PROJECT MANUAL

OGDEN CITY - REGIONAL AIRPORT
Hinckley Front Terminal Expansion

3909 AIRPORT ROAD
OGDEN, UTAH
01 JULY 2024

SAA
SANDERS ASSOCIATES ARCHITECTS

PROJECT DIRECTORY

OWNER

OGDEN CITY
Regional Airport - Hinckley Terminal Expansion
3909 Airport Road
Ogden, Utah
Contact: Lynn Hinrichs, Project Manager

ARCHITECTURAL

SANDERS ASSOCIATES ARCHITECTS
2668 Grant Ave. Suite 100
Ogden, Utah 84401
Telephone: 801.621.7303
Contact: Shane Sanders, AIA, NCARB

STRUCTURAL

VECTOR ENGINEERS
P.O. Box 160204
Clearfield, Utah 84016
Telephone: 801.927.2054
Contact: David Fotheringham, SE

MECHANICAL

CUNNING AND ASSOCIATES
4685 W. 11600 N.
Tremonton, Utah 84337
Telephone: 801.726.5047
Contact: Norm Cunning, PE

ELECTRICAL

BNA CONSULTING
635 South State Street
Salt Lake City, Utah 84111
Telephone: 801.532.2196
Contact: Josh Oakeson, PE, RCDD

CIVIL

ANDERSON WAHLEN & ASSOCIATES
2010 N. Redwood Road
Salt Lake City, Utah 84116
Telephone: 801.521.8529
Contact: Shaun Young, PE

LANDSCAPING

ANDERSON WAHLEN & ASSOCIATES
2010 N. Redwood Road
Salt Lake City, Utah 84116
Telephone: 801.521.8529
Contact: Jared Manscill, RLA

AVIATION

MEAD & HUNT
Denver, Colorado 80204
Telephone: 303.275.8030
Contact: Jeremy Lee, PE

OGDEN CITY REGIONAL AIRPORT - FRONT HINCKLEY TERMINAL EXPANSION

COVER SHEET
PROJECT DIRECTORY
TABLE OF CONTENTS

DIVISION 0 - CONTRACT REQUIREMENTS:
002113 INSTRUCTIONS TO BIDDERS
GENERAL CONDITIONS AIA A201-2017
APPLICATION FOR PAYMENT (SAMPLE)
CERTIFICATE OF SUBSTANTIAL COMPLETION (SAMPLE)
SUBSTITUTION REQUEST (SAMPLE)
FEDERAL LABOR STANDARDS
FAA REQUIRED FEDERAL CONTRACT PROVISIONS
GENERAL CONTRACT PROVISIONS - SECTION 80 - EXECUTION & PROGRESS
CONSTRUCTION SAFETY AND PHASING PLAN
GEOTECHNICAL REPORT - 2012 TERMINAL EXPANSION
CMT LETTER
CONSTRUCTION AGREEMENT (SAMPLE)

DIVISION 1 - GENERAL REQUIREMENTS:
011000 SUMMARY
012300 ALTERNATES
012302 CONTRACTOR MARK UP LIMITS
012500 SUBSTITUTION PROCEDURES
012600 CONTRACT MODIFICATION PROCEDURES
012900 PAYMENT PROCEDURES
013100 PROJECT MANAGEMENT & COORDINATION
013200 CONSTRUCTION PROGRESS DOCUMENTATION
013300 SUBMITTAL PROCEDURES
014000 QUALITY REQUIREMENTS
014200 REFERENCES
015000 TEMPORARY FACILITIES & CONTROLS
016000 PRODUCT REQUIREMENTS
016001 BUY AMERICAN PREFERENCE REQUIREMENTS (AIP)
017300 EXECUTION
017419 CONSTRUCTION WASTE MANAGEMENT & DISPOSAL
017700 CLOSEOUT PROCEDURES
017823 OPERATION & MAINTENANCE DATA
017839 PROJECT RECORD DOCUMENTS
017900 DEMONSTRATION AND TRAINING

DIVISION 2 - EXISTING CONDITIONS:
021500 SHORING & BRACING
024113 SELECTIVE SITE DEMOLITION
024119 SELECTIVE DEMOLITION

DIVISION 3 - CONCRETE:
030500 COMMON WORK RESULTS FOR CONCRETE
033000 CAST-IN-PLACE CONCRETE
033300 ARCHITECTURAL CONCRETE
033543 POLISHING CONCRETE FINISHING

DIVISION 4 - MASONRY:
042200 CONCRETE UNIT MASONRY
042613 MASONRY VENEER

DIVISION 5 - METALS:
051200 STRUCTURAL STEEL FRAMING
053100 STEEL DECKING
054000 COLD FORMED METAL FRAMING
055000 METAL FABRICATIONS

DIVISION 6 - WOODS, PLASTICS, AND COMPOSITES:
061000 ROUGH CARPENTRY
061050 MISCELLANEOUS CARPENTRY
061600 SHEATHING

TABLE OF CONTENTS

SAA
SANDERS ASSOCIATES ARCHITECTS

061601 GYPSUM PANEL SHEATHING
062023 INTERIOR FINISH CARPENTRY
064023 INTERIOR ARCHITECTURAL WOODWORK

DIVISION 7 - THERMAL AND MOISTURE PROTECTION:
072100 BUILDING INSULATION
072413 POLYMER-BASED EXTERIOR INSULATION AND FINISH SYSTEM
072726 FLUID-APPLIED MEMBRANE AIR BARRIERS
074213 COMPOSITE METAL WALL SYSTEMS
075423 POLYVINYL-CHLORIDE (PVC) ROOFING
076200 SHEET METAL FLASHING AND TRIM
077100 ROOF SPECIALTIES
078400 THROUGH PENETRATION FIRESTOP SYSTEMS
079100 PREFORMED JOINT SEALS
079200 JOINT SEALANTS
079513.13 INTERIOR EXPANSION JOINT COVER ASSEMBLIES

DIVISION 8 - OPENINGS:
081113 HOLLOW METAL DOORS & FRAMES
081416 FLUSH WOOD DOORS
08229.23 SLIDING AUTOMATIC ENTRANCES
083313 COILING COUNTER DOORS
083613 SECTIONAL DOORS
084113 ALUMINUM - FRAMED STOREFRONTS
087100 DOOR HARDWARE
088000 GLAZING

DIVISION 9 - FINISHES:
092200 NON-LOAD-BEARING STEEL FRAMING
092900 GYPSUM BOARD ASSEMBLIES
093000 TILING
095113 ACOUSTICAL PANEL CEILINGS
096513 RESILIENT BASE & ACCESSORIES
096813 TILE CARPETING
097200 WALL COVERINGS
099113 EXTERIOR PAINTING
099123 INTERIOR PAINTING

DIVISION 10 - SPECIALTIES:
101400 SIGNS
101419 DIMENSIONAL LETTER SIGNAGE
102600 WALL PROTECTION
102800 TOILET ACCESSORIES
104413 FIRE PROTECTION SPECIALTIES

DIVISION 21 - FIRE SUPPRESSION
213000 FIRE SPRINKLER SYSTEM

DIVISION 22 - PLUMBING
221000 VALVES
224100 WATER DISTRIBUTION PIPING EQUIPMENT
224200 DRAINAGE AND VENT SYSTEMS AND EQUIPMENT
224850 NATURAL GAS PIPING

DIVISION 23 - HEATING VENTILATING AND AIR CONDITIONING
230000 GENERAL MECHANICAL REQUIREMENTS
230005 DEMOLITION
230600 GENERAL PIPES AND FITTINGS
231400 MECHANICAL SUPPORTING DEVICES
231700 MOTORS, DRIVES AND ELECTRICAL REQUIREMENTS
232500 MECHANICAL INSULATION
236200 FUEL FIRED HEATERS
236500 REFRIGERATION PIPING AND EQUIPMENT
238850 AIR FILTERS
238900 DUCTWORK

TABLE OF CONTENTS

SAA
SANDERS ASSOCIATES ARCHITECTS

239100 DUCTWORK ACCESSORIES
239400 AIR OUTLETS AND INLETS
239550 MECHANICAL CONTROL SYSTEMS
239950 SYSTEM COMMISSIONING, TESTING AND BALANCING

DIVISION 26 - ELECTRICAL
260500 ELECTRICAL GENERAL PROVISIONS
260502 ELECTRICAL SUBMITTALS AND SPARE PARTS
260507 ELECTRICAL CONNECTIONS FOR EQUIPMENT
260519 CONDUCTORS AND CABLES (600V AND BELOW)
260526 GROUNDING
260529 SUPPORTING DEVICES
260532 CONDUIT RACEWAYS
260533 ELECTRICAL BOXES AND FITTINGS
260548 ELECTRICAL SEISMIC CONTROL
260553 ELECTRICAL IDENTIFICATION
260573 PROTECTIVE DEVICE STUDY
260923 OCCUPANCY SENSORS
260943 LIGHTING CONTROL EQUIPMENT
262413 SWITCHGEAR AND SWITCHBOARDS
262416 PANELBOARDS
262713 SERVICE ENTRANCE
262726 WIRING DEVICES
262815 OVERCURRENT PROTECTIVE DEVICES
262816 MOTOR AND CURCUIT DISCONNECTS
262913 MOTOR STARTERS
263213 EMERGENCY ELECTRICAL SYSTEMS
264313 SURGE PROTECTIVE DEVICES (SPD)
265100 INTERIOR AND EXTERIOR BUILDING LIGHTING
265600 EXTERIOR AREA LIGHTING

DIVISION 27 - COMMUNICATIONS
271500 TELEPHONE/DATA SYSTEMS

DIVISION 28 - ELECTRONIC SAFETY AND SECURITY
283111 FIRE ALARM AND DETECTION SYSTEM

DIVISION 31 - EARTHWORK
311000 SITE CLEARING
312000 EARTH MOVING

DIVISION 32 - EXTERIOR IMPROVEMENTS
321216 ASPHALT PAVING
321313 CONCRETE PAVING
321373 PAVING JOINT SEALANTS
321700 PAVING SPECIALTIES
323119 DECORATIVE METAL FENCES AND GATES
328400 IRRIGATION
329000 PLANTING

DIVISION 33 - UTILITIES
331100 WATER UTILITY DISTRIBUTION PIPING
333100 SANITARY UTILITY SEWERAGE PIPING
334100 STORM UTILITY DRAINAGE PIPING

TABLE OF CONTENTS

SAA
SANDERS ASSOCIATES ARCHITECTS

002113 INSTRUCTIONS TO BIDDERS
GENERAL CONDITIONS AIA A201-2017
APPLICATION FOR PAYMENT (SAMPLE)
CERTIFICATE OF SUBSTANTIAL COMPLETION (SAMPLE)
SUBSTITUTION REQUEST (SAMPLE)
FEDERAL LABOR STANDARDS
FAA REQUIRED FEDERAL CONTRACT PROVISIONS
GENERAL CONTRACT PROVISIONS - SECTION 80 - EXECUTION & PROGRESS
CONSTRUCTION SAFETY AND PHASING PLAN
GEOTECHNICAL REPORT - 2012 TERMINAL EXPANSION
CMT LETTER
CONSTRUCTION AGREEMENT (SAMPLE)

CONTRACT REQUIREMENTS

division 0

SAA
SANDERS ASSOCIATES ARCHITECTS

DOCUMENT 002113 - INSTRUCTIONS TO BIDDERS

1.1 INSTRUCTIONS TO BIDDERS

A. Ogden City Corporation, "Instruction to Bid," is hereby incorporated into the Procurement and Contracting Requirements by reference.

1. A copy of Ogden City Corporation, "Instruction to Bid," will be submitted to each General Contractor that is Bidding this Project.

B. Additional Bid requirements is indicated in Attachment “A.”

C. The “Non-Collusion Declaration” is indicated in Attachment “B.”

D. A Sample “Bid Bond” is indicated in Attachment “C.”

E. The “Statement of Bidder’s Qualifications” is indicated in Attachment “D”.

F. A Sample “Subcontractor List;” is indicated in Attachment “E.”

G. The “Equal Employment Opportunity Report Statement” is indicated in Attachment “F.

H. The “Non-Trafficking Certification” is indicated in Attachment “G.”

I. The “Certificate of Offerer/Bidder Regarding Tax Delinquency and Felony Convictions” is indicated in Attachment “H.”

J. The “Letter of Intent – Disadvantage Business Enterprise” is indicated in Attachment “I.”

K. The “Immigration Reform Act Certification” is indicated in Attachment “J.”

L. A Subcontractor/Material Supplier List is indicated in Attachment “K.”

M. Title 49 CFR Part 26: “Participation by Disadvantaged Business Enterprises in Department of Transportation Financial Assistance Programs.”

1. The requirements of 49 CFR part 26 apply to this contract. It is the policy of the Ogden City Corporation to practice nondiscrimination based on race, color, sex or national origin in the award or performance of this contract. The Owner encourages participation by all firms qualifying under this solicitation regardless of business size or ownership. The DBE goal for this project is 0.00% Race Conscious and 3.65% Race Neutral.

2. Goals for minority / female participation: The goals and timetables for minority and female participation, expressed in percentage terms for the contractor's aggregate workforce in each trade on all construction work in the covered area, are as follows:

Timetables:
a. Goals for minority participation for each trade: 6.0%
b. Goals for female participation in each trade: 6.9%

END OF DOCUMENT 002113

(ATTACHMENT 'A')

THE UNDERSIGNED ALSO DECLARES AND AGREES AS FOLLOWS:

1. The undersigned acknowledges that the FAA does not permit escalation clauses for increases in fuel, asphalt, or other construction costs. Bids shall be adjusted accordingly to account for possible material and labor cost increases over the life of the project.

2. It is understood that the schedule of minimum wage rates, as established by the Secretary of Labor and included in the Specifications, are to govern on this project, and the undersigned certifies that s/he has examined this schedule of wage rates and that the prices bid are based on such established wage rates.

3. The undersigned acknowledges the requirements of 49 CFR part 26 apply to this contract. It is the policy of the Ogden City Corporation to practice nondiscrimination based on race, color, sex or national origin in the award or performance of this contract. The Owner encourages participation by all firms qualifying under this solicitation regardless of business size or ownership.

4. The undersigned agree upon written notice of the acceptance of this bid, that within 15 days after the award, that s/he will execute the contract in accordance with the bid as accepted and give contract (Performance and Payment) bond on attached forms within 10 days after the prescribed forms are presented for signature.

5. The undersigned further agrees that if awarded the contract, s/he will commence the work within 10 calendar days after the receipt of a notice to proceed and that s/he will complete the work for the bid schedules within the allowed construction time identified under Section 80-08. An extension of time may be allowed when extra or additional work is ordered by the engineer. Liquidated damages shall be in accordance with Section 80-08. Further, each schedule of work under the project has additional liquidated damage clauses, as outlined in Section 80-08 FAILURE TO COMPLETE ON TIME.

6. As an evidence of good faith in submitting this bid, the undersigned encloses a bid guarantee in the amount of 5% of the TOTAL BID (including all schedules and sales tax) which, in case the undersigned refuses or fails to accept an award and to enter into a contract and file the required bonds within the prescribed time, shall be forfeited to the Ogden City Corporation, Ogden, Utah, as liquidated damages.

7. By entering into this contract, the Contractor certifies that neither it (nor s/he) nor any person or firm who has an interest in the Contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

8. No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

9. The undersigned hereby declares that the only parties interested in this bid are named herein, that this bid is made without collusion with any other person, or corporation. That no member of the council, officer or agent of Ogden City Corporation, is directly or indirectly financially interested in this bid.

10. The undersigned acknowledges receipt of the following Addendums:

Addendum No. _____ Date Received_____

Addendum No. _____ Date Received_____

Addendum No. _____ Date Received_____

(ATTACHMENT 'B')

NON-COLLUSION DECLARATION

I, by signing the bid, hereby declare, under penalty of perjury under the laws of the United States that the following statements are true and correct:

1. That the undersigned person(s), firm, association or corporation has (have) not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with the project for which this bid is submitted.
2. That by signing the signature page of this bid, I am deemed to have signed and to have agreed to the provisions of this declaration.

NOTICE TO ALL BIDDERS

To report rigging activities call: **1-800-424-9071**

The U.S. Department of Transportation (USDOT) operates the above toll-free "hotline" Monday through Friday, 8:00 a.m. to 5:00 p.m., Eastern Time. Anyone with knowledge of possible bid rigging, bidder collusion, or other fraudulent activities should use the "hotline" to report such activities.

The "hotline" is part of USDOT's continuing effort to identify and investigate highway construction contract fraud and abuse and is operated under the direction of the USDOT Inspector General. All information will be treated confidentially and caller anonymity will be respected.

CERTIFICATION OF OFFERER/BIDDER REGARDING DEBARMENT

By submitting a bid under this solicitation, the bidder or offeror certifies that neither it nor its principals are presently debarred or suspended by any Federal department or agency from participation in this transaction.

CERTIFICATION OF LOWER TIER CONTRACTORS REGARDING DEBARMENT

The successful bidder, by administering each lower tier subcontract that exceeds $25,000 as a "covered transaction", must confirm each lower tier participant of a "covered transaction" under the project is not presently debarred or otherwise disqualified from participation in this federally-assisted project. The successful bidder will accomplish this by:

1. Checking the System for Award Management at website: http://www.sam.gov
2. Collecting a certification statement similar to the Certification of Offeror /Bidder Regarding Debarment, above.
3. Inserting a clause or condition in the covered transaction with the lower tier contract

If the Federal Aviation Administration later determines that a lower tier participant failed to disclose to a higher tier participant that it was excluded or disqualified at the time it entered the covered transaction, the FAA may pursue any available remedies, including suspension and debarment of the non-compliant participant.

CERTIFICATION REGARDING LOBBYING

The Bidder or Offeror certifies by signing and submitting this bid, to the best of his or her knowledge and belief, that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the Bidder or Offeror, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all sub-awards at all tiers (including subcontracts, sub-grants, and contracts under grants, loans, and cooperative agreements) and that all sub-recipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

TRADE RESTRICTION CERTIFICATION

By submission of an offer, the Offeror certifies that with respect to this solicitation and any resultant contract, the Offeror -

1. is not owned or controlled by one or more citizens of a foreign country included in the list of countries that discriminate against U.S. firms as published by the Office of the United States Trade Representative (USTR);

2. has not knowingly entered into any contract or subcontract for this project with a person that is a citizen or national of a foreign country included on the list of countries that discriminate against U.S. firms as published by the USTR; and

3. has not entered into any subcontract for any product to be used on the Federal on the project that is produced in a foreign country included on the list of countries that discriminate against U.S. firms published by the USTR.

This certification concerns a matter within the jurisdiction of an agency of the United States of America and the making of a false, fictitious, or fraudulent certification may render the maker subject to prosecution under Title 18, USC, Section 1001.

The Offeror/Contractor must provide immediate written notice to the Owner if the Offeror/Contractor learns that its certification or that of a subcontractor was erroneous when submitted or has become erroneous by reason of changed circumstances. The Contractor must require subcontractors provide immediate written notice to the Contractor if at any time it learns that its certification was erroneous by reason of changed circumstances.

Unless the restrictions of this clause are waived by the Secretary of Transportation in accordance with 49 CFR 30.17, no contract shall be awarded to an Offeror or subcontractor:

(1) who is owned or controlled by one or more citizens or nationals of a foreign country included on the list of countries that discriminate against U.S. firms published by the USTR; or
(2) whose subcontractors are owned or controlled by one or more citizens or nationals of a foreign country on such USTR list; or
(3) who incorporates in the public works project any product of a foreign country on such U.S.T.R. list;

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

The Offeror agrees that, if awarded a contract resulting from this solicitation, it will incorporate this provision for certification without modification in all lower tier subcontracts. The Contractor may rely on the certification of a prospective subcontractor that it is not a firm from a foreign country included on the list of countries that discriminate against U.S. firms as published by USTR, unless the Offeror has knowledge that the certification is erroneous.

This certification is a material representation of fact upon which reliance was placed when making an award. If it is later determined that the Contractor or subcontractor knowingly rendered an erroneous certification, the Federal Aviation Administration may direct through the Owner cancellation of the contract or subcontract for default at no cost to the Owner or the Federal Aviation Administration.

SIGNATURE OF BIDDER:

(Seal if Bid is By Corporation)

SUBMITTED ON (DATE) _____

BIDDERS SIGNATURE _____

TYPED NAME AND TITLE _____

COMPANY NAME _____
MAILING ADDRESS _____

TELEPHONE _____

Intentionally Left Blank

(ATTACHMENT 'C')

BID BOND (SAMPLE)

KNOW ALL MEN BY THESE PRESENTS, that _____ _____ as Principal, hereinafter called Contractor, and _____, licensed to do business as such in the State of Utah, as Surety, hereby bind themselves and their respective heirs, executors, administrators, successors, and assigns, unto Ogden City Corporation, Ogden, Utah, as Obligee, in the penal sum of _____ Dollars ($_____) for the payment whereof Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, by these presents.

WHEREAS,
The Contractor has submitted to the Obligee, a contract bid dated the _____ day of _____ for the following contract:

_____
_____
_____

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that, if the Contractor bid is accepted by the Obligee and the Contractor is awarded the contract in whole or in part, the Contractor shall enter into the Contract with the Obligee in accordance with the terms of such bid, give such Payment and Performance Bonds as may be specified in the Contract Documents with good and sufficient surety for the faithful performance of such Contract and for the prompt payment of labor and materials furnished in the prosecution thereof, or in the event of failure of the Contractor to enter such Contract and give such bond or bonds, if the Contractor shall promptly pay the Obligee the amount of this bond as set forth herein above, then the obligation shall be null and void, otherwise this obligation will remain in full force and effect.

IN WITNESS WHEREOF, the above parties have executed this instrument, the _____ day of _____, 20___.

SIGNATURE OF PRINCIPAL (as applicable)

A. Individual, partnership or joint venture _____
(Signature of sole proprietor or general partner)

B. Corporation _____
Name of Corporate Principal

Attest: _____ By _____
Secretary (affix seal)

SIGNATURE OF SURETY Name and address of Corporate Surety

_____

_____

By _____ (seal)
Attorney in Fact (attach power of attorney)

ACCEPTANCE BY

The foregoing bond is approved.

Date _____ By _____

The foregoing bond is in due form according to law and is approved.

Date _____ By _____

(ATTACHMENT 'D')

STATEMENT OF BIDDER'S QUALIFICATIONS

All questions must be answered and the data given must be clear and comprehensive. This statement must be notarized. If necessary, questions may be answered on separate attached sheets. The Bidder may submit any additional information he desires.

1. Name of Bidder and office where project will be administered:

2. Provide evidence of financial responsibility consisting of a confidential statement or report of Contractor's financial resources and liabilities as of the last calendar year or last fiscal year. Such statement or report shall be certified by a public accountant. Unless otherwise specified, a bidder may submit evidence that he or she is prequalified with the State Highway Division and is on the current "bidder's list" of the state in which the proposed work is located. Such evidence of State Highway Division prequalification may be submitted as evidence of financial responsibility in lieu of the certified statements or reports specified above.

3. List two or more construction projects similar in size and scope to this project that your company has completed within the past 3 years. Provide the following:

   a. Project Name: _____
   b. Owner Name: _____
   c. Owner Contact: _____
   d. Beginning Contract Amount: _____
   e. Total Cost of Change Orders: _____
   f. Project Duration: _____
   g. Total Time Extensions: _____
   h. Project Superintendent: _____

   a. Project Name: _____
   b. Owner Name: _____
   c. Owner Contact: _____
   d. Beginning Contract Amount: _____
   e. Total Cost of Change Orders: _____
   f. Project Duration: _____
   g. Total Time Extensions: _____
   h. Project Superintendent: _____

a. Project Name: _____
b. Owner Name: _____
c. Owner Contact: _____
d. Beginning Contract Amount: _____
e. Total Cost of Change Orders: _____
f. Project Duration: _____
g. Total Time Extensions: _____
h. Project Superintendent: _____

Note: All contact information shall be verified by the Contractor to be current and correct. This Information shall include: the Owner's name, address, phone number, the Owner's representative, who has working knowledge of the project, their name and phone number.

4. List any projects involving your company that have involved litigation, threatened litigation, or negotiated settlements due to quality of work, contract time or other noncompliance with plans and specifications.

5. Provide on a separate piece of paper the background and experience of the principal members of your organization, including as a minimum the following staff to be assigned to the Project: Full-time project manager, full-time superintendent(s), full-time quality control manager, CECSL, etc., including status of availability and percent availability of staff as of May 2022.

6. Type of Business Entity: _____
NOTE: If bidder is **partnership** or **joint venture**, give full names of all partners or joint ventures. Bid must be signed by all Joint Ventures. If bidder is a **limited liability company**, bid must be signed by an authorized manager (may be signed by member-manager if LLC is organized to allow management by members).

7. Address of Contractor: _____
_____
_____

8. Telephone: _____ Fax: _____
E-mail: _____

9. Established where and when: _____ _____

10. Contractor's Banking Information: _____
_____
_____

11. Principal Officers of Contractor (managers and members if LLC):

Name: _____ Name: _____

Title: _____ Title: _____

Name: _____ Name: _____

Title: _____ Title: _____

Name: _____ Name: _____

Title: _____ Title: _____

12. Bidder's/Contractor's state of incorporation (state of organization if an LLC or Partnership):

_____

13. Bidder's Surety: _____

14. Surety's State of Incorporation: _____

15. Name and Address of person to receive payment _____

_____

_____

16. If the Bidder/Contractor is a Joint Venture, it shall attach a certified copy of the Joint Venture Agreement. The Joint Venture Agreement will not be included as part of the Contract Documents.

17. The Bidder/Contractor shall identify all applicable labor agreements (if any) to be used in the performance of the work:

_____

_____

_____

The undersigned, as a duly authorized representative of the Contractor, certifies that the information provided in this Prequalification Form is accurate as reported.

The undersigned hereby authorizes and requests any person, firm, or corporation to furnish any information requested by the Owner in verification of the recitals comprising this Statement.

Dated at this day of _____.

(Name of Bidder) _____

By: _____

Title: _____

State of)
) ss.
County of)

_____ being duly sworn deposes and says that he is _____ of _____ (Name of Organization) and that the answers to the foregoing questions and all statements therein contained are true and correct.

Subscribed and sworn to before me this day of _____.

(Notary Public) _____

State of _____

My Commission Expires _____

(ATTACHMENT 'E')

SUBCONTRACTOR LIST

For every invitation to bid that is expected to cost one million dollars or more for the construction, alteration, or repair of any public building or public work, the Bidder shall list as part of its bid in the space provided below either itself or the names of the subcontractors with whom the Bidder, if awarded the contract, will subcontract for performance of the work of: HVAC (heating, ventilation, and air conditioning); plumbing. The Bidder shall ensure that two or more subcontractors are not performing the same scope of work.

The Ogden City Corporation estimates this major construction project may cost one million dollars or more; therefore, Bidders are required to complete and submit this form with their bid.

If no subcontractor is listed below, the bidder acknowledges that it does not intend to use any subcontractor to perform those items of work.

Subcontractor	Portion of Work	Address
Subcontractor	Portion of Work	Address
Subcontractor	Portion of Work	Address
Subcontractor	Portion of Work	Address
Subcontractor	Portion of Work	Address
Subcontractor	Portion of Work	Address

Bidders are notified that in the opinion of the enforcement agency PVC or metal conduit junction boxes, etc. are considered electrical equipment and must be installed by a licensed electrical contractor, even if the installation is for future use and no wiring or electric current is connected during the project. A licensed electrical contractor must be listed to perform the work.

Intentionally Left Blank

(ATTACHMENT 'F')

EQUAL EMPLOYMENT OPPORTUNITY REPORT STATEMENT

Each bidder shall complete and sign the Equal Employment Opportunity Report Statement. A bid may be considered unresponsive and may be rejected, in the Owner's sole discretion, if the bidder fails to provide the fully executed statement or fails to furnish the required data. The bidder shall also, prior to award, furnish such other pertinent information regarding its own employment policies and practices as well as those of its proposed subcontractors as the FAA, the Owner, or the Executive Vice Chairman of the President's Committee may require.

The bidder shall furnish similar statements executed by each of its first-tier and second-tier subcontractors and shall obtain similar compliance by each subcontractor, before awarding subcontracts. No subcontract shall be awarded to any non-complying subcontractor.

EQUAL EMPLOYMENT OPPORTUNITY REPORT STATEMENT

As Required in 41 CFR 60-1.7(b)

The bidder shall complete the following statements by checking the appropriate blanks. Failure to complete these blanks may be grounds for rejection of the bid:

1. The Bidder has ___ has not ___ developed and has on file at each establishment affirmative action programs pursuant to 41 CFR 60-1.40 and 41 CFR 60-2.

2. The Bidder has ___ has not ___ participated in any previous contract or subcontract subject to the equal opportunity clause prescribed by Executive order 11246, as amended.

3. The Bidder has ___ has not ___ filed with the Joint Reporting Committee the annual compliance report on Standard Form 100 (EEO-1 Report).

4. The Bidder Does ___ does not ___ employ fifty or more employees.

Date	Signature of Authorized Agent
Company Name	Printed Name of Authorized Agent

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(ATTACHMENT 'G')

NON-TRAFFICKING CERTIFICATION

Trafficking in persons:

1) **Provisions applicable to a recipient that is a private entity.**
   a) You as the recipient, your employees, subrecipients under this award, and subrecipients' employees may not –
      i) Engage in severe forms of trafficking in persons during the period of time that the award is in effect;
      ii) Procure a commercial sex act during the period of time that the award is in effect; or
      iii) Use forced labor in the performance of the award of subawards under the award.

Certification:

I, _____, being _____(title) of _____, hereby certify that the information as stated above is true and complete to the best of my knowledge and belief and the above mentioned statement will be provided in writing to all subcontractors hired for the above mentioned job.

_____ _____

Signature Date

_____

Name and Title

_____

Contractor

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(ATTACHMENT 'H')

CERTIFICATION OF OFFERER/BIDDER REGARDING TAX DELINQUENCY AND FELONY CONVICTIONS

(Reference: Sections 415 and 416 of Title IV, Division L of the Consolidated Appropriations Act, 2014 (Pub. L. 113-76), and similar provisions in subsequent appropriations acts.)

(Reference: DOT Order 4200.6 - Requirements for Procurement and Non-Procurement Regarding Tax Delinquency and Felony Convictions)

The bidder must complete the following two certification statements. The bidder must indicate its current status as it relates to tax delinquency and felony conviction by inserting a checkmark (✓) in the space following the applicable response. The bidder agrees that, if awarded a contract resulting from this solicitation, it will incorporate this provision for certification in all lower tier subcontracts.

Certifications

1) The bidder represents that it is ___ is not ___ a corporation that has any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability.

2) The bidder represents that it is ___ is not ___ a corporation that was convicted of a criminal violation under any Federal law within the preceding 24 months.

If the bidder responds in the affirmative to either of the above representations, the bidder is ineligible to receive an award unless the sponsor has received notification from the agency suspension and debarment official (SDO) that the SDO has considered suspension or debarment and determined that further action is not required to protect the Government's interests. The bidder therefore must provide information to the owner about its tax liability or conviction to the Owner, who will then notify the FAA Airports District Office, which will then notify the agency's SDO to facilitate completion of the required considerations before award decisions are made.

Term Definitions

Felony conviction: Felony conviction means a conviction within the preceding twenty-four (24) months of a felony criminal violation under any Federal law and includes conviction of an offense defined in a section of the U.S. code that specifically classifies the offense as a felony and conviction of an offense that is classified as a felony under 18 U.S.C. § 3559.

Tax Delinquency: A tax delinquency is any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted, or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability.

Date	Signature of Authorized Agent
Company Name	Printed Name of Authorized Agent

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(ATTACHMENT 'I')
LETTER OF INTENT
Disadvantage Business Enterprise

(This page shall be submitted for each DBE firm)

Bidder/Offer Name: _____

Address: _____

City:_____ State:_____ Zip: _____

DBE Firm: DBE Firm: _____

Address: _____

City: _____State: _____Zip: _____

DBE Contact Person: Name: _Phone: (___)_____

DBE Certifying Agency: Expiration _____Date: _____

Each DBE Firm shall submit evidence (such as a photocopy) of their certification status.

Classification: □ Prime Contractor □ Subcontractor □ Joint Venture
□ Manufacturer □ Supplier

Work item(s) to be performed by DBE	**Description of Work Item**	**Quantity**	**Total**

The bidder/offeror is committed to utilizing the above-named DBE firm for the work described above. The estimated participation is as follows:

DBE contract amount: $_____ Percent of total contract: _____%

AFFIRMATION:

The above-named DBE firm affirms that it will perform the portion of the contract for the estimated dollar value as stated above.

By: _____

(Prime Bidder Signature) *(Title)*

* In the event the bidder/offeror does not receive award of the prime contract, any and all representations in this Letter of Intent and Affirmation shall be null and void.

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(ATTACHMENT 'J')

IMMIGRATION REFORM ACT CERTIFICATION

CRS §8-17.5-101 (Not applicable to agreements relating to the offer, issuance, or sale of securities, investment advisory services or fund management services, sponsored projects, intergovernmental agreements, or information technology services or products and services).

Grantee certifies, warrants, and agrees that it does not knowingly employ or contract with an illegal alien who will perform work under this Grant and will confirm the employment eligibility of all employees who are newly hired for employment in the United States to perform work under this Grant, through participation in the E-Verify Program or the State program established pursuant to CRS §8-17.5-1 02(5)(c), Grantee shall not knowingly employ or contract with an illegal alien to perform work under this Grant or enter into a grant with a Subgrantee that fails to certify to Grantee that the Subgrantee shall not knowingly employ or contract with an illegal alien to perform work under this Grant. Grantee

(a) shall not use E-Verify Program or State program procedures to undertake ~ pre-employment screening of job applicants while this Grant is being performed,

(b) shall notify the Subgrantee and the granting State agency within three days if Grantee has actual knowledge that a Subgrantee is employing or contracting with an illegal alien for work under this Grant,

(c) shall terminate the subgrant if a Subgrantee does not stop employing or contracting with the illegal alien within three days of receiving the notice, and

(d) shall comply with reasonable requests made in the course of an investigation, undertaken pursuant to CRS §8-17 .5-1 02(5), by the Colorado Department of Labor and Employment.

If Grantee participates in the State program, Grantee shall deliver to the granting State agency, Institution of Higher Education or political subdivision, a written, notarized affirmation, affirming that Grantee has examined the legal work status of such employee, and shall comply with all of the other requirements of the State program. If Grantee fails to comply with any requirement of this provision or CRS §8-17.5-1 01 et seq., the granting State agency, institution of higher education or political subdivision may terminate this Grant for breach and, if so terminated, Grantee shall be liable for damages.

Date: _____

_____
Company

_____
Authorized Agent (print)

_____
Signature of Authorized Agent

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(ATTACHMENT 'K')

SUBCONTRACTOR/MATERIAL SUPPLIER LIST

The Bidder shall provide information on all subcontractors/material suppliers bidding or quoting on subcontracts for this project. Bidders are required to complete and submit this form with their bid. If no subcontractor is listed below, the bidder acknowledges that it does not intend to use any subcontractor to perform those items of work.

AIP Project No.	Project Name	Name of Firm	Subconsultant / Address	Type of Work to be Performed on Contract	Certified DBE Yes	Certified DBE No	Type of DBE	Bid Amount	*GRS

Attach additional pages, as necessary.

***GRS - Annual Gross Receipts**

Enter 1 for less than $1 million

Enter 2 for more than $1 million but less than $5 million

Enter 3 for more than $5 million but less than $10 million

Enter 4 for more than $10 million but less than $15 million

Enter 5 for more than $15 million

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General Conditions of the Contract for Construction

for the following PROJECT:
(Name and location or address)

Ogden City Regional Airport - Hinckley Terminal Expansion
3909 Airport Road
Ogden, Utah

THE OWNER:
(Name, legal status and address)

Ogden City Corporation
2549 Washington Blvd.
Ogden, Utah

THE ARCHITECT:
(Name, legal status and address)

Sanders Associates Architects
2668 Grant Avenue
Ogden, Utah

TABLE OF ARTICLES

1 GENERAL PROVISIONS

2 OWNER

3 CONTRACTOR

4 ARCHITECT

5 SUBCONTRACTORS

6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

7 CHANGES IN THE WORK

8 TIME

9 PAYMENTS AND COMPLETION

10 PROTECTION OF PERSONS AND PROPERTY

11 INSURANCE AND BONDS

12 UNCOVERING AND CORRECTION OF WORK

13 MISCELLANEOUS PROVISIONS

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

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

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

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14 TERMINATION OR SUSPENSION OF THE CONTRACT

15 CLAIMS AND DISPUTES

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INDEX
(Topics and numbers in bold are Section headings.)

Acceptance of Nonconforming Work
9.6.6, 9.9.3, **12.3**
Acceptance of Work
9.6.6, 9.8.2, 9.9.3, 9.10.1, 9.10.3, 12.3
Access to Work
3.16, 6.2.1, 12.1
Accident Prevention
10
Acts and Omissions
3.2, 3.3.2, 3.12.8, 3.18, 4.2.3, 8.3.1, 9.5.1, 10.2.5, 10.2.8, 13.3.2, 14.1, 15.1.2, 15.2
Addenda
1.1.1
Additional Costs, Claims for
3.7.4, 3.7.5, 10.3.2, 15.1.5
Additional Inspections and Testing
9.4.2, 9.8.3, 12.2.1, **13.4**
Additional Time, Claims for
3.2.4, 3.7.4, 3.7.5, 3.10.2, 8.3.2, **15.1.6**
Administration of the Contract
3.1.3, **4.2**, 9.4, 9.5
Advertisement or Invitation to Bid
1.1.1
Aesthetic Effect
4.2.13
Allowances
3.8
Applications for Payment
4.2.5, 7.3.9, 9.2, **9.3**, 9.4, 9.5.1, 9.5.4, 9.6.3, 9.7, 9.10
Approvals
2.1.1, 2.3.1, 2.5, 3.1.3, 3.10.2, 3.12.8, 3.12.9, 3.12.10.1, 4.2.7, 9.3.2, 13.4.1
Arbitration
8.3.1, 15.3.2, **15.4**
ARCHITECT
4
Architect, Definition of
4.1.1
Architect, Extent of Authority
2.5, 3.12.7, 4.1.2, 4.2, 5.2, 6.3, 7.1.2, 7.3.4, 7.4, 9.2, 9.3.1, 9.4, 9.5, 9.6.3, 9.8, 9.10.1, 9.10.3, 12.1, 12.2.1, 13.4.1, 13.4.2, 14.2.2, 14.2.4, 15.1.4, 15.2.1
Architect, Limitations of Authority and Responsibility
2.1.1, 3.12.4, 3.12.8, 3.12.10, 4.1.2, 4.2.1, 4.2.2, 4.2.3, 4.2.6, 4.2.7, 4.2.10, 4.2.12, 4.2.13, 5.2.1, 7.4, 9.4.2, 9.5.4, 9.6.4, 15.1.4, 15.2
Architect's Additional Services and Expenses
2.5, 12.2.1, 13.4.2, 13.4.3, 14.2.4
Architect's Administration of the Contract
3.1.3, 3.7.4, 15.2, 9.4.1, 9.5
Architect's Approvals
2.5, 3.1.3, 3.5, 3.10.2, 4.2.7
Architect's Authority to Reject Work
3.5, 4.2.6, 12.1.2, 12.2.1
Architect's Copyright
1.1.7, 1.5
Architect's Decisions
3.7.4, 4.2.6, 4.2.7, 4.2.11, 4.2.12, 4.2.13, 4.2.14, 6.3, 7.3.4, 7.3.9, 8.1.3, 8.3.1, 9.2, 9.4.1, 9.5, 9.8.4, 9.9.1, 13.4.2, 15.2
Architect's Inspections
3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.8.3, 9.9.2, 9.10.1, 13.4
Architect's Instructions
3.2.4, 3.3.1, 4.2.6, 4.2.7, 13.4.2
Architect's Interpretations
4.2.11, 4.2.12
Architect's Project Representative
4.2.10
Architect's Relationship with Contractor
1.1.2, 1.5, 2.3.3, 3.1.3, 3.2.2, 3.2.3, 3.2.4, 3.3.1, 3.4.2, 3.5, 3.7.4, 3.7.5, 3.9.2, 3.9.3, 3.10, 3.11, 3.12, 3.16, 3.18, 4.1.2, 4.2, 5.2, 6.2.2, 7, 8.3.1, 9.2, 9.3, 9.4, 9.5, 9.7, 9.8, 9.9, 10.2.6, 10.3, 11.3, 12, 13.3.2, 13.4, 15.2
Architect's Relationship with Subcontractors
1.1.2, 4.2.3, 4.2.4, 4.2.6, 9.6.3, 9.6.4, 11.3
Architect's Representations
9.4.2, 9.5.1, 9.10.1
Architect's Site Visits
3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.5.1, 9.9.2, 9.10.1, 13.4
Asbestos
10.3.1
Attorneys' Fees
3.18.1, 9.6.8, 9.10.2, 10.3.3
Award of Separate Contracts
6.1.1, 6.1.2
Award of Subcontracts and Other Contracts for Portions of the Work
5.2
Basic Definitions
1.1
Bidding Requirements
1.1.1
Binding Dispute Resolution
8.3.1, 9.7, 11.5, 13.1, 15.1.2, 15.1.3, 15.2.1, 15.2.5, 15.2.6.1, 15.3.1, 15.3.2, 15.3.3, 15.4.1
Bonds, Lien
7.3.4.4, 9.6.8, 9.10.2, 9.10.3
Bonds, Performance, and Payment
7.3.4.4, 9.6.7, 9.10.3, **11.1.2**, 11.1.3, **11.5**
Building Information Models Use and Reliance
1.8
Building Permit
3.7.1
Capitalization
1.3
Certificate of Substantial Completion
9.8.3, 9.8.4, 9.8.5

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Certificates for Payment
4.2.1, 4.2.5, 4.2.9, 9.3.3, **9.4**, 9.5, 9.6.1, 9.6.6, 9.7, 9.10.1, 9.10.3, 14.1.1.3, 14.2.4, 15.1.4
Certificates of Inspection, Testing or Approval
13.4.4
Certificates of Insurance
9.10.2
Change Orders
1.1.1, 3.4.2, 3.7.4, 3.8.2.3, 3.11, 3.12.8, 4.2.8, 5.2.3, 7.1.2, 7.1.3, **7.2**, 7.3.2, 7.3.7, 7.3.9, 7.3.10, 8.3.1, 9.3.1.1, 9.10.3, 10.3.2, 11.2, 11.5, 12.1.2
Change Orders, Definition of
7.2.1
CHANGES IN THE WORK
2.2.2, 3.11, 4.2.8, **7**, 7.2.1, 7.3.1, 7.4, 8.3.1, 9.3.1.1, 11.5
Claims, Definition of
15.1.1
Claims, Notice of
1.6.2, 15.1.3
CLAIMS AND DISPUTES
3.2.4, 6.1.1, 6.3, 7.3.9, 9.3.3, 9.10.4, 10.3.3, **15**, 15.4
Claims and Timely Assertion of Claims
15.4.1
Claims for Additional Cost
3.2.4, 3.3.1, 3.7.4, 7.3.9, 9.5.2, 10.2.5, 10.3.2, **15.1.5**
Claims for Additional Time
3.2.4, 3.3.1, 3.7.4, 6.1.1, 8.3.2, 9.5.2, 10.3.2, **15.1.6**
Concealed or Unknown Conditions, Claims for
3.7.4
Claims for Damages
3.2.4, 3.18, 8.3.3, 9.5.1, 9.6.7, 10.2.5, 10.3.3, 11.3, 11.3.2, 14.2.4, 15.1.7
Claims Subject to Arbitration
15.4.1
Cleaning Up
3.15, 6.3
Commencement of the Work, Conditions Relating to
2.2.1, 3.2.2, 3.4.1, 3.7.1, 3.10.1, 3.12.6, 5.2.1, 5.2.3, 6.2.2, 8.1.2, 8.2.2, 8.3.1, 11.1, 11.2, **15.1.5**
Commencement of the Work, Definition of
8.1.2
Communications
3.9.1, **4.2.4**
Completion, Conditions Relating to
3.4.1, 3.11, 3.15, 4.2.2, 4.2.9, 8.2, 9.4.2, 9.8, 9.9.1, 9.10, 12.2, 14.1.2, 15.1.2
COMPLETION, PAYMENTS AND
9
Completion, Substantial
3.10.1, 4.2.9, 8.1.1, 8.1.3, 8.2.3, 9.4.2, 9.8, 9.9.1, 9.10.3, 12.2, 15.1.2
Compliance with Laws
2.3.2, 3.2.3, 3.6, 3.7, 3.12.10, 3.13, 9.6.4, 10.2.2, 13.1, 13.3, 13.4.1, 13.4.2, 13.5, 14.1.1, 14.2.1.3, 15.2.8, 15.4.2, 15.4.3
Concealed or Unknown Conditions
3.7.4, 4.2.8, 8.3.1, 10.3
Conditions of the Contract
1.1.1, 6.1.1, 6.1.4
Consent, Written
3.4.2, 3.14.2, 4.1.2, 9.8.5, 9.9.1, 9.10.2, 9.10.3, 13.2, 15.4.4.2
Consolidation or Joinder
15.4.4
CONSTRUCTION BY OWNER OR BY
SEPARATE CONTRACTORS
1.1.4, **6**
Construction Change Directive, Definition of
7.3.1
Construction Change Directives
1.1.1, 3.4.2, 3.11, 3.12.8, 4.2.8, 7.1.1, 7.1.2, 7.1.3, **7.3**, 9.3.1.1
Construction Schedules, Contractor's
3.10, 3.11, 3.12.1, 3.12.2, 6.1.3, 15.1.6.2
Contingent Assignment of Subcontracts
5.4, 14.2.2.2
Continuing Contract Performance
15.1.4
Contract, Definition of
1.1.2
CONTRACT, TERMINATION OR
SUSPENSION OF THE
5.4.1.1, 5.4.2, 11.5, **14**
Contract Administration
3.1.3, 4, 9.4, 9.5
Contract Award and Execution, Conditions Relating to
3.7.1, 3.10, 5.2, 6.1
Contract Documents, Copies Furnished and Use of
1.5.2, 2.3.6, 5.3
Contract Documents, Definition of
1.1.1
Contract Sum
2.2.2, 2.2.4, 3.7.4, 3.7.5, 3.8, 3.10.2, 5.2.3, 7.3, 7.4, **9.1**, 9.2, 9.4.2, 9.5.1.4, 9.6.7, 9.7, 10.3.2, 11.5, 12.1.2, 12.3, 14.2.4, 14.3.2, 15.1.4.2, **15.1.5, 15.2.5**
Contract Sum, Definition of
9.1
Contract Time
1.1.4, 2.2.1, 2.2.2, 3.7.4, 3.7.5, 3.10.2, 5.2.3, 6.1.5, 7.2.1.3, 7.3.1, 7.3.5, 7.3.6, 7, 7, 7.3.10, 7.4, 8.1.1, 8.2.1, 8.2.3, 8.3.1, 9.5.1, 9.7, 10.3.2, 12.1.1, 12.1.2, 14.3.2, 15.1.4.2, 15.1.6.1, 15.2.5
Contract Time, Definition of
8.1.1
CONTRACTOR
3
Contractor, Definition of
3.1, 6.1.2
Contractor's Construction and Submittal
Schedules
3.10, 3.12.1, 3.12.2, 4.2.3, 6.1.3, 15.1.6.2

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Contractor's Employees
2.2.4, 3.3.2, 3.4.3, 3.8.1, 3.9, 3.18.2, 4.2.3, 4.2.6, 10.2, 10.3, 11.3, 14.1, 14.2.1.1
Contractor's Liability Insurance
11.1
Contractor's Relationship with Separate Contractors and Owner's Forces
3.12.5, 3.14.2, 4.2.4, 6, 11.3, 12.2.4
Contractor's Relationship with Subcontractors
1.2.2, 2.2.4, 3.3.2, 3.18.1, 3.18.2, 4.2.4, 5, 9.6.2, 9.6.7, 9.10.2, 11.2, 11.3, 11.4
Contractor's Relationship with the Architect
1.1.2, 1.5, 2.3.3, 3.1.3, 3.2.2, 3.2.3, 3.2.4, 3.3.1, 3.4.2, 3.5.1, 3.7.4, 3.10, 3.11, 3.12, 3.16, 3.18, 4.2, 5.2, 6.2.2, 7, 8.3.1, 9.2, 9.3, 9.4, 9.5, 9.7, 9.8, 9.9, 10.2.6, 10.3, 11.3, 12, 13.4, 15.1.3, 15.2.1
Contractor's Representations
3.2.1, 3.2.2, 3.5, 3.12.6, 6.2.2, 8.2.1, 9.3.3, 9.8.2
Contractor's Responsibility for Those Performing the Work
3.3.2, 3.18, 5.3, 6.1.3, 6.2, 9.5.1, 10.2.8
Contractor's Review of Contract Documents
3.2
Contractor's Right to Stop the Work
2.2.2, 9.7
Contractor's Right to Terminate the Contract
14.1
Contractor's Submittals
3.10, 3.11, 3.12, 4.2.7, 5.2.1, 5.2.3, 9.2, 9.3, 9.8.2, 9.8.3, 9.9.1, 9.10.2, 9.10.3
Contractor's Superintendent
3.9, 10.2.6
Contractor's Supervision and Construction Procedures
1.2.2, 3.3, 3.4, 3.12.10, 4.2.2, 4.2.7, 6.1.3, 6.2.4, 7.1.3, 7.3.4, 7.3.6, 8.2, 10, 12, 14, 15.1.4
Coordination and Correlation
1.2, 3.2.1, 3.3.1, 3.10, 3.12.6, 6.1.3, 6.2.1
Copies Furnished of Drawings and Specifications
1.5, 2.3.6, 3.11
Copyrights
1.5, **3.17**
Correction of Work
2.5, 3.7.3, 9.4.2, 9.8.2, 9.8.3, 9.9.1, 12.1.2, **12.2**, 12.3, 15.1.3.1, 15.1.3.2, 15.2.1
Correlation and Intent of the Contract Documents
1.2
Cost, Definition of
7.3.4
Costs
2.5, 3.2.4, 3.7.3, 3.8.2, 3.15.2, 5.4.2, 6.1.1, 6.2.3, 7.3.3.3, 7.3.4, 7.3.8, 7.3.9, 9.10.2, 10.3.2, 10.3.6, 11.2, 12.1.2, 12.2.1, 12.2.4, 13.4, 14
Cutting and Patching
3.14, 6.2.5
Damage to Construction of Owner or Separate Contractors
3.14.2, 6.2.4, 10.2.1.2, 10.2.5, 10.4, 12.2.4
Damage to the Work
3.14.2, 9.9.1, 10.2.1.2, 10.2.5, 10.4, 12.2.4
Damages, Claims for
3.2.4, 3.18, 6.1.1, 8.3.3, 9.5.1, 9.6.7, 10.3.3, 11.3.2, 11.3, 14.2.4, 15.1.7
Damages for Delay
6.2.3, 8.3.3, 9.5.1.6, 9.7, 10.3.2, 14.3.2
Date of Commencement of the Work, Definition of
8.1.2
Date of Substantial Completion, Definition of
8.1.3
Day, Definition of
8.1.4
Decisions of the Architect
3.7.4, 4.2.6, 4.2.7, 4.2.11, 4.2.12, 4.2.13, 6.3, 7.3.4, 7.3.9, 8.1.3, 8.3.1, 9.2, 9.4, 9.5.1, 9.8.4, 9.9.1, 13.4.2, 14.2.2, 14.2.4, 15.1, 15.2
Decisions to Withhold Certification
9.4.1, **9.5**, 9.7, 14.1.1.3
Defective or Nonconforming Work, Acceptance, Rejection and Correction of
2.5, 3.5, 4.2.6, 6.2.3, 9.5.1, 9.5.3, 9.6.6, 9.8.2, 9.9.3, 9.10.4, 12.2.1
Definitions
1.1, 2.1.1, 3.1.1, 3.5, 3.12.1, 3.12.2, 3.12.3, 4.1.1, 5.1, 6.1.2, 7.2.1, 7.3.1, 8.1, 9.1, 9.8.1, 15.1.1
Delays and Extensions of Time
3.2, **3.7.4**, 5.2.3, 7.2.1, 7.3.1, **7.4**, **8.3**, 9.5.1, **9.7**, 10.3.2, **10.4**, 14.3.2, **15.1.6**, 15.2.5
Digital Data Use and Transmission
1.7
Disputes
6.3, 7.3.9, 15.1, 15.2
Documents and Samples at the Site
3.11
Drawings, Definition of
1.1.5
Drawings and Specifications, Use and Ownership of
3.11
Effective Date of Insurance
8.2.2
Emergencies
10.4, 14.1.1.2, **15.1.5**
Employees, Contractor's
3.3.2, 3.4.3, 3.8.1, 3.9, 3.18.2, 4.2.3, 4.2.6, 10.2, 10.3.3, 11.3, 14.1, 14.2.1.1
Equipment, Labor, or Materials
1.1.3, 1.1.6, 3.4, 3.5, 3.8.2, 3.8.3, 3.12, 3.13, 3.15.1, 4.2.6, 4.2.7, 5.2.1, 6.2.1, 7.3.4, 9.3.2, 9.3.3, 9.5.1.3, 9.10.2, 10.2.1, 10.2.4, 14.2.1.1, 14.2.1.2
Execution and Progress of the Work
1.1.3, 1.2.1, 1.2.2, 2.3.4, 2.3.6, 3.1, 3.3.1, 3.4.1, 3.7.1, 3.10.1, 3.12, 3.14, 4.2, 6.2.2, 7.1.3, 7.3.6, 8.2, 9.5.1, 9.9.1, 10.2, 10.3, 12.1, 12.2, 14.2, 14.3.1, 15.1.4

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Extensions of Time
3.2.4, 3.7.4, 5.2.3, 7.2.1, 7.3, 7.4, 9.5.1, 9.7, 10.3.2, 10.4, 14.3, 15.1.6, **15.2.5**
Failure of Payment
9.5.1.3, **9.7**, 9.10.2, 13.5, 14.1.1.3, 14.2.1.2
Faulty Work
(See Defective or Nonconforming Work)
Final Completion and Final Payment
4.2.1, 4.2.9, 9.8.2, **9.10**, 12.3, 14.2.4, 14.4.3
Financial Arrangements, Owner's
2.2.1, 13.2.2, 14.1.1.4
GENERAL PROVISIONS
1
Governing Law
13.1
Guarantees (See Warranty)
Hazardous Materials and Substances
10.2.4, **10.3**
Identification of Subcontractors and Suppliers
5.2.1
Indemnification
3.17, **3.18**, 9.6.8, 9.10.2, 10.3.3, 11.3
Information and Services Required of the Owner
2.1.2, **2.2**, 2.3, 3.2.2, 3.12.10.1, 6.1.3, 6.1.4, 6.2.5, 9.6.1, 9.9.2, 9.10.3, 10.3.3, 11.2, 13.4.1, 13.4.2, 14.1.1.4, 14.1.4, 15.1.4
Initial Decision
15.2
Initial Decision Maker, Definition of
1.1.8
Initial Decision Maker, Decisions
14.2.4, 15.1.4.2, 15.2.1, 15.2.2, 15.2.3, 15.2.4, 15.2.5
Initial Decision Maker, Extent of Authority
14.2.4, 15.1.4.2, 15.2.1, 15.2.2, 15.2.3, 15.2.4, 15.2.5
Injury or Damage to Person or Property
10.2.8, 10.4
Inspections
3.1.3, 3.3.3, 3.7.1, 4.2.2, 4.2.6, 4.2.9, 9.4.2, 9.8.3, 9.9.2, 9.10.1, 12.2.1, 13.4
Instructions to Bidders
1.1.1
Instructions to the Contractor
3.2.4, 3.3.1, 3.8.1, 5.2.1, 7, 8.2.2, 12, 13.4.2
Instruments of Service, Definition of
1.1.7
Insurance
6.1.1, 7.3.4, 8.2.2, 9.3.2, 9.8.4, 9.9.1, 9.10.2, 10.2.5, **11**
Insurance, Notice of Cancellation or Expiration
11.1.4, 11.2.3
Insurance, Contractor's Liability
11.1
Insurance, Effective Date of
8.2.2, 14.4.2
Insurance, Owner's Liability
11.2
Insurance, Property
10.2.5, 11.2, 11.4, 11.5
Insurance, Stored Materials
9.3.2
INSURANCE AND BONDS
11
Insurance Companies, Consent to Partial Occupancy
9.9.1
Insured loss, Adjustment and Settlement of
11.5
Intent of the Contract Documents
1.2.1, 4.2.7, 4.2.12, 4.2.13
Interest
13.5
Interpretation
1.1.8, 1.2.3, **1.4**, 4.1.1, 5.1, 6.1.2, 15.1.1
Interpretations, Written
4.2.11, 4.2.12
Judgment on Final Award
15.4.2
Labor and Materials, Equipment
1.1.3, 1.1.6, **3.4**, 3.5, 3.8.2, 3.8.3, 3.12, 3.13, 3.15.1, 5.2.1, 6.2.1, 7.3.4, 9.3.2, 9.3.3, 9.5.1.3, 9.10.2, 10.2.1, 10.2.4, 14.2.1.1, 14.2.1.2
Labor Disputes
8.3.1
Laws and Regulations
1.5, 2.3.2, 3.2.3, 3.2.4, 3.6, 3.7, 3.12.10, 3.13, 9.6.4, 9.9.1, 10.2.2, 13.1, 13.3.1, 13.4.2, 13.5, 14, 15.2.8, 15.4
Liens
2.1.2, 9.3.1, 9.3.3, 9.6.8, 9.10.2, 9.10.4, 15.2.8
Limitations, Statutes of
12.2.5, 15.1.2, 15.4.1.1
Limitations of Liability
3.2.2, 3.5, 3.12.10, 3.12.10.1, 3.17, 3.18.1, 4.2.6, 4.2.7, 6.2.2, 9.4.2, 9.6.4, 9.6.7, 9.6.8, 10.2.5, 10.3.3, 11.3, 12.2.5, 13.3.1
Limitations of Time
2.1.2, 2.2, 2.5, 3.2.2, 3.10, 3.11, 3.12.5, 3.15.1, 4.2.7, 5.2, 5.3, 5.4.1, 6.2.4, 7.3, 7.4, 8.2, 9.2, 9.3.1, 9.3.3, 9.4.1, 9.5, 9.6, 9.7, 9.8, 9.9, 9.10, 12.2, 13.4, 14, 15, 15.1.2, 15.1.3, 15.1.5
Materials, Hazardous
10.2.4, **10.3**
Materials, Labor, Equipment and
1.1.3, 1.1.6, 3.4.1, 3.5, 3.8.2, 3.8.3, 3.12, 3.13, 3.15.1, 5.2.1, 6.2.1, 7.3.4, 9.3.2, 9.3.3, 9.5.1.3, 9.10.2, 10.2.1.2, 10.2.4, 14.2.1.1, 14.2.1.2
Means, Methods, Techniques, Sequences and Procedures of Construction
3.3.1, 3.12.10, 4.2.2, 4.2.7, 9.4.2
Mechanic's Lien
2.1.2, 9.3.1, 9.3.3, 9.6.8, 9.10.2, 9.10.4, 15.2.8
Mediation
8.3.1, 15.1.3.2, 15.2.1, 15.2.5, 15.2.6, **15.3**, 15.4.1, 15.4.1.1
Minor Changes in the Work
1.1.1, 3.4.2, 3.12.8, 4.2.8, 7.1, **7.4**

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MISCELLANEOUS PROVISIONS
13
Modifications, Definition of
1.1.1
Modifications to the Contract
1.1.1, 1.1.2, 2.5, 3.11, 4.1.2, 4.2.1, 5.2.3, 7, 8.3.1, 9.7, 10.3.2
Mutual Responsibility
6.2
Nonconforming Work, Acceptance of
9.6.6, 9.9.3, **12.3**
Nonconforming Work, Rejection and Correction of
2.4, 2.5, 3.5, 4.2.6, 6.2.4, 9.5.1, 9.8.2, 9.9.3, 9.10.4, 12.2
Notice
1.6, 1.6.1, 1.6.2, 2.1.2, 2.2.2., 2.2.3, 2.2.4, 2.5, 3.2.4, 3.3.1, 3.7.4, 3.7.5, 3.9.2, 3.12.9, 3.12.10, 5.2.1, 7.4, 8.2.2 9.6.8, 9.7, 9.10.1, 10.2.8, 10.3.2, 11.5, 12.2.2.1, 13.4.1, 13.4.2, 14.1, 14.2.2, 14.4.2, 15.1.3, 15.1.5, 15.1.6, 15.4.1
Notice of Cancellation or Expiration of Insurance
11.1.4, 11.2.3
Notice of Claims
1.6.2, 2.1.2, 3.7.4, 9.6.8, 10.2.8, **15.1.3**, 15.1.5, 15.1.6, 15.2.8, 15.3.2, 15.4.1
Notice of Testing and Inspections
13.4.1, 13.4.2
Observations, Contractor's
3.2, 3.7.4
Occupancy
2.3.1, 9.6.6, 9.8
Orders, Written
1.1.1, 2.4, 3.9.2, 7, 8.2.2, 11.5, 12.1, 12.2.2.1, 13.4.2, 14.3.1
OWNER
2
Owner, Definition of
2.1.1
Owner, Evidence of Financial Arrangements
2.2, 13.2.2, 14.1.1.4
Owner, Information and Services Required of the
2.1.2, **2.2**, 2.3, 3.2.2, 3.12.10, 6.1.3, 6.1.4, 6.2.5, 9.3.2, 9.6.1, 9.6.4, 9.9.2, 9.10.3, 10.3.3, 11.2, 13.4.1, 13.4.2, 14.1.1.4, 14.1.4, 15.1.4
Owner's Authority
1.5, 2.1.1, 2.3.32.4, 2.5, 3.4.2, 3.8.1, 3.12.10, 3.14.2, 4.1.2, 4.2.4, 4.2.9, 5.2.1, 5.2.4, 5.4.1, 6.1, 6.3, 7.2.1, 7.3.1, 8.2.2, 8.3.1, 9.3.2, 9.5.1, 9.6.4, 9.9.1, 9.10.2, 10.3.2, 11.4, 11.5, 12.2.2, 12.3, 13.2.2, 14.3, 14.4, 15.2.7
Owner's Insurance
11.2
Owner's Relationship with Subcontractors
1.1.2, 5.2, 5.3, 5.4, 9.6.4, 9.10.2, 14.2.2
Owner's Right to Carry Out the Work
2.5, 14.2.2
Owner's Right to Clean Up
6.3
Owner's Right to Perform Construction and to Award Separate Contracts
6.1
Owner's Right to Stop the Work
2.4
Owner's Right to Suspend the Work
14.3
Owner's Right to Terminate the Contract
14.2, 14.4
Ownership and Use of Drawings, Specifications and Other Instruments of Service
1.1.1, 1.1.6, 1.1.7, **1.5**, 2.3.6, 3.2.2, 3.11, 3.17, 4.2.12, 5.3
Partial Occupancy or Use
9.6.6, **9.9**
Patching, Cutting and
3.14, 6.2.5
Patents
3.17
Payment, Applications for
4.2.5, 7.3.9, 9.2, **9.3**, 9.4, 9.5, 9.6.3, 9.7, 9.8.5, 9.10.1, 14.2.3, 14.2.4, 14.4.3
Payment, Certificates for
4.2.5, 4.2.9, 9.3.3, **9.4**, 9.5, 9.6.1, 9.6.6, 9.7, 9.10.1, 9.10.3, 14.1.1.3, 14.2.4
Payment, Failure of
9.5.1.3, **9.7**, 9.10.2, 13.5, 14.1.1.3, 14.2.1.2
Payment, Final
4.2.1, 4.2.9, **9.10**, 12.3, 14.2.4, 14.4.3
Payment Bond, Performance Bond and
7.3.4.4, 9.6.7, 9.10.3, **11.1.2**
Payments, Progress
9.3, **9.6**, 9.8.5, 9.10.3, 14.2.3, 15.1.4
PAYMENTS AND COMPLETION
9
Payments to Subcontractors
5.4.2, 9.5.1.3, 9.6.2, 9.6.3, 9.6.4, 9.6.7, 14.2.1.2
PCB
10.3.1
Performance Bond and Payment Bond
7.3.4.4, 9.6.7, 9.10.3, **11.1.2**
Permits, Fees, Notices and Compliance with Laws
2.3.1, **3.7**, 3.13, 7.3.4.4, 10.2.2
PERSONS AND PROPERTY, PROTECTION OF
10
Polychlorinated Biphenyl
10.3.1
Product Data, Definition of
3.12.2
Product Data and Samples, Shop Drawings
3.11, **3.12**, 4.2.7
Progress and Completion
4.2.2, **8.2**, 9.8, 9.9.1, 14.1.4, 15.1.4
Progress Payments
9.3, **9.6**, 9.8.5, 9.10.3, 14.2.3, 15.1.4

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Project, Definition of
1.1.4
Project Representatives
4.2.10
Property Insurance
10.2.5, **11.2**
Proposal Requirements
1.1.1
PROTECTION OF PERSONS AND PROPERTY
10
Regulations and Laws
1.5, 2.3.2, 3.2.3, 3.6, 3.7, 3.12.10, 3.13, 9.6.4, 9.9.1, 10.2.2, 13.1, 13.3, 13.4.1, 13.4.2, 13.5, 14, 15.2.8, 15.4
Rejection of Work
4.2.6, 12.2.1
Releases and Waivers of Liens
9.3.1, 9.10.2
Representations
3.2.1, 3.5, 3.12.6, 8.2.1, 9.3.3, 9.4.2, 9.5.1, 9.10.1
Representatives
2.1.1, 3.1.1, 3.9, 4.1.1, 4.2.10, 13.2.1
Responsibility for Those Performing the Work
3.3.2, 3.18, 4.2.2, 4.2.3, 5.3, 6.1.3, 6.2, 6.3, 9.5.1, 10
Retainage
9.3.1, 9.6.2, 9.8.5, 9.9.1, 9.10.2, 9.10.3
Review of Contract Documents and Field Conditions by Contractor
3.2, 3.12.7, 6.1.3
Review of Contractor's Submittals by Owner and Architect
3.10.1, 3.10.2, 3.11, 3.12, 4.2, 5.2, 6.1.3, 9.2, 9.8.2
Review of Shop Drawings, Product Data and Samples by Contractor
3.12
Rights and Remedies
1.1.2, 2.4, 2.5, 3.5, 3.7.4, 3.15.2, 4.2.6, 5.3, 5.4, 6.1, 6.3, 7.3.1, 8.3, 9.5.1, 9.7, 10.2.5, 10.3, 12.2.1, 12.2.2, 12.2.4, **13.3**, 14, 15.4
Royalties, Patents and Copyrights
3.17
Rules and Notices for Arbitration
15.4.1
Safety of Persons and Property
10.2, 10.4
Safety Precautions and Programs
3.3.1, 4.2.2, 4.2.7, 5.3, **10.1**, 10.2, 10.4
Samples, Definition of
3.12.3
Samples, Shop Drawings, Product Data and
3.11, **3.12**, 4.2.7
Samples at the Site, Documents and
3.11
Schedule of Values
9.2, 9.3.1
Schedules, Construction
3.10, 3.12.1, 3.12.2, 6.1.3, 15.1.6.2
Separate Contracts and Contractors
1.1.4, 3.12.5, 3.14.2, 4.2.4, 4.2.7, 6, 8.3.1, 12.1.2
Separate Contractors, Definition of
6.1.1
Shop Drawings, Definition of
3.12.1
Shop Drawings, Product Data and Samples
3.11, **3.12**, 4.2.7
Site, Use of
3.13, 6.1.1, 6.2.1
Site Inspections
3.2.2, 3.3.3, 3.7.1, 3.7.4, 4.2, 9.9.2, 9.4.2, 9.10.1, 13.4
Site Visits, Architect's
3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.5.1, 9.9.2, 9.10.1, 13.4
Special Inspections and Testing
4.2.6, 12.2.1, 13.4
Specifications, Definition of
1.1.6
Specifications
1.1.1, **1.1.6**, 1.2.2, 1.5, 3.12.10, 3.17, 4.2.14
Statute of Limitations
15.1.2, 15.4.1.1
Stopping the Work
2.2.2, 2.4, 9.7, 10.3, 14.1
Stored Materials
6.2.1, 9.3.2, 10.2.1.2, 10.2.4
Subcontractor, Definition of
5.1.1
SUBCONTRACTORS
5
Subcontractors, Work by
1.2.2, 3.3.2, 3.12.1, 3.18, 4.2.3, 5.2.3, 5.3, 5.4, 9.3.1.2, 9.6.7
Subcontractual Relations
5.3, 5.4, 9.3.1.2, 9.6, 9.10, 10.2.1, 14.1, 14.2.1
Submittals
3.10, 3.11, 3.12, 4.2.7, 5.2.1, 5.2.3, 7.3.4, 9.2, 9.3, 9.8, 9.9.1, 9.10.2, 9.10.3
Submittal Schedule
3.10.2, 3.12.5, 4.2.7
Subrogation, Waivers of
6.1.1, **11.3**
Substances, Hazardous
10.3
Substantial Completion
4.2.9, 8.1.1, 8.1.3, 8.2.3, 9.4.2, **9.8**, 9.9.1, 9.10.3, 12.2, 15.1.2
Substantial Completion, Definition of
9.8.1
Substitution of Subcontractors
5.2.3, 5.2.4
Substitution of Architect
2.3.3
Substitutions of Materials
3.4.2, 3.5, 7.3.8
Sub-subcontractor, Definition of
5.1.2

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Subsurface Conditions
3.7.4
Successors and Assigns
13.2
Superintendent
3.9, 10.2.6
Supervision and Construction Procedures
1.2.2, **3.3**, 3.4, 3.12.10, 4.2.2, 4.2.7, 6.1.3, 6.2.4, 7.1.3, 7.3.4, 8.2, 8.3.1, 9.4.2, 10, 12, 14, 15.1.4
Suppliers
1.5, 3.12.1, 4.2.4, 4.2.6, 5.2.1, 9.3, 9.4.2, 9.5.4, 9.6, 9.10.5, 14.2.1
Surety
5.4.1.2, 9.6.8, 9.8.5, 9.10.2, 9.10.3, 11.1.2, 14.2.2, 15.2.7
Surety, Consent of
9.8.5, 9.10.2, 9.10.3
Surveys
1.1.7, 2.3.4
Suspension by the Owner for Convenience
14.3
Suspension of the Work
3.7.5, 5.4.2, 14.3
Suspension or Termination of the Contract
5.4.1.1, 14
Taxes
3.6, 3.8.2.1, 7.3.4.4
Termination by the Contractor
14.1, 15.1.7
Termination by the Owner for Cause
5.4.1.1, **14.2,** 15.1.7
Termination by the Owner for Convenience
14.4
Termination of the Architect
2.3.3
Termination of the Contractor Employment
14.2.2

TERMINATION OR SUSPENSION OF THE CONTRACT
14
Tests and Inspections
3.1.3, 3.3.3, 3.7.1, 4.2.2, 4.2.6, 4.2.9, 9.4.2, 9.8.3, 9.9.2, 9.10.1, 10.3.2, 12.2.1, **13.4**
TIME
8
Time, Delays and Extensions of
3.2.4, 3.7.4, 5.2.3, 7.2.1, 7.3.1, 7.4, **8.3**, 9.5.1, 9.7, 10.3.2, 10.4, 14.3.2, 15.1.6, 15.2.5
Time Limits
2.1.2, 2.2, 2.5, 3.2.2, 3.10, 3.11, 3.12.5, 3.15.1, 4.2, 5.2, 5.3, 5.4, 6.2.4, 7.3, 7.4, 8.2, 9.2, 9.3.1, 9.3.3, 9.4.1, 9.5, 9.6, 9.7, 9.8, 9.9, 9.10, 12.2, 13.4, 14, 15.1.2, 15.1.3, 15.4
Time Limits on Claims
3.7.4, 10.2.8, 15.1.2, 15.1.3
Title to Work
9.3.2, 9.3.3
UNCOVERING AND CORRECTION OF WORK
12
Uncovering of Work
12.1
Unforeseen Conditions, Concealed or Unknown
3.7.4, 8.3.1, 10.3
Unit Prices
7.3.3.2, 9.1.2
Use of Documents
1.1.1, 1.5, 2.3.6, 3.12.6, 5.3
Use of Site
3.13, 6.1.1, 6.2.1
Values, Schedule of
9.2, 9.3.1
Waiver of Claims by the Architect
13.3.2
Waiver of Claims by the Contractor
9.10.5, 13.3.2, **15.1.7**
Waiver of Claims by the Owner
9.9.3, 9.10.3, 9.10.4, 12.2.2.1, 13.3.2, 14.2.4, **15.1.7**
Waiver of Consequential Damages
14.2.4, 15.1.7
Waiver of Liens
9.3, 9.10.2, 9.10.4
Waivers of Subrogation
6.1.1, **11.3**
Warranty
3.5, 4.2.9, 9.3.3, 9.8.4, 9.9.1, 9.10.2, 9.10.4, 12.2.2, 15.1.2
Weather Delays
8.3, 15.1.6.2
Work, Definition of
1.1.3
Written Consent
1.5.2, 3.4.2, 3.7.4, 3.12.8, 3.14.2, 4.1.2, 9.3.2, 9.10.3, 13.2, 13.3.2, 15.4.4.2
Written Interpretations
4.2.11, 4.2.12
Written Orders
1.1.1, 2.4, 3.9, 7, 8.2.2, 12.1, 12.2, 13.4.2, 14.3.1

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents

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

§ 1.1.2 The Contract

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

§ 1.1.3 The Work

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

§ 1.1.4 The Project

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

§ 1.1.5 The Drawings

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

§ 1.1.6 The Specifications

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

§ 1.1.7 Instruments of Service

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

§ 1.1.8 Initial Decision Maker

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

§ 1.2 Correlation and Intent of the Contract Documents

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

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

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

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

§ 1.3 Capitalization

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

§ 1.4 Interpretation

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

§ 1.5 Ownership and Use of Drawings, Specifications, and Other Instruments of Service

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

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect's consultants.

§ 1.6 Notice

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

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

§ 1.7 Digital Data Use and Transmission

The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties will use AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document

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G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

ARTICLE 2 OWNER

§ 2.1 General

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

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

§ 2.2 Evidence of the Owner's Financial Arrangements

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

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

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

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

§ 2.3 Information and Services Required of the Owner

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

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

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

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

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

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

§ 2.4 Owner's Right to Stop the Work

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

§ 2.5 Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect and the Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect, or failure. If current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 15.

ARTICLE 3 CONTRACTOR

§ 3.1 General

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

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

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

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

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

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§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.4, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

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

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner, subject to Section 15.1.7, as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 Supervision and Construction Procedures

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely notice to the Owner and Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the Architect objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures.

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

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

§ 3.4 Labor and Materials

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

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

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

§ 3.5 Warranty

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

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

§ 3.6 Taxes

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

§ 3.7 Permits, Fees, Notices and Compliance with Laws

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

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

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

§ 3.7.4 Concealed or Unknown Conditions

If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 14 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may submit a Claim as provided in Article 15.

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

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§ 3.8 Allowances

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

§ 3.8.2 Unless otherwise provided in the Contract Documents,

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

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

§ 3.9 Superintendent

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

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the Architect may notify the Contractor, stating whether the Owner or the Architect (1) has reasonable objection to the proposed superintendent or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

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

§ 3.10 Contractor's Construction and Submittal Schedules

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

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

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

§ 3.11 Documents and Samples at the Site

The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and similar required submittals. These shall be in electronic form or paper copy, available to the Architect and Owner, and

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delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 Shop Drawings, Product Data and Samples

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

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

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

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

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

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

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

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

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

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures. The Contractor shall not be required to provide professional services in violation of applicable law.

§ 3.12.10.1 If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will

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specify all performance and design criteria that such services must satisfy. The Contractor shall be entitled to rely upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review and approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

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

§ 3.13 Use of Site

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

§ 3.14 Cutting and Patching

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

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

§ 3.15 Cleaning Up

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

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

§ 3.16 Access to Work

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

§ 3.17 Royalties, Patents and Copyrights

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

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§ 3.18 Indemnification

§ 3.18.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

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

ARTICLE 4 ARCHITECT

§ 4.1 General

§ 4.1.1 The Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement.

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

§ 4.2 Administration of the Contract

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

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

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner (1) known deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of, and will not be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 Communications

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

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

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, whether or not the Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons or entities performing portions of the Work.

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

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

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

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more Project representatives to assist in carrying out the Architect's responsibilities at the site. The Owner shall notify the Contractor of any change in the duties, responsibilities and limitations of authority of the Project representatives.

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

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

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

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

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ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

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

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

§ 5.2 Award of Subcontracts and Other Contracts for Portions of the Work

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

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

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

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

§ 5.3 Subcontractual Relations

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

§ 5.4 Contingent Assignment of Subcontracts

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

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

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

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

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

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 Owner's Right to Perform Construction and to Award Separate Contracts

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

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

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

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

§ 6.2 Mutual Responsibility

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

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a Separate Contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify the Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Architect of apparent discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner's or Separate Contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractor that are not apparent.

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

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

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

§ 6.3 Owner's Right to Clean Up

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

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

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

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

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

§ 7.2 Change Orders

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

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

§ 7.3 Construction Change Directives

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

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

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

- **.1** Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
- **.2** Unit prices stated in the Contract Documents or subsequently agreed upon;
- **.3** Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
- **.4** As provided in Section 7.3.4.

§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.4 shall be limited to the following:

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.1 Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;

.2 Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;

.3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;

.4 Costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; and

.5 Costs of supervision and field office personnel directly attributable to the change.

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

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

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

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

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

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

§ 7.4 Minor Changes in the Work

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

ARTICLE 8 TIME

§ 8.1 Definitions

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

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

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

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

§ 8.2 Progress and Completion

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

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, commence the Work prior to the effective date of insurance required to be furnished by the Contractor and Owner.

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

§ 8.3 Delays and Extensions of Time

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

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

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

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

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

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

§ 9.2 Schedule of Values

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

§ 9.3 Applications for Payment

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

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

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

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

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information, and belief, be free and clear of liens, claims, security interests, or encumbrances, in favor of the Contractor, Subcontractors, suppliers, or other persons or entities that provided labor, materials, and equipment relating to the Work.

§ 9.4 Certificates for Payment

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either (1) issue to the Owner a Certificate for Payment in the full amount of the Application for Payment, with a copy to the Contractor; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Contractor and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Contractor and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1.

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

§ 9.5 Decisions to Withhold Certification

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

- **.1** defective Work not remedied;
- **.2** third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
- **.3** failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;

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.4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
.5 damage to the Owner or a Separate Contractor;
.6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
.7 repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When either party disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, that party may submit a Claim in accordance with Article 15.

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

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

§ 9.6 Progress Payments

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

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

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

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

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

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

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

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

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§ 9.7 Failure of Payment

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

§ 9.8 Substantial Completion

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

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

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

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

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

§ 9.9 Partial Occupancy or Use

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

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

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

§ 9.10 Final Completion and Final Payment

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

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment, (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, and (6) if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts and releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees.

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

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

- **.1** liens, Claims, security interests, or encumbrances arising out of the Contract and unsettled;
- **.2** failure of the Work to comply with the requirements of the Contract Documents;
- **.3** terms of special warranties required by the Contract Documents; or
- **.4** audits performed by the Owner, if permitted by the Contract Documents, after final payment.

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

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

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

§ 10.2 Safety of Persons and Property

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

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.1 employees on the Work and other persons who may be affected thereby;

.2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; and

.3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

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

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

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

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

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

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

§ 10.2.8 Injury or Damage to Person or Property

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

§ 10.3 Hazardous Materials and Substances

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

§ 10.3.2 Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor and the Architect will

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promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

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

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

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

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

§ 10.4 Emergencies

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

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

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

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

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

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

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or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

§ 11.2 Owner's Insurance

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

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

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

§ 11.3 Waivers of Subrogation

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

§ 11.3.2 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, to the extent permissible by such policies, the Owner waives all rights in accordance with the terms of Section 11.3.1 for damages caused by fire or other causes of loss covered by this separate property insurance.

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

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

§11.5 Adjustment and Settlement of Insured Loss

§ 11.5.1 A loss insured under the property insurance required by the Agreement shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.5.2. The Owner shall pay the Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

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

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

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

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

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

§ 12.2.2 After Substantial Completion

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.5.

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

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

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

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

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

§ 12.3 Acceptance of Nonconforming Work

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

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

The Contract shall be governed by the law of the place where the Project is located, excluding that jurisdiction's choice of law rules. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

§ 13.2 Successors and Assigns

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

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

§ 13.3 Rights and Remedies

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

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

§ 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and

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approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 13.4.2 If the Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense.

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including those of repeated procedures and compensation for the Architect's services and expenses, shall be at the Contractor's expense.

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

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

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

§ 13.5 Interest

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

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

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

- **.1** Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
- **.2** An act of government, such as a declaration of national emergency, that requires all Work to be stopped;
- **.3** Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or
- **.4** The Owner has failed to furnish to the Contractor reasonable evidence as required by Section 2.2.

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

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, as well as reasonable overhead and profit on Work not executed, and costs incurred by reason of such termination.

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

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

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

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, and upon certification by the Architect that sufficient cause exists to justify such action, the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

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

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

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

§ 14.3 Suspension by the Owner for Convenience

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

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

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

§ 14.4 Termination by the Owner for Convenience

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

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

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

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§ 14.4.3 In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, a change in the Contract Time, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

§ 15.1.2 Time Limits on Claims

The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the binding dispute resolution method selected in the Agreement and within the period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section 15.1.2.

§ 15.1.3 Notice of Claims

§ 15.1.3.1 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party under this Section 15.1.3.1 shall be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

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

§ 15.1.4 Continuing Contract Performance

§ 15.1.4.1 Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

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

§ 15.1.5 Claims for Additional Cost

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

§ 15.1.6 Claims for Additional Time

§ 15.1.6.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, notice as provided in Section 15.1.3 shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

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

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§ 15.1.7 Waiver of Claims for Consequential Damages

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

.1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and

.2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit, except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 Initial Decision

§ 15.2.1 Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

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

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

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

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

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

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

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

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

§ 15.3 Mediation

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract, except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.7, shall be subject to mediation as a condition precedent to binding dispute resolution.

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

§ 15.3.3 Either party may, within 30 days from the date that mediation has been concluded without resolution of the dispute or 60 days after mediation has been demanded without resolution of the dispute, demand in writing that the other party file for binding dispute resolution. If such a demand is made and the party receiving the demand fails to file for binding dispute resolution within 60 days after receipt thereof, then both parties waive their rights to binding dispute resolution proceedings with respect to the initial decision.

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

§ 15.4 Arbitration

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

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

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

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

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§ 15.4.4 Consolidation or Joinder

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

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

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

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AIA® Document G702™ – 1992

Application and Certificate for Payment

TO OWNER:	**PROJECT:**	**APPLICATION NO:**	**Distribution to:**
		PERIOD TO:	OWNER: ☐
		CONTRACT FOR:	ARCHITECT: ☐
FROM CONTRACTOR:	**VIA ARCHITECT:**	**CONTRACT DATE:**	CONTRACTOR: ☐
		PROJECT NOS: / /	FIELD: ☐
			OTHER: ☐

CONTRACTOR'S APPLICATION FOR PAYMENT

Application is made for payment, as shown below, in connection with the Contract.
Continuation Sheet, AIA Document G703, is attached.

1. ORIGINAL CONTRACT SUM ..... $ _____

2. Net change by Change Orders ..... $ _____

3. CONTRACT SUM TO DATE (Line 1 ± 2) ..... $ _____

4. TOTAL COMPLETED & STORED TO DATE (Column G on G703) ..... $ _____

5. RETAINAGE:

a. _____% of Completed Work
(Column D + E on G703) $ _____

b. _____% of Stored Material
(Column F on G703) $ _____

Total Retainage (Lines 5a + 5b or Total in Column I of G703) ..... $ _____

6. TOTAL EARNED LESS RETAINAGE ..... $ _____
(Line 4 Less Line 5 Total)

7. LESS PREVIOUS CERTIFICATES FOR PAYMENT ..... $ _____
(Line 6 from prior Certificate)

The undersigned Contractor certifies that to the best of the Contractor's knowledge, information and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payment were issued and payments received from the Owner, and that current payment shown herein is now due.

CONTRACTOR:

By: _____ Date: _____

State of:

County of:

Subscribed and sworn to before
me this day of

Notary Public:

My Commission expires:

ARCHITECT'S CERTIFICATE FOR PAYMENT

In accordance with the Contract Documents, based on on-site observations and the data comprising this application, the Architect certifies to the Owner that to the best of the Architect's knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the

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8. CURRENT PAYMENT DUE ..... $

9. BALANCE TO FINISH, INCLUDING RETAINAGE

(Line 3 less Line 6) $_____

CHANGE ORDER SUMMARY	ADDITIONS	DEDUCTIONS
Total changes approved in previous months by Owner	$	$
Total approved this Month	$	$
TOTALS	$	$
NET CHANGES by Change Order	$	

AMOUNT CERTIFIED ..... $_____

(Attach explanation if amount certified differs from the amount applied. Initial all figures on this Application and on the Continuation Sheet that are changed to conform with the amount certified.)

ARCHITECT:

By: _____ Date: _____

This Certificate is not negotiable. The AMOUNT CERTIFIED is payable only to the Contractor named herein. Issuance, payment and acceptance of payment are without prejudice to any rights of the Owner or Contractor under this Contract

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AIA® Document G704™ – 2000

Certificate of Substantial Completion

PROJECT:
(Name and address):

PROJECT NUMBER: /
CONTRACT FOR:
CONTRACT DATE:

OWNER: ☐
ARCHITECT: ☐
CONTRACTOR: ☐
FIELD: ☐
OTHER: ☐

TO OWNER:
(Name and address):

TO CONTRACTOR:
(Name and address):

PROJECT OR PORTION OF THE PROJECT DESIGNATED FOR PARTIAL OCCUPANCY OR USE SHALL INCLUDE:

The Work performed under this Contract has been reviewed and found, to the Architect's best knowledge, information and belief, to be substantially complete. Substantial Completion is the stage in the progress of the Work when the Work or designated portion is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use. The date of Substantial Completion of the Project or portion designated above is the date of issuance established by this Certificate, which is also the date of commencement of applicable warranties required by the Contract Documents, except as stated below:

Warranty **Date of Commencement**

ARCHITECT	BY	DATE OF ISSUANCE

A list of items to be completed or corrected is attached hereto. The failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents. Unless otherwise agreed to in writing, the date of commencement of warranties for items on the attached list will be the date of issuance of the final Certificate of Payment or the date of final payment.

Cost estimate of Work that is incomplete or defective: $ 0.00

The Contractor will complete or correct the Work on the list of items attached hereto within Zero (0) days from the above date of Substantial Completion.

CONTRACTOR	BY	DATE

The Owner accepts the Work or designated portion as substantially complete and will assume full possession at (time) on (date).

OWNER	BY	DATE

The responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance shall be as follows:
(Note: Owner's and Contractor's legal and insurance counsel should determine and review insurance requirements and coverage.)

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Advancement of Construction Technology

SUBSTITUTION REQUEST

(After the Bidding Phase)

Project: _____ Substitution Request Number: _____

_____ From: _____

To: _____ Date: _____

_____ A/E Project Number: _____

Re: _____ Contract For: _____

Specification Title: _____ Description: _____

Section: _____ Page: _____ Article/Paragraph: _____

Proposed Substitution: _____

Manufacturer: _____ Address: _____ Phone: _____

Trade Name: _____ Model No.: _____

Installer: _____ Address: _____ Phone: _____

History: ☐ New product ☐ 2-5 years old ☐ 5-10 yrs old ☐ More than 10 years old

Differences between proposed substitution and specified product: _____

_____

_____

☐ Point-by-point comparative data attached - REQUIRED BY A/E

Reason for not providing specified item: _____

_____

Similar Installation:

Project: _____ Architect: _____

Address: _____ Owner: _____

_____ Date Installed: _____

Proposed substitution affects other parts of Work: ☐ No ☐ Yes; explain _____

_____

Savings to Owner for accepting substitution: _____ ($ _____).

Proposed substitution changes Contract Time: ☐ No ☐ Yes [Add] [Deduct] _____ days.

Supporting Data Attached: ☐ Drawings ☐ Product Data ☐ Samples ☐ Tests ☐ Reports ☐ _____

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September 1996
CSI Form 13.1A

SUBSTITUTION REQUEST
(Continued)

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Cost data as stated above is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.
- Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Submitted by: _____

Signed by: _____

Firm: _____

Address: _____

_____

Telephone: _____

Attachments: _____

A/E's REVIEW AND ACTION

☐ Substitution approved - Make submittals in accordance with Specification Section 01330.
☐ Substitution approved as noted - Make submittals in accordance with Specification Section 01330.
☐ Substitution rejected - Use specified materials.
☐ Substitution Request received too late - Use specified materials.

Signed by: Date:

Additional Comments: ☐ Contractor ☐ Subcontractor ☐ Supplier ☐ Manufacturer ☐ A/E ☐ _____

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FEDERAL LABOR STANDARDS

1.1 FEDERAL LABOR STANDARDS

General

A. This section provides an overview of federal and state laws which govern competitive bidding and the wages and working conditions for laborers and mechanics employed under construction contracts funded in whole or in part by Federal funds. Solicitation of bids and the awarding of contracts for construction, alteration or rehabilitation of public works projects, public facilities, and some housing projects are governed by a set of laws designed to ensure that:

1. All political subdivisions award construction or vendor contracts to the lowest responsible bidder.
2. All contractors pay mechanics and laborers at a rate equal to that paid to those workers on similar activities in the locality. This is known as the "prevailing wage rate".
3. Workers be paid at regularly scheduled intervals (at least once a week) and only those deductions allowable by law or as authorized by the employee shall be taken out of the worker's gross pay.
4. All workers receive "overtime" compensation at a rate of one and a half (1.5) times their regularly hourly wage for work performed in excess of forty (40) hours per week.
5. All workers are assured of safe and healthy working conditions.

1.2 LABOR STANDARDS

A. Contractors must comply with the following statues and acts in the work of the project.

1. Davis-Bacon and related Acts (40 USC 276 (a)-277). Document included
with this section.

   Objective: To ensure that mechanics and laborers employed in construction work under federal contracts and contracts of recipients of federal financial assistance are paid wage rates and fringe benefits equal to those of corresponding classes of workers on similar construction in the locality in which the work is performed.

   Key Provisions - Applicable to all contracts or subcontracts, which exceed $2,000 for construction, alteration, or rehabilitation. Rate determinations will be provided by the division of Community Development or by the regional office of the Wage and Hour of workers excluded from prevailing wage rates include apprentices registered in a bona fide apprenticeship program, trainees employed under a program approved by the U.S. Department of Labor, or helpers if the helper classification is specified on the request to the Department of Labor for a wage rate determination.

"General Decision Number: UT20240089 04/19/2024

Superseded General Decision Number: UT20230089

State: Utah

Construction Type: Building

Counties: Morgan and Weber Counties in Utah.

BUILDING CONSTRUCTION PROJECTS (does not include single family homes or apartments up to and including 4 stories).

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(1).

If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022:	. Executive Order 14026 generally applies to the contract. . The contractor must pay all covered workers at least $17.20 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2024.
If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:	. Executive Order 13658 generally applies to the contract. . The contractor must pay all covered workers at least $12.90 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2024.

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at http://www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/05/2024
1	01/19/2024

2 03/15/2024
3 04/19/2024

CARP0801-002 12/01/2022

	Rates	Fringes
CARPENTER (Drywall Hanging and Metal Stud Installation Only)	$ 31.66	13.97

ELEC0354-001 06/11/2023

	Rates	Fringes
ELECTRICIAN (Low Voltage Wiring Only)	$ 27.65	1.5%+14.73
ELECTRICIAN	$ 39.00	1.3%+16.55

PAIN0077-003 07/01/2022

	Rates	Fringes
DRYWALL FINISHER/TAPER	$ 31.00	8.44

PLUM0140-001 08/01/2023

	Rates	Fringes
PLUMBER/PIPEFITTER	$ 42.00	15.02

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* SFUT0669-003 01/01/2024

	Rates	Fringes
SPRINKLER FITTER (Fire Sprinklers)	$ 39.43	26.04

SHEE0312-002 07/01/2022

	Rates	Fringes
SHEET METAL WORKER (Including HVAC Duct Installation)	$ 39.26	11.67

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* SUUT2012-021 07/29/2014

	Rates	Fringes
BRICKLAYER	$ 22.13	1.67
CARPENTER (Acoustical Ceiling Installation Only)	$ 21.00	3.20
CARPENTER, Excludes Acoustical Ceiling Installation, Drywall Hanging, and Metal Stud Installation	$ 20.68	5.49
CEMENT MASON/CONCRETE FINISHER	$ 16.00 **	0.00
INSULATOR - MECHANICAL (Duct, Pipe & Mechanical System Insulation)	$ 17.76	1.83

IRONWORKER, STRUCTURAL.....$ 20.21 3.22

LABORER: Common or General.....$ 12.78 ** 0.00

LABORER: Irrigation.....$ 9.50 ** 0.00

LABORER: Mason Tender - Brick...$ 16.38 ** 1.00

LABORER: Mason Tender - Cement/Concrete.....$ 13.87 ** 0.14

LABORER: Pipelayer.....$ 13.57 ** 0.00

OPERATOR: Backhoe/Excavator/Trackhoe.....$ 16.92 ** 0.00

OPERATOR: Loader.....$ 19.34 0.00

PAINTER (Brush, Roller and Spray, Excluding Drywalling/Taping).....$ 15.33 ** 0.00

ROOFER.....$ 15.62 ** 0.00

TILE FINISHER.....$ 13.54 ** 0.00

TILE SETTER.....$ 23.00 0.00

TRUCK DRIVER: Dump Truck.....$ 17.74 2.66

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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** Workers in this classification may be entitled to a higher minimum wage under Executive Order 14026 ($17.20) or 13658 ($12.90). Please see the Note at the top of the wage determination for more information. Please also note that the minimum wage requirements of Executive Order 14026 are not currently being enforced as to any contract or subcontract to which the states of Texas, Louisiana, or Mississippi, including their agencies, are a party.

Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at https://www.dol.gov/agencies/whd/government-contracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (iii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union

average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour National Office because National Office has responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION"

REQUIRED FEDERAL CONTRACT PROVISIONS

ACCESS TO RECORDS AND REPORTS

(Refs: 2 CFR § 200.334, 2 CFR § 200.337, FAA Order 5100.38)

The Contractor must maintain an acceptable cost accounting system. The Contractor agrees to provide the Owner, the Federal Aviation Administration and the Comptroller General of the United States or any of their duly authorized representatives access to any books, documents, papers and records of the Contractor which are directly pertinent to the specific contract for the purpose of making audit, examination, excerpts and transcriptions. The Contractor agrees to maintain all books, records and reports required under this contract for a period of not less than three years after final payment is made and all pending matters are closed.

NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY

(Refs: 41 CFR Part 60-4, 49 CFR Part 26)

1. The Offeror's or Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Opportunity Construction Contract Specifications" set forth herein.

2. The goals and timetables for minority and female participation, expressed in percentage terms for the contractor's aggregate workforce in each trade on all construction work in the covered area, are as follows:

Timetables

Goals for minority participation for each trade:	6.0%
Goals for female participation in each trade:	6.9%

These goals are applicable to all of the contractor's construction work (whether or not it is Federal or federally-assisted) performed in the covered area. If the contractor performs construction work in a geographical area located outside of the covered area, it shall apply the goals established for such geographical area where the work is actually performed. With regard to this second area, the contractor also is subject to the goals for both its federally involved and non-federally involved construction.

The Contractor's compliance with the Executive Order and the regulations in 41 CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4.3(a), and its efforts to meet the goals. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade, and the contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, the Executive Order and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

3. The Contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs (OFCCP) within 10 working days of award of any construction subcontract in excess of $10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the name, address, and telephone number of the subcontractor; employer identification number of the subcontractor; estimated dollar amount of the subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the subcontract is to be performed.

4. As used in this notice and in the contract resulting from this solicitation, the "covered area" is Ogden, Weber County, Utah.

BREACH OF CONTRACT TERMS

(Ref: 2 CFR Part 200, Appendix II(A))

Any violation or breach of terms of this contract on the part of the *Contractor* or its subcontractors may result in the suspension or termination of this contract or such other action that may be necessary to enforce the rights of the parties of this agreement.

Owner will provide *Contractor* written notice that describes the nature of the breach and corrective actions the *Contractor* must undertake in order to avoid termination of the contract. Owner reserves the right to withhold payments to Contractor until such time the Contractor corrects the breach or the Owner elects to terminate the contract. The Owner's notice will identify a specific date by which the *Contractor* must correct the breach. Owner may proceed with termination of the contract if the *Contractor* fails to correct the breach by the deadline indicated in the Owner's notice.

The duties and obligations imposed by the Contract Documents and the rights and remedies available thereunder are in addition to, and not a limitation of, any duties, obligations, rights and remedies otherwise imposed or available by law.

GENERAL CIVIL RIGHTS PROVISIONS

(Ref: 49 USC § 47123)

In all its activities within the scope of its airport program, the Contractor agrees to comply with pertinent statutes, Executive Orders, and such rules as identified in Title VI List of Pertinent Nondiscrimination Acts and Authorities to ensure that no person shall, on the grounds of race, color, national origin (including limited English proficiency), creed, sex (including sexual orientation and gender identity), age, or disability be excluded from participating in any activity conducted with or benefiting from Federal assistance.

This provision is in addition to that required by Title VI of the Civil Rights Act of 1964.

The above provision binds the Contractor and subcontractors from the bid solicitation period through the completion of the contract.

Title VI List of Pertinent Nondiscrimination Acts and Authorities

(Refs: 49 USC § 47123, FAA Order 1400.11)

During the performance of this contract, the Contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "Contractor") agrees to comply with the following non-discrimination statutes and authorities; including but not limited to:

- Title VI of the Civil Rights Act of 1964 (42 USC § 2000d *et seq*., 78 stat. 252) (prohibits discrimination on the basis of race, color, national origin);
- 49 CFR part 21 (Non-discrimination in Federally-Assisted programs of the Department of Transportation—Effectuation of Title VI of the Civil Rights Act of 1964);
- The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (42 USC § 4601) (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-aid programs and projects);
- Section 504 of the Rehabilitation Act of 1973 (29 USC § 794 *et seq*.), as amended (prohibits discrimination on the basis of disability); and 49 CFR part 27 (Nondiscrimination on the Basis of Disability in Programs or Activities Receiving Federal Financial Assistance);
- The Age Discrimination Act of 1975, as amended (42 USC § 6101 *et seq*.) (prohibits discrimination on the basis of age);
- Airport and Airway Improvement Act of 1982 (49 USC § 47123), as amended (prohibits discrimination based on race, creed, color, national origin, or sex);
- The Civil Rights Restoration Act of 1987 (PL 100-259) (broadened the scope, coverage and applicability of Title VI of the Civil Rights Act of 1964, the Age Discrimination Act of 1975 and Section 504 of the Rehabilitation Act of 1973, by expanding the definition of the terms "programs or activities" to include all of the programs or activities of the Federal-aid recipients, sub-recipients and contractors, whether such programs or activities are Federally funded or not);
- Titles II and III of the Americans with Disabilities Act of 1990 (42 USC § 12101, et seq) (prohibit discrimination on the basis of disability in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities) as implemented by U.S. Department of Transportation regulations at 49 CFR parts 37 and 38;
- The Federal Aviation Administration's Nondiscrimination statute (49 USC § 47123) (prohibits discrimination on the basis of race, color, national origin, and sex);
- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (ensures nondiscrimination against minority populations by discouraging programs, policies, and activities with disproportionately high and adverse human health or environmental effects on minority and low-income populations);
- Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency, and resulting agency guidance, national origin discrimination includes discrimination because of limited English proficiency (LEP). To ensure compliance with Title VI, you must take reasonable steps to ensure that LEP persons have meaningful access to your programs [70 Fed. Reg. 74087 (2005)];
- Title IX of the Education Amendments of 1972, as amended, which prohibits you from discriminating because of sex in education programs or activities (20 USC § 1681, et seq).

Compliance with Nondiscrimination Requirements:

During the performance of this contract, the Contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "Contractor"), agrees as follows:

1. **Compliance with Regulations:** The Contractor (hereinafter includes consultants) will comply with the Title VI List of Pertinent Nondiscrimination Acts and Authorities, as they may be amended from time to time, which are herein incorporated by reference and made a part of this contract.
2. **Nondiscrimination:** The Contractor, with regard to the work performed by it during the contract, will not discriminate on the grounds of race, color, national origin (including limited English proficiency), creed, sex (including sexual orientation and gender identity), age, or disability in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The Contractor will not participate directly or indirectly in the discrimination prohibited by the Nondiscrimination Acts and Authorities, including employment practices when the contract covers any activity, project, or program set forth in Appendix B of 49 CFR part 21.
3. **Solicitations for Subcontracts, including Procurements of Materials and Equipment:** In all solicitations, either by competitive bidding or negotiation made by the Contractor for work to be performed under a subcontract, including procurements of materials, or leases of equipment, each potential subcontractor or supplier will be notified by the Contractor of the contractor's obligations under this contract and the Nondiscrimination Acts and Authorities on the grounds of race, color, or national origin.
4. **Information and Reports:** The Contractor will provide all information and reports required by the Acts, the Regulations, and directives issued pursuant thereto and will permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the Sponsor or the Federal Aviation Administration to be pertinent to ascertain compliance with such Nondiscrimination Acts and Authorities and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish the information, the Contractor will so certify to the Sponsor or the Federal Aviation Administration, as appropriate, and will set forth what efforts it has made to obtain the information.
5. **Sanctions for Noncompliance:** In the event of a Contractor's noncompliance with the non-discrimination provisions of this contract, the Sponsor will impose such contract sanctions as it or the Federal Aviation Administration may determine to be appropriate, including, but not limited to:
    a. Withholding payments to the Contractor under the contract until the Contractor complies; and/or
    b. Cancelling, terminating, or suspending a contract, in whole or in part.
6. **Incorporation of Provisions: The Contractor will include the provisions <u>of paragraphs one through six in every subcontract,</u>** including procurements of materials and leases of equipment, unless exempt by the Acts, the Regulations, and directives issued pursuant thereto. The Contractor will take action with respect to any subcontract or procurement as the Sponsor or the Federal Aviation Administration may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, that if the Contractor becomes involved in, or is threatened with litigation by a subcontractor, or supplier because of such direction, the Contractor may request the Sponsor to enter into any litigation to protect the interests of the Sponsor. In addition, the Contractor may request the United States to enter into the litigation to protect the interests of the United States.

CLEAN AIR AND WATER POLLUTION CONTROL

(Refs: 2 CFR Part 200, Appendix II(G), 42 USC § 7401, et seq, 33 USC § 1251, et seq)

Contractor agrees to comply with all applicable standards, orders, and regulations issued pursuant to the Clean Air Act (42 USC §§ 7401-7671q) and the Federal Water Pollution Control Act as amended (33 USC §§ 1251-1387). The Contractor agrees to report any violation to the Owner immediately upon discovery. The Owner assumes responsibility for notifying the Environmental Protection Agency (EPA) and the Federal Aviation Administration.

Contractor must include this requirement in all subcontracts that exceed $150,000.

CONTRACT WORKHOURS AND SAFETY STANDARDS ACT REQUIREMENTS

(Refs: 2 CFR Part 200, Appendix II(E), 2 CFR § 5.5(b), 40 USC § 3702, 40 USC § 3704)

1. Overtime Requirements.

No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic, including watchmen and guards, in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

2. Violation; Liability for Unpaid Wages; Liquidated Damages.

In the event of any violation of the clause set forth in paragraph (1) of this clause, the Contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1) of this clause, in the sum of $29 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1) of this clause.

3. Withholding for Unpaid Wages and Liquidated Damages.

The Federal Aviation Administration (FAA) or the Owner shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2) of this clause.

4. Subcontractors.

The Contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraphs (1) through (4) and also a clause requiring the subcontractor to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1) through (4) of this clause.

COPELAND "ANTI-KICKBACK" ACT

(Refs: 2 CFR Part 200, Appendix II(D), 29 CFR Parts 3 and 5)

Contractor must comply with the requirements of the Copeland "Anti-Kickback" Act (18 USC 874 and 40 USC 3145), as supplemented by Department of Labor regulation 29 CFR part 3. Contractor and subcontractors are prohibited from inducing, by any means, any person employed on the project to give up any part of the compensation to which the employee is entitled. The Contractor and each Subcontractor must submit to the Owner, a weekly statement on the wages paid to each employee performing on covered work during the prior week. Owner must report any violations of the Act to the Federal Aviation Administration.

DAVIS-BACON REQUIREMENTS

(Refs: 2 CFR Part 200, Appendix II(D), 29 CFR Part 5, 49 USC § 47112(b), 40 USC §§ 3141-3144, 3146, and 3147)

1. Minimum Wages.

(i) All laborers and mechanics employed or working upon the site of the work will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by the Secretary of Labor under the Copeland Act (29 CFR Part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalent thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the Contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR § 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: *Provided,* that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under (1)(ii) of this section) and the Davis-Bacon

poster (WH-1321) shall be posted at all times by the Contractor and its subcontractors at the site of the work in a prominent and accessible place where it can easily be seen by the workers.

(ii)(A) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(1) The work to be performed by the classification requested is not performed by a classification in the wage determination;

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(B) If the Contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(C) In the event the Contractor, the laborers, or mechanics to be employed in the classification, or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to subparagraphs (1)(ii) (B) or (C) of this paragraph, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the Contractor does not make payments to a trustee or other third person, the Contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, *Provided,* that the Secretary of Labor has found, upon the written request of the Contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the Contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

2. Withholding. The Federal Aviation Administration or the Sponsor shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the Contractor under this contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the Contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the Federal Aviation Administration may, after written notice to the Contractor, Sponsor, Applicant, or Owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

3. Payrolls and Basic Records.

(i) Payrolls and basic records relating thereto shall be maintained by the Contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker; his or her correct classification; hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in 1(b)(2)(B) of the Davis-Bacon Act); daily and weekly number of hours worked; deductions made; and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the Contractor shall maintain records that show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual costs incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(ii)(A) The Contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the Federal Aviation Administration if the agency is a party to the contract, but if the agency is not such a party, the Contractor will submit the payrolls to the applicant, Sponsor, or Owner, as the case may be, for transmission to the Federal Aviation Administration. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR § 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (*e.g.,* the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH–347 is available for this purpose from the Wage and Hour Division Web site at *http://www.dol.gov/esa/whd/forms/wh347instr.htm* or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker

and shall provide them upon request to the Federal Aviation Administration if the agency is a party to the contract, but if the agency is not such a party, the Contractor will submit them to the applicant, Sponsor, or Owner, as the case may be, for transmission to the Federal Aviation Administration, the Contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the sponsoring government agency (or the applicant, Sponsor, or Owner).

(B) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the Contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be provided under 29 CFR § 5.5(a)(3)(ii), the appropriate information is being maintained under 29 CFR § 5.5 (a)(3)(i), and that such information is correct and complete;

(2) That each laborer and mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR Part 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the “Statement of Compliance” required by paragraph (3)(ii)(B) of this section.

(D) The falsification of any of the above certifications may subject the Contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 231 of Title 31 of the United States Code.

(iii) The Contractor or subcontractor shall make the records required under paragraph (3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the Sponsor, the Federal Aviation Administration, or the Department of Labor and shall permit such representatives to interview employees during working hours on the job. If the Contractor or subcontractor fails to submit the required records or to make them available, the Federal agency may, after written notice to the Contractor, Sponsor, applicant, or Owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR § 5.12.

4. Apprentices and Trainees.

(i) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training

Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the Contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the Contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) Trainees. Except as provided in 29 CFR § 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination that provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate that is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage

determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the Contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) Equal Employment Opportunity. The utilization of apprentices, trainees, and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.

5. Compliance with Copeland Act Requirements.

The Contractor shall comply with the requirements of 29 CFR Part 3, which are incorporated by reference in this contract.

6. Subcontracts.

The Contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR §§ 5.5(a)(1) through (10) and such other clauses as the Federal Aviation Administration may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR § 5.5.

7. Contract Termination: Debarment.

A breach of the contract clauses in paragraph 1 through 10 of this section may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR § 5.12.

8. Compliance with Davis-Bacon and Related Act Requirements.

All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR Parts 1, 3, and 5 are herein incorporated by reference in this contract.

9. Disputes Concerning Labor Standards.

Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR Parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the Contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

10. Certification of Eligibility.

(i) By entering into this contract, the Contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the Contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR § 5.12(a)(1).

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR § 5.12(a)(1).

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 USC § 1001.

CERTIFICATION OF OFFEROR/BIDDER REGARDING DEBARMENT

(Refs: 2 CFR Part 180 (Subpart B), 2 CFR Part 200, Appendix II(H), 2 CFR Part 1200, DOT Order 4200.5, Executive Orders 12549 and 12689)

By submitting a bid/proposal under this solicitation, the bidder or offeror certifies that neither it nor its principals are presently debarred or suspended by any Federal department or agency from participation in this transaction.

CERTIFICATION OF LOWER TIER CONTRACTORS REGARDING DEBARMENT

The successful bidder, by administering each lower tier subcontract that exceeds $25,000 as a "covered transaction", must confirm each lower tier participant of a "covered transaction" under the project is not presently debarred or otherwise disqualified from participation in this federally-assisted project. The successful bidder will accomplish this by:

1. Checking the System for Award Management at website: http://www.sam.gov
   Collecting a certification statement similar to the Certification of Offeror /Bidder Regarding Debarment, above.
2. Inserting a clause or condition in the covered transaction with the lower tier contract.

If the Federal Aviation Administration later determines that a lower tier participant failed to disclose to a higher tier participant that it was excluded or disqualified at the time it entered the covered transaction, the FAA may pursue any available remedies, including suspension and debarment of the non-compliant participant.

DISADVANTAGED BUSINESS ENTERPRISE

(Ref: 49 CFR Part 26)

The Contractor, subrecipient or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The Contractor shall carry out applicable requirements of 49 CFR part 26 in the award and administration of DOT-assisted contracts. Failure by the Contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the recipient deems appropriate, which may include, but is not limited to:

1) Withholding monthly progress payments;
2) Assessing sanctions;
3) Liquidated damages; and/or
4) Disqualifying the Contractor from future bidding as non-responsible.

Prompt Payment (49 CFR § 26.29)

The prime contractor agrees to pay each subcontractor under this prime contract for satisfactory performance of its contract no later than 30 days from the receipt of each payment the prime contractor receives from Ogden City Corporation. The prime contractor agrees further to return retainage payments

to each subcontractor within 30 days after the subcontractor's work is satisfactorily completed. Any delay or postponement of payment from the above referenced time frame may occur only for good cause following written approval of the Ogden City Corporation. This clause applies to both DBE and non-DBE subcontractors.

TEXTING WHEN DRIVING

(Refs: Executive Order 13513, DOT Order 3902.10)

In accordance with Executive Order 13513, "Federal Leadership on Reducing Text Messaging While Driving", (10/1/2009) and DOT Order 3902.10, "Text Messaging While Driving", (12/30/2009), the Federal Aviation Administration encourages recipients of Federal grant funds to adopt and enforce safety policies that decrease crashes by distracted drivers, including policies to ban text messaging while driving when performing work related to a grant or subgrant.

In support of this initiative, the Owner encourages the Contractor to promote policies and initiatives for its employees and other work personnel that decrease crashes by distracted drivers, including policies that ban text messaging while driving motor vehicles while performing work activities associated with the project. The Contractor must include the substance of this clause in all sub-tier contracts exceeding $10,000 that involve driving a motor vehicle in performance of work activities associated with the project.

PROHIBITION ON CERTAIN TELECOMMUNICATIONS AND VIDEO SURVEILLANCE SERVICES OR EQUIPMENT

(Refs: 2 CFR § 200, Appendix II(K), 2 CFR § 200.216)

Contractor and Subcontractor agree to comply with mandatory standards and policies relating to use and procurement of certain telecommunications and video surveillance services or equipment in compliance with the National Defense Authorization Act [Public Law 115-232 § 889(f)(1)].

EQUAL OPPORTUNITY CONTRACT CLAUSE

(Refs: 2 CFR Part 200, Appendix II(C), 41 CFR § 60-1.4, 41 CFR § 60-4.3, Executive Order 11246)

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, color, religion, sex, sexual orientation, gender identity, or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, sexual orientation, gender identify, or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff, or termination; 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 to be provided setting forth the provisions of this 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, color, religion, sex, sexual orientation, gender identity, or national origin.

(3) The Contractor will not discharge or in any other manner discriminate against any employee or applicant for employment because such employee or applicant has inquired about, discussed, or disclosed the compensation of the employee or applicant or another employee or applicant. This provision shall not apply to instances in which an employee who has access to the compensation information of other employees or applicants as a part of such employee's essential job functions discloses the compensation of such other employees or applicants to individuals who do not otherwise have access to such information, unless such disclosure is in response to a formal complaint or charge, in furtherance of an investigation, proceeding, hearing, or action, including an investigation conducted by the employer, or is consistent with the contractor's legal duty to furnish information.

(4) 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 to be provided by the agency contracting officer, advising the labor union or workers' representative of the Contractor's commitments under this section 202 of Executive Order 11246 of September 24, 1965, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(5) The Contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.

(6) The Contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by the rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the contracting agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(7) In the event of the Contractor's noncompliance with the nondiscrimination clauses of this contract or with any such rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and the Contractor may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

(8) The Contractor will include the provisions of paragraphs (1) through (8) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as may be directed by the Secretary of Labor 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 with a subcontractor or vendor as a result of such direction, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

STANDARD FEDERAL EQUAL EMPLOYMENT OPPORTUNITY
CONSTRUCTION CONTRACT SPECIFICATIONS

1. As used in these specifications:

a. "Covered area" means the geographical area described in the solicitation from which this contract resulted;

b. "Director" means Director, Office of Federal Contract Compliance Programs (OFCCP), U.S. Department of Labor, or any person to whom the Director delegates authority;

c. "Employer identification number" means the Federal social security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941;

d. "Minority" includes:

(1) Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);

(2) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race);

(3) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and

(4) American Indian or Alaskan native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).

2. **Whenever the Contractor, or any subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of $10,000 the provisions of these specifications** and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.

3. If the Contractor is participating (pursuant to 41 CFR part 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each Contractor or subcontractor participating in an approved plan is individually required to comply with its obligations under the EEO clause and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other Contractors or subcontractors toward a goal in an approved Plan does not excuse any covered Contractor's or subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.

4. The Contractor shall implement the specific affirmative action standards provided in paragraphs 7a through 7p of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and

female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. Covered construction contractors performing construction work in a geographical area where they do not have a Federal or federally assisted construction contract shall apply the minority and female goals established for the geographical area where the work is being performed. Goals are published periodically in the Federal Register in notice form, and such notices may be obtained from any Office of Federal Contract Compliance Programs office or from Federal procurement contracting officers. The Contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specified.

5. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the Contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant thereto.

6. In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.

7. The Contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully, and shall implement affirmative action steps at least as extensive as the following:

a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the Contractor's employees are assigned to work. The Contractor, where possible, will assign two or more women to each construction project. The Contractor shall specifically ensure that all foremen, superintendents, and other onsite supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.

b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.

c. Maintain a current file of the names, addresses, and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source, or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the Contractor, this shall be documented in the file with the reason therefore, along with whatever additional actions the Contractor may have taken.

d. Provide immediate written notification to the Director when the union or unions with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority

person or woman sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligations.

e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources compiled under 7b above.

f. Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.

g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination, or other employment decisions including specific review of these items with onsite supervisory personnel such superintendents, general foremen, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

h. Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the Contractor's EEO policy with other contractors and subcontractors with whom the Contractor does or anticipates doing business.

i. Direct its recruitment efforts, both oral and written, to minority, female, and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the Contractor shall send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.

j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer, and vacation employment to minority and female youth both on the site and in other areas of a contractor's work force.

k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR part 60-3.

l. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel, for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.

m. Ensure that seniority practices, job classifications, work assignments, and other personnel practices do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.

n. Ensure that all facilities and company activities are nonsegregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.

o. Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.

p. Conduct a review, at least annually, of all supervisor's adherence to and performance under the Contractor's EEO policies and affirmative action obligations.

8. Contractors are encouraged to participate in voluntary associations, which assist in fulfilling one or more of their affirmative action obligations (7a through 7p). The efforts of a contractor association, joint contractor-union, contractor-community, or other similar group of which the Contractor is a member and participant may be asserted as fulfilling any one or more of its obligations under 7a through 7p of these specifications provided that the Contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female workforce participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's noncompliance.

9. A single goal for minorities and a separate single goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even though the Contractor has achieved its goals for women generally, the Contractor may be in violation of the Executive Order if a specific minority group of women is underutilized).

10. The Contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex, sexual orientation, gender identity, or national origin.

11. The Contractor shall not enter into any subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.

12. The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination, and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs. Any contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.

13. The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7 of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR part 60-4.8.

14. The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government, and to keep records. Records shall at least include for each employee, the name, address, telephone numbers, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice, trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.

15. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g. those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

FEDERAL FAIR LABOR STANDARDS ACT CLAUSE

(Refs: 29 USC § 201, et seq, 2 CFR § 200.430)

All contracts and subcontracts that result from this solicitation incorporate by reference the provisions of 29 CFR part 201, et seq, the Federal Fair Labor Standards Act (FLSA), with the same force and effect as if given in full text. The FLSA sets minimum wage, overtime pay, recordkeeping, and child labor standards for full and part-time workers.

The *Contractor* has full responsibility to monitor compliance to the referenced statute or regulation. The *Contractor* must address any claims or disputes that arise from this requirement directly with the U.S. Department of Labor – Wage and Hour Division.

CERTIFICATION REGARDING LOBBYING

(Refs: 31 USC § 1352 – Byrd Anti-Lobbying Amendment, 2 CFR Part 200, Appendix II(I), 49 CFR Part 20, Appendix A)

The Bidder or Offeror certifies by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the Bidder or Offeror, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a

Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all sub-awards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all sub-recipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

PROHIBITION OF SEGREGATED FACILITIES

(Refs: 2 CFR Part 200, Appendix II(C), 41 CFR Part 60-1)

(a) The Contractor agrees that it does not and will not maintain or provide for its employees any segregated facilities at any of its establishments, and that it does not and will not permit its employees to perform their services at any location under its control where segregated facilities are maintained. The Contractor agrees that a breach of this clause is a violation of the Equal Employment Opportunity clause in this contract.

(b) "Segregated facilities," as used in this clause, means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees that are segregated by explicit directive or are in fact segregated on the basis of race, color, religion, sex, sexual orientation, gender identity, or national origin because of written or oral policies or employee custom. The term does not include separate or single-user rest rooms or necessary dressing or sleeping areas provided to assure privacy between the sexes.

(c) The Contractor shall include this clause in every subcontract and purchase order that is subject to the Equal Employment Opportunity clause of this contract.

OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970

(Ref: 29 CFR Part 1910)

All contracts and subcontracts that result from this solicitation incorporate by reference the requirements of 29 CFR Part 1910 with the same force and effect as if given in full text. The employer must provide a work environment that is free from recognized hazards that may cause death or serious physical harm to the employee. The employer retains full responsibility to monitor its compliance and their subcontractor's compliance with the applicable requirements of the Occupational Safety and Health Act of 1970 (29 CFR Part 1910). The employer must address any claims or disputes that pertain to a referenced requirement directly with the U.S. Department of Labor – Occupational Safety and Health Administration.

PROCUREMENT OF RECOVERED MATERIALS

(Refs: 2 CFR § 200.323, 2 CFR Part 200, Appendix II(J), 40 CFR Part 247, 42 USC § 6901, et seq (Resource Conservation and Recovery Act (RCRA)))

Contractor and subcontractor agree to comply with Section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act, and the regulatory provisions of 40 CFR Part 247. In the performance of this contract and to the extent practicable, the Contractor and subcontractors are to use products containing the highest percentage of recovered materials for items designated by the Environmental Protection Agency (EPA) under 40 CFR Part 247 whenever:

1) The contract requires procurement of $10,000 or more of a designated item during the fiscal year; or
2) The contractor has procured $10,000 or more of a designated item using Federal funding during the previous fiscal year.

The list of EPA-designated items is available at www.epa.gov/smm/comprehensive-procurement-guidelines-construction-products.

Section 6002(c) establishes exceptions to the preference for recovery of EPA-designated products if the contractor can demonstrate the item is:

a) Not reasonably available within a timeframe providing for compliance with the contract performance schedule;
b) Fails to meet reasonable contract performance requirements; or
c) Is only available at an unreasonable price.

SEISMIC SAFETY

(Ref: 49 CFR Part 41)

The Contractor agrees to ensure that all work performed under this contract, including work performed by subcontractors, conforms to a building code standard that provides a level of seismic safety substantially equivalent to standards established by the National Earthquake Hazards Reduction Program (NEHRP). Local building codes that model their codes after the current version of the International Building Code (IBC) meet the NEHRP equivalency level for seismic safety.

CERTIFICATION OF OFFEROR/BIDDER REGARDING TAX DELINQUENCY AND FELONY CONVICTIONS

(Refs: Section 8113 of the Consolidated Appropriations Act, 2022 (Public Law 117-103) and similar provisions in subsequent appropriations acts. DOT Order 4200.6 – Appropriations Act Requirements for Procurement and Non-Procurement Regarding Tax Delinquency and Felony Convictions)

The applicant must complete the following two certification statements. The applicant must indicate its current status as it relates to tax delinquency and felony conviction by inserting a checkmark (✓) in the space following the applicable response. The applicant agrees that, if awarded a contract resulting from this solicitation, it will incorporate this provision for certification in all lower tier subcontracts.

Certifications

1) The applicant represents that it is ( ) is not ( ) a corporation that has any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability.

2) The applicant represents that it is ( ) is not ( ) a corporation that was convicted of a criminal violation under any Federal law within the preceding 24 months.

Note

If an applicant responds in the affirmative to either of the above representations, the applicant is ineligible to receive an award unless the Sponsor has received notification from the agency suspension and debarment official (SDO) that the SDO has considered suspension or debarment and determined that further action is not required to protect the Government's interests. The applicant therefore must provide information to the owner about its tax liability or conviction to the Owner, who will then notify the FAA Airports District Office, which will then notify the agency's SDO to facilitate completion of the required considerations before award decisions are made.

Term Definitions

> **Felony conviction:** Felony conviction means a conviction within the preceding twenty-four (24) months of a felony criminal violation under any Federal law and includes conviction of an offense defined in a section of the U.S. Code that specifically classifies the offense as a felony and conviction of an offense that is classified as a felony under 18 USC § 3559.

Tax Delinquency: A tax delinquency is any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted, or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability.

TERMINATION FOR CONVENIENCE (CONSTRUCTION & EQUIPMENT CONTRACTS)

(Refs: 2 CFR Part 200, Appendix II(B), FAA Advisory Circular 150/5370-10, Section 80-09)

The Owner may terminate this contract in whole or in part at any time by providing written notice to the Contractor. Such action may be without cause and without prejudice to any other right or remedy of Owner. Upon receipt of a written notice of termination, except as explicitly directed by the Owner, the Contractor shall immediately proceed with the following obligations regardless of any delay in determining or adjusting amounts due under this clause:

1. Contractor must immediately discontinue work as specified in the written notice.
2. Terminate all subcontracts to the extent they relate to the work terminated under the notice.
3. Discontinue orders for materials and services except as directed by the written notice.
4. Deliver to the Owner all fabricated and partially fabricated parts, completed and partially completed work, supplies, equipment and materials acquired prior to termination of the work, and as directed in the written notice.
5. Complete performance of the work not terminated by the notice.
6. Take action as directed by the Owner to protect and preserve property and work related to this contract that Owner will take possession.

Owner agrees to pay Contractor for:

1. Completed and acceptable work executed in accordance with the contract documents prior to the effective date of termination;
2. Documented expenses sustained prior to the effective date of termination in performing work and furnishing labor, materials, or equipment as required by the contract documents in connection with uncompleted work;
3. Reasonable and substantiated claims, costs, and damages incurred in settlement of terminated contracts with Subcontractors and Suppliers; and
4. Reasonable and substantiated expenses to the Contractor directly attributable to Owner's termination action.

Owner will not pay Contractor for loss of anticipated profits or revenue or other economic loss arising out of or resulting from the Owner's termination action.

The rights and remedies this clause provide are in addition to any other rights and remedies provided by law or under this contract.

TERMINATION FOR CAUSE (CONSTRUCTION)

Section 80-09 of FAA Advisory Circular 150/5370-10 establishes standard language for conditions, rights, and remedies associated with Owner termination of this contract for cause due to default of the Contractor.

TRADE RESTRICTION CERTIFICATION

(Refs: 49 USC § 50104, 49 CFR Part 30)

By submission of an offer, the Offeror certifies that with respect to this solicitation and any resultant contract, the Offeror –

1) is not owned or controlled by one or more citizens of a foreign country included in the list of countries that discriminate against U.S. firms as published by the Office of the United States Trade Representative (USTR);

2) has not knowingly entered into any contract or subcontract for this project with a person that is a citizen or national of a foreign country included on the list of countries that discriminate against U.S. firms as published by the USTR; and

3) has not entered into any subcontract for any product to be used on the Federal project that is produced in a foreign country included on the list of countries that discriminate against U.S. firms published by the USTR.

This certification concerns a matter within the jurisdiction of an agency of the United States of America and the making of a false, fictitious, or fraudulent certification may render the maker subject to prosecution under Title 18 USC § 1001.

The Offeror/Contractor must provide immediate written notice to the Owner if the Offeror/Contractor learns that its certification or that of a subcontractor was erroneous when submitted or has become erroneous by reason of changed circumstances. The Contractor must require subcontractors provide immediate written notice to the Contractor if at any time it learns that its certification was erroneous by reason of changed circumstances.

Unless the restrictions of this clause are waived by the Secretary of Transportation in accordance with 49 CFR § 30.17, no contract shall be awarded to an Offeror or subcontractor:

1) who is owned or controlled by one or more citizens or nationals of a foreign country included on the list of countries that discriminate against U.S. firms published by the USTR; or
2) whose subcontractors are owned or controlled by one or more citizens or nationals of a foreign country on such USTR list; or
3) who incorporates in the public works project any product of a foreign country on such USTR list.

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

The Offeror agrees that, if awarded a contract resulting from this solicitation, it will incorporate this provision for certification without modification in all lower tier subcontracts. The Contractor may rely on the certification of a prospective subcontractor that it is not a firm from a foreign country included on the list of countries that discriminate against U.S. firms as published by USTR, unless the Offeror has knowledge that the certification is erroneous.

This certification is a material representation of fact upon which reliance was placed when making an award. If it is later determined that the Contractor or subcontractor knowingly rendered an erroneous

certification, the Federal Aviation Administration (FAA) may direct through the Owner cancellation of the contract or subcontract for default at no cost to the Owner or the FAA.

VETERAN'S PREFERENCE

(Ref: 49 USC § 47112(c))

In the employment of labor (excluding executive, administrative, and supervisory positions), the Contractor and all sub-tier contractors must give preference to covered veterans as defined within Title 49 United States Code Section 47112. Covered veterans include Vietnam-era veterans, Persian Gulf veterans, Afghanistan-Iraq war veterans, disabled veterans, and small business concerns (as defined by 15 USC § 632) owned and controlled by disabled veterans. This preference only applies when there are covered veterans readily available and qualified to perform the work to which the employment relates.

CERTIFICATION REGARDING DOMESTIC PREFERENCES FOR PROCUREMENTS

(Refs: 2 CFR § 200.322; 2 CFR Part 200, Appendix II(L))

The Bidder or Offeror certifies by signing and submitting this bid or proposal that, to the greatest extent practicable, the Bidder or Offeror has provided a preference for the purchase, acquisition, or use of goods, products, or materials produced in the United States (including, but not limited to, iron, aluminum, steel, cement, and other manufactured products) in compliance with 2 CFR § 200.322.

END OF FEDERAL CONTRACT PROVISIONS

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SECTION 80 EXECUTION AND PROGRESS

80-01 Subletting of contract. The Owner will not recognize any subcontractor on the work. The Contractor shall at all times when work is in progress be represented either in person, by a qualified superintendent, or by other designated, qualified representative who is duly authorized to receive and execute orders of the Resident Project Representative (RPR).

The Contractor shall perform, with his organization, an amount of work equal to at least 25 percent of the total contract cost.

Should the Contractor elect to assign their contract, said assignment shall be concurred in by the surety, shall be presented for the consideration and approval of the Owner, and shall be consummated only on the written approval of the Owner.

The Contractor shall provide copies of all subcontracts to the RPR 14 days prior to being utilized on the project. As a minimum, the information shall include the following:

- Subcontractor's legal company name.
- Subcontractor's legal company address, including County name.
- Principal contact person's name, telephone and fax number.
- Complete narrative description, and dollar value of the work to be performed by the subcontractor.
- Copies of required insurance certificates in accordance with the specifications.

Minority/ non-minority status.

80-02 Notice to proceed (NTP). The Owners notice to proceed will state the date on which contract time commences. The Contractor is expected to commence project operations within 10 days of the NTP date. The Contractor shall notify the RPR at least 3 Days in advance of the time contract operations begins. The Contractor shall not commence any actual operations prior to the date on which the notice to proceed is issued by the Owner.

80-03 Execution and progress. Unless otherwise specified, the Contractor shall submit their coordinated construction schedule showing all work activities for the RPR's review and acceptance at least 10 days prior to the start of work. The Contractor's progress schedule, once accepted by the RPR, will represent the Contractor's baseline plan to accomplish the project in accordance with the terms and conditions of the Contract. The RPR will compare actual Contractor progress against the baseline schedule to determine that status of the Contractor's performance. The Contractor shall provide sufficient materials, equipment, and labor to guarantee the completion of the project in accordance with the plans and specifications within the time set forth in the proposal.

If the Contractor falls significantly behind the submitted schedule, the Contractor shall, upon the RPR's request, submit a revised schedule for completion of the work within the contract time and modify their operations to provide such additional materials, equipment, and labor necessary to meet the revised schedule. Should the execution of the work be discontinued for any reason, the Contractor shall notify the RPR at least 48 hours in advance of resuming operations.

The Contractor shall not commence any actual construction prior to the date on which the NTP is issued by the Owner.

The project schedule shall be prepared as a network diagram in Critical Path Method (CPM), Program Evaluation and Review Technique (PERT), or other format, or as otherwise specified. It shall include information on the sequence of work activities, milestone dates, and activity duration. The schedule shall show all work items identified in the project proposal for each work area and shall include the project start date and end date.

The Contractor shall maintain the work schedule and provide an update and analysis of the progress schedule on a **weekly** basis, or as otherwise specified in the contract. Submission of the work schedule shall not relieve the Contractor of overall responsibility for scheduling, sequencing, and coordinating all work to comply with the requirements of the contract.

80-04 Limitation of operations. The Contractor shall control their operations and the operations of their subcontractors and all suppliers to provide for the free and unobstructed movement of aircraft in the air operations areas (AOA) of the airport.

When the work requires the Contractor to conduct their operations within an AOA of the airport, the work shall be coordinated with airport operations (through the RPR) at least 48 hours prior to commencement of such work. The Contractor shall not close an AOA until so authorized by the RPR and until the necessary temporary marking, signage and associated lighting is in place as provided in Section 70, paragraph 70-08, *Construction Safety and Phasing Plan (CSPP)*.

When the contract work requires the Contractor to work within an AOA of the airport on an intermittent basis (intermittent opening and closing of the AOA), the Contractor shall maintain constant communications as specified; immediately obey all instructions to vacate the AOA; and immediately obey all instructions to resume work in such AOA. Failure to maintain the specified communications or to obey instructions shall be cause for suspension of the Contractor's operations in the AOA until satisfactory conditions are provided. The areas of the AOA identified in the Construction Safety Phasing Plan (CSPP) and as listed below, cannot be closed to operating aircraft to permit the Contractor's operations on a continuous basis and will therefore be closed to aircraft operations intermittently as follows:

See Construction Safety and Phasing Plans.

The Contractor shall be required to conform to safety standards contained in AC 150/5370-2, Operational Safety on Airports During Construction and the approved CSPP.

80-04.1 Operational safety on airport during construction. All Contractors' operations shall be conducted in accordance with the approved project Construction Safety and Phasing Plan (CSPP) and the Safety Plan Compliance Document (SPCD) and the provisions set forth within the current version of AC 150/5370-2, Operational Safety on Airports During Construction. The CSPP included within the contract documents conveys minimum requirements for operational safety on the airport during construction activities. The Contractor shall prepare and submit a SPCD that details how it proposes to comply with the requirements presented within the CSPP.

The Contractor shall implement all necessary safety plan measures prior to commencement of any work activity. The Contractor shall conduct routine checks to assure compliance with the safety plan measures.

The Contractor is responsible to the Owner for the conduct of all subcontractors it employs on the project. The Contractor shall assure that all subcontractors are made aware of the requirements of the CSPP and SPCD and that they implement and maintain all necessary measures.

No deviation or modifications may be made to the approved CSPP and SPCD unless approved in writing by the Owner. The necessary coordination actions to review Contractor proposed modifications to an approved CSPP or approved SPCD can require a significant amount of time.

80-05 Character of workers, methods, and equipment. The Contractor shall, at all times, employ sufficient labor and equipment for prosecuting the work to full completion in the manner and time required by the contract, plans, and specifications.

All workers shall have sufficient skill and experience to perform properly the work assigned to them. Workers engaged in special work or skilled work shall have sufficient experience in such work and in the operation of the equipment required to perform the work satisfactorily.

Any person employed by the Contractor or by any subcontractor who violates any operational regulations or operational safety requirements and, in the opinion of the RPR, does not perform his work in a proper and skillful manner or is intemperate or disorderly shall, at the written request of the RPR, be removed immediately by the Contractor or subcontractor employing such person, and shall not be employed again in any portion of the work without approval of the RPR.

Should the Contractor fail to remove such person or persons or fail to furnish suitable and sufficient personnel for the proper execution of the work, the RPR may suspend the work by written notice until compliance with such orders.

All equipment that is proposed to be used on the work shall be of sufficient size and in such mechanical condition as to meet requirements of the work and to produce a satisfactory quality of work. Equipment used on any portion of the work shall not cause injury to previously completed work, adjacent property, or existing airport facilities due to its use.

When the methods and equipment to be used by the Contractor in accomplishing the work are not prescribed in the contract, the Contractor is free to use any methods or equipment that will accomplish the work in conformity with the requirements of the contract, plans, and specifications.

When the contract specifies the use of certain methods and equipment, such methods and equipment shall be used unless otherwise authorized by the RPR. If the Contractor desires to use a method or type of equipment other than specified in the contract, the Contractor may request authority from the RPR to do so. The request shall be in writing and shall include a full description of the methods and equipment proposed and of the reasons for desiring to make the change. If approval is given, it will be on the condition that the Contractor will be fully responsible for producing work in conformity with contract requirements. If, after trial use of the substituted methods or equipment, the RPR determines that the work produced does not meet contract requirements, the Contractor shall discontinue the use of the substitute method or equipment and shall complete the remaining work with the specified methods and equipment. The Contractor shall remove any deficient work and replace it with work of specified quality or take such other corrective action as the RPR may direct. No change will be made in basis of payment for the contract items involved nor in contract time as a result of authorizing a change in methods or equipment under this paragraph.

80-06 Temporary suspension of the work. The Owner shall have the authority to suspend the work wholly, or in part, for such period or periods the Owner may deem necessary, due to unsuitable weather, or other conditions considered unfavorable for the execution of the work, or for such time necessary due to the failure on the part of the Contractor to carry out orders given or perform any or all provisions of the contract.

In the event that the Contractor is ordered by the Owner, in writing, to suspend work for some unforeseen cause not otherwise provided for in the contract and over which the Contractor has no control, the Contractor may be reimbursed for actual money expended on the work during the period of shutdown. No allowance will be made for anticipated profits. The period of shutdown shall be computed from the effective date of the written order to suspend work to the effective date of the written order to resume the work. Claims for such compensation shall be filed with the RPR within the time period stated in the RPR's order to resume work. The Contractor shall submit with their own claim information substantiating the amount shown on the claim. The RPR will forward the Contractor's claim to the Owner for consideration in

accordance with local laws or ordinances. No provision of this article shall be construed as entitling the Contractor to compensation for delays due to inclement weather or for any other delay provided for in the contract, plans, or specifications.

If it becomes necessary to suspend work for an indefinite period, the Contractor shall store all materials in such manner that they will not become an obstruction nor become damaged in any way. The Contractor shall take every precaution to prevent damage or deterioration of the work performed and provide for normal drainage of the work. The Contractor shall erect temporary structures where necessary to provide for traffic on, to, or from the airport.

80-07 Determination and extension of contract time. The number of calendar days shall be stated in the proposal and contract and shall be known as the Contract Time.

If the contract time requires extension for reasons beyond the Contractor's control, it shall be adjusted as follows:

80-07.1 Contract time based on calendar days. Contract Time based on calendar days shall consist of the number of calendar days stated in the contract counting from the effective date of the Notice to Proceed and including all Saturdays, Sundays, holidays, and non-work days. All calendar days elapsing between the effective dates of the Owner's orders to suspend and resume all work, due to causes not the fault of the Contractor, shall be excluded.

At the time of final payment, the contract time shall be increased in the same proportion as the cost of the actually completed quantities bears to the cost of the originally estimated quantities in the proposal. Such increase in the contract time shall not consider either cost of work or the extension of contract time that has been covered by a change order or supplemental agreement. Charges against the contract time will cease as of the date of final acceptance.

80-08 Failure to complete on time. For each calendar day or working day, as specified in the contract, that any work remains uncompleted after the contract time (including all extensions and adjustments as provided in paragraph 80-07, *Determination and Extension of Contract Time*) the sum specified in the contract and proposal as liquidated damages (LD) will be deducted from any money due or to become due the Contractor or their own surety. Such deducted sums shall not be deducted as a penalty but shall be considered as liquidation of a reasonable portion of damages including but not limited to additional engineering services that will be incurred by the Owner should the Contractor fail to complete the work in the time provided in their contract.

Bid Schedule	Liquidated Damages Cost	Allowed Construction Time
Mobilization	up to $250/calendar day for each RPR plus any incurred expenses (per diem, lodging, vehicle rental, etc.) as determined by the RPR.	30 calendar days
Phase 1	up to $250/calendar day for airport operational costs as determined by the RPR.	300 calendar days

Permitting the Contractor to continue and finish the work or any part of it after the time fixed for its completion, or after the date to which the time for completion may have been extended, will in no way operate as a wavier on the part of the Owner of any of its rights under the contract.

80-09 Default and termination of contract. The Contractor shall be considered in default of their contract and such default will be considered as cause for the Owner to terminate the contract for any of the following reasons, if the Contractor:

a. Fails to begin the work under the contract within the time specified in the Notice to Proceed, or

b. Fails to perform the work or fails to provide sufficient workers, equipment and/or materials to assure completion of work in accordance with the terms of the contract, or

c. Performs the work unsuitably or neglects or refuses to remove materials or to perform anew such work as may be rejected as unacceptable and unsuitable, or

d. Discontinues the execution of the work, or

e. Fails to resume work which has been discontinued within a reasonable time after notice to do so, or

f. Becomes insolvent or is declared bankrupt, or commits any act of bankruptcy or insolvency, or

g. Allows any final judgment to stand against the Contractor unsatisfied for a period of 10 days, or

h. Makes an assignment for the benefit of creditors, or

i. For any other cause whatsoever, fails to carry on the work in an acceptable manner.

Should the Owner consider the Contractor in default of the contract for any reason above, the Owner shall immediately give written notice to the Contractor and the Contractor's surety as to the reasons for considering the Contractor in default and the Owner's intentions to terminate the contract.

If the Contractor or surety, within a period of 10 days after such notice, does not proceed in accordance therewith, then the Owner will, upon written notification from the RPR of the facts of such delay, neglect, or default and the Contractor's failure to comply with such notice, have full power and authority without violating the contract, to take the execution of the work out of the hands of the Contractor. The Owner may appropriate or use any or all materials and equipment that have been mobilized for use in the work and are acceptable and may enter into an agreement for the completion of said contract according to the terms and provisions thereof, or use such other methods as in the opinion of the RPR will be required for the completion of said contract in an acceptable manner.

All costs and charges incurred by the Owner, together with the cost of completing the work under contract, will be deducted from any monies due or which may become due the Contractor. If such expense exceeds the sum which would have been payable under the contract, then the Contractor and the surety shall be liable and shall pay to the Owner the amount of such excess.

80-10 Termination for national emergencies. The Owner shall terminate the contract or portion thereof by written notice when the Contractor is prevented from proceeding with the construction contract as a direct result of an Executive Order of the President with respect to the execution of war or in the interest of national defense.

When the contract, or any portion thereof, is terminated before completion of all items of work in the contract, payment will be made for the actual number of units or items of work completed at the contract price or as mutually agreed for items of work partially completed or not started. No claims or loss of anticipated profits shall be considered.

Reimbursement for organization of the work, and other overhead expenses, (when not otherwise included in the contract) and moving equipment and materials to and from the job will be considered, the intent being that an equitable settlement will be made with the Contractor.

Acceptable materials obtained or ordered by the Contractor for the work and that are not incorporated in the work shall, at the option of the Contractor, be purchased from the Contractor at actual cost as shown by receipted bills and actual cost records at such points of delivery as may be designated by the RPR.

Termination of the contract or a portion thereof shall neither relieve the Contractor of their responsibilities for the completed work nor shall it relieve their surety of its obligation for and concerning any just claim arising out of the work performed.

80-11 Work area, storage area and sequence of operations. The Contractor shall obtain approval from the RPR prior to beginning any work in all areas of the airport. No operating runway, taxiway, or air operations area (AOA) shall be crossed, entered, or obstructed while it is operational. The Contractor shall plan and coordinate work in accordance with the approved CSPP and SPCD.

END OF SECTION 80

CONSTRUCTION SAFETY AND PHASING PLAN

Front Terminal Expansion

Ogden Airport

3909 Airport Road, Ogden, Utah, 84405

June 29, 2024

Issued for Bid

Mead&Hunt

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I. OVERVIEW 1
II. PURPOSE 1
III. CONSTRUCTION SAFETY AND PHASING RESPONSIBILITIES 1
A. AIRPORT OPERATOR 1
B. CONSTRUCTION CONTRACTOR 1
C. AIRPORT USERS AND TENANTS 2
D. RESIDENT PROJECT REPRESENTATIVE (RPR) 2
IV. CONSTRUCTION SAFETY AND PHASING 2
A. COORDINATION 2
B. PHASING AND TIME LIMITATIONS 3
C. AREAS AND OPERATIONS AFFECTED BY CONSTRUCTION 5
D. NAVAID PROTECTION 7
E. CONTRACTOR ACCESS 7
F. WILDLIFE MANAGEMENT 9
G. FOREIGN OBJECT DEBRIS (FOD) MANAGEMENT AND DUST CONTROL 9
H. HAZARDOUS MATERIALS (HAZMAT) MANAGEMENT 10
I. NOTIFICATION OF CONSTRUCTION ACTIVITIES 11
J. INSPECTION REQUIREMENTS 12
K. UNDERGROUND UTILITIES AND NOTIFICATION RESPONSIBILITIES. 13
L. PENALTIES 13
M. SPECIAL CONDITIONS 13
N. RUNWAY AND TAXIWAY VISUAL AIDS 14
O. MARKING AND SIGNS FOR ACCESS ROUTES 15
P. HAZARD MARKING AND LIGHTING 15
Q. PROTECTION OF RUNWAY AND TAXIWAY CRITICAL AREAS 16
R. PROTECTION OF RUNWAY AND TAXIWAY CRITICAL AREAS 16
S. OTHER LIMITATIONS ON CONSTRUCTION 18
T. SAFETY PLAN COMPLIANCE DOCUMENT (SPCD) 20

SUPPLEMENTS TO THIS CSPP

Supplement 1 - Safety Plan Compliance Document, Example

Supplement 2 – Daily Safety Inspection Checklist

Supplement 3 – Definition of Terms

Supplement 4 – Construction Safety and Phasing Plan Sheet

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I. OVERVIEW

This document presents the Construction Safety and Phasing Plan (CSPP) for the Front Terminal Expansion project at Ogden Airport (Airport). This project is being constructed with local and FAA funding. Work on this project will be completed in one phase based upon available funding at the time of award. Construction is scheduled to start during the summer of of 2024. The work is expected to be completed over 300 calendar days.

The objective of this CSPP is to provide a general outline of the construction safety and phasing provisions for working in or near the Air Operations Area (AOA) contained in the bid documents (Project Plans and Specifications), and to explain how those provisions will be implemented during construction.

II. PURPOSE

The CSPP provides single source information for all Project and Airport personnel to use during construction, and defines the specific responsibilities of the Airport Operator, the Contractor, Airport users/tenants, and the Consulting Engineer. The FAA's Safety and Phasing Plan Checklist was utilized in the preparation of this CSPP, which includes (but is not limited to) provisions for Airport safety and security, operational limitations on construction activities, identifying potential hazards and the impacts those hazards may have on airfield and construction activities, and construction phasing requirements to maximize safety for aircraft and equipment.

Requirements for maintaining operational safety during construction are in conformance with FAA Advisory Circular 150/5370-2G, "Operational Safety on Airports During Construction." The Project specific safety and phasing provisions for the Project elements are shown in the Plans as well as detailed in the Project Specifications.

III. CONSTRUCTION SAFETY AND PHASING RESPONSIBILITIES

A. AIRPORT OPERATOR

The Airport Operator is responsible for operational safety on the Airport at all times. Ogden Airport (Airport) is the Airport Operator. The Airport will issue Notices to Air Missions (NOTAMS) whenever construction activities occur in the AOA. Airport staff will provide oversight of all construction activities and coordinate those activities with FAA personnel, Air Traffic Control (ATC) personnel, Airport users (pilots), and Airport tenants. The Airport will host weekly construction progress and safety meetings. During those meetings, operational safety will be reviewed and an action plan will be developed as needed to address any discrepancies in safety that need to be corrected. The Contractor is required to submit a Safety Plan Compliance Document (SPCD) which details the Contractor's compliance with the CSPP and conditions outlined in the 7460. The Airport's approval of the SPCD will be required prior to issuance of the Notice to Proceed with Construction.

B. CONSTRUCTION CONTRACTOR

The Contractor will be chosen by Ogden City through an open bidding process. The Contractor will be required to attend weekly progress and safety meetings and to correct any discrepancies found in safety.

The Contractor is required to prepare and submit a completed SPCD to the Airport for approval before the Notice to Proceed for Construction can be issued. A sample SPCD is included as Supplement 1.

C. AIRPORT USERS AND TENANTS

The Airport will notify Airport users and tenants of all pending construction activities that impact them and advise the users and tenants of planned pavement closures and other activities near the AOA that will affect aircraft/Airport operations. Users and tenants will be permitted to attend weekly construction progress and safety meetings, when appropriate.

D. RESIDENT PROJECT REPRESENTATIVE (RPR)

As part of the Project construction management, observation, and quality assurance process, the airport and RPR will work together to monitor construction safety on a daily basis. A tool that may be used to ensure an appropriate level of priority is given to safety is the "Construction Project Daily Safety Inspection Checklist" (see Supplement 2). Any discrepancies in safety will be immediately brought to the attention of the Contractor and Airport for corrective action implementation.

IV. CONSTRUCTION SAFETY AND PHASING

A. COORDINATION

1) **Design Progress Meetings.** A design conference was held with the Airport during the design phase of this project. This meeting was held to help avoid possible conflicts between construction activities and the operation of the Airport.

2) **Preconstruction Conference.** A preconstruction conference will be held as soon as practicable after the Contract has been awarded. The Contractor must submit the preliminary construction schedule and receive approval of the SPCD before the Notice to Proceed (NTP) will be given. The preconstruction conference participants should include, but not be limited to, the Airport, RPR, Airport Management, testing laboratory representative, Contractor and major subcontractor(s), Contractor's project superintendent, Contractor's project clerk, Utility companies, Aircraft Rescue and Fire Fighting (ARFF) personnel, federal, state, or local agencies affected by the proposed construction, and FAA representatives. The Contractor shall distribute previously submitted copies of the preliminary construction schedule at the preconstruction meeting. At the discretion of the Operator, the meeting may also include Airport tenants.

3) **Contractor Progress Meetings.** Contractor progress meetings will be held weekly for the duration of construction. Operational safety will be a standing agenda item for discussion during progress meetings throughout the Project. Date, time, and location of the progress meetings will be determined at the preconstruction meeting.

4) **Scope or Schedule Changes.** Scope or schedule changes for the Project may necessitate revisions to the CSPP and require review and approval by the Airport and the FAA.

5) **FAA Air Traffic Organization (ATO) Coordination.** It will be necessary for the FAA ATO to be kept current on the construction progress, including schedule. All coordination with the FAA will be conducted through Airport Management. No FAA-owned equipment should be impacted by the project, but the expected lead time for coordination of FAA equipment shutdown is 14 days.

6) **Contractor Supervisor.** Contractor shall provide the supervisor's contact information to the airport and engineer prior to beginning construction. The supervisor shall be available at all times should the airport/engineer need to contact the contractor. At all times when construction activities, including work being conducted solely by subcontractors, are being performed on the project, the prime Contractor must have a representative on-site and immediately available who is authorized to make decisions regarding the operations and safety of all personnel employed by the Contractor and Subcontractors. Each day the designated superintendent must meet with the RPR to coordinate activities for the day's work.

7) **Airport Familiarization Meeting on First Day of Construction.** Immediately prior to deploying on-site on the first day of construction, the Airport, RPR, and Contractor's on-site representative shall meet at the Project Site. Topics of discussion will include a safety briefing, general familiarization with Airport Operations, changes to contact-lists, and any issues of concern raised since the Pre-Construction meeting.

   This is not intended as a replacement for the Pre-Construction meeting, but rather as a supplement, to verify that all on-site personnel are familiar with the Airport's procedures and the Project Construction Documents.

B. PHASING AND TIME LIMITATIONS

The Construction Element includes one phase to define the sequence of the work associated with the Project. This phase shall start in Summer 2024, and is expected to take 10 months with a Summer 2025 completion.

The SPCD must be submitted at the Preconstruction meeting. A 30-day Mobilization Phase will be allotted and precedes the initial awarded schedules for completion of all major submittals including initial security and safety training. The work efforts and affected airfield areas within the AOA are detailed below. Construction is anticipated to begin when funding is available, which is anticipated to be in Summer 2024. If the Contractor fails to meet any of the time limitations listed below, liquidated damages will be assessed as described in Division 4, Section 80-08 of the Project Specifications.

1) Mobilization. During this Element of the Project, no work will be conducted that in any way that restricts Airport operations. Mobilization work will include, but not be limited to, the following:

   a. Processing of required submittals, including the Contractor's work schedule.

b. Preparation and submission of the SPCD.

c. Security and safety training including badging

d. Airfield Safety Devices delivered/prepared at the site (construction flags, flashing lights, low-profile barricades, delineators airport radios, runway closure markers).

e. Materials and equipment delivered to site, as applicable.

f. Underground utility investigation and potholing.

g. All miscellaneous Mobilization efforts required to commence construction.

All preliminary work required to pursue construction to completion will be finalized during the Mobilization Element to minimize delays during construction.

2) Construction. Construction.

General Phasing Limitations. The following phasing restrictions apply:

- The majority of the OGD Terminal will be closed for the duration of the project including the administrative offices. The airport administrative office will be relocated to a temporary trailer located northeast of the existing terminal. The restaurant concessionaire will remain open during this project.
- A portion of the airside pavement will be closed for the duration of the Terminal Expansion project. Low profile barricades will be placed around the limits of the commercial apron as shown on the construction Safety and Phasing plan.

Construction Phase *Summary (300 Calendar Days)*

	Project Elements
	Construction Items
Scope of Work	**Phase I** – Front terminal expansion, utility work, and basement renovation, and security fencing
Area Closed to Aircraft Operations	None
Duration of Closure	300 Calendar Days
Alternate Taxi Route	Not applicable
ARFF Access Routes	No impacts to ARFF Access Routes

Construction Staging Area	The staging area will be located northeast of the terminal outside of the airport security fence.
Construction Access & Haul Route	Access to the side will be through Gate 2 located just north of the terminal. Two additional airside access gates into the fenced staging area will be available for large deliveries on the north side of the staging area. Deliveries will need to be escorted by badged personnel.
Impacts to NAVAIDS	None
Lighting, Marking & Signing Changes	No changes to airfield signage or lighting are anticipated.
Required Hazard Marking, Lighting & Signing Changes	The Contractor shall install low profile barricades to mark the limits of the staging area. Temporary cranes used for terminal building erection shall be marked in accordance with FAA Advisory Circular 150/5370-2G.
Available Runway Length	The runway length will not be impacted.
Work Zone Lighting for Nighttime Construction	Lighting required as described in Work Zone Lighting for Nighttime Construction section below
Lead Times for Required Notification	The contractor shall provide a minimum of 7 working days notice to the airport before closing a Runway or Taxiway and shutting down NAVAIDS.

Additional Phasing Notes

- Contractor may propose additional access points and haul routes for review and approval. Subject to security plan coordination.

3) Construction Safety and Phasing Plan Sheets. A drawing specifically indicating operational safety procedures and methods in affected areas has been developed. This drawing is included in Supplement 4.

C. AREAS AND OPERATIONS AFFECTED BY CONSTRUCTION

1) Runways. There are no expected closures of Runway 3/21 or Runway 17/35.

Operational Requirements	Open (Existing)
Runway 3-21 ARC	C-III
Runway 3 Approach Visibility Minimums	¾ Mile
Runway 21 Approach Visibility Minimums	Visual
Runway 3 Declared Distances	TORA: 8,103’
	TODA: 8,103’

	ASDA: 7,252
	LDA: 7252
Runway 21 Declared Distances	TORA: 8,103’
	TODA: 8,103’
	ASDA: 8,103’
	LDA: 7,252
Runway 3 Approach Procedures	Precision
Runway 21 Approach Procedures	Visual
Runway 3 NAVAIDS	GPS, ILS, PAPI, MALS
Runway 21 NAVAIDS	PAPI
Taxiway Design Group (TDG)	III
ATCT (hours open)	7:00 am to 8:00 pm
ARFF Index	B
Special Conditions	None

Operational Requirements	**Open (Existing)**
Runway 17-35 ARC	C-II
Runway 17 Approach Visibility Minimums	None
Runway 35 Approach Visibility Minimums	None
Runway 17 Declared Distances	TORA: 5,195’
	TODA: 5,195’
	ASDA: 5,195’
	LDA: 5,195’
Runway 35 Declared Distances	TORA: 5,195’
	TODA: 5,195’
	ASDA: 5,195’
	LDA: 5,195’
Runway 17 Approach Procedures	Visual
Runway 35 Approach Procedures	Visual
Runway 17 NAVAIDS	PAPI, REILS
Runway 35 NAVAIDS	PAPI, REILs
Taxiway Design Group (TDG)	III
ATCT (hours open)	7:00 am to 8:00 pm
ARFF Index	B
Special Conditions	None.

2) **Taxiways.** No taxiways will be closed during this project.

D. NAVAID PROTECTION

1) Rotating Beacon: The Rotating Beacon will not be affected by construction and shall remain operational for the duration of the project.

2) PAPI: The Runway 3/21 and Runway 17/35 PAPIs will not be disabled during the duration of the project.

3) REIL: The Runway 17-35 REILs will not be affected by this project.

4) MALS: The Runway 3 MALS will be not disabled for the duration of the project.

5) Wind Cones. The windcone will not be impacted by the project.

6) Localizer/Offset Localizer. The Runway 3 Localizer will not be disabled for the duration of the project.

E. CONTRACTOR ACCESS

1) **Location of Stockpiled Construction Materials and Equipment.** Location of stockpiled materials and equipment storage shall be in the areas identified on the Plans or as approved by the Airport. Stockpiling materials and equipment outside the designated areas and within the AOA will require prior approval from the FAA, via the Airport, and will be subjected to additional limitations depending on the height(s). Stockpiled material and equipment storage are not permitted within the RSA or OFZ, and, if possible, should not be within the OFA of an operational runway. See Section IV.R "Protection of Runway and Taxiway Critical Areas" for requirements of stockpiled materials inside the ROFA. Stockpiled material shall meet the requirements of Section IV.F "Wildlife Management" to prevent the stockpile location(s) from becoming wildlife attractants.

2) **Vehicle and Pedestrian Operations.**

a) **Construction Site Parking.** Employees' vehicles shall be parked in the staging areas designated on the Plans or outside the AOA. No employee vehicles will be allowed beyond the staging area limits. In areas where the staging area is adjacent to the perimeter security fence, all vehicles shall be positioned a minimum of ten feet away from either side of the fence.

b) **Construction Equipment Parking.** All service and construction vehicles and/or equipment shall be parked in the Contractor staging area when not in use and shall be positioned a minimum of 10 feet away from either side of a perimeter security fence. See Section IV.Q, "Protection of Runway and Taxiway Critical Areas" for further parking restrictions within safety areas and object free areas.

c) **Access and Haul Roads.** The Contractor will be restricted to use the Project security gates and haul routes shown on the Drawings. Right of way shall be given to all ARFF, emergency vehicles, and aircraft sharing the haul routes with the Contractor. See paragraphs d) through h) in this section for operating within the airfield environment requirements.

d) **Marking and Lighting of Vehicles.** Marking and lighting of vehicles used on airports shall be in accordance with AC 150/5210-5D. Only marked Contractor owned and/or operated vehicles required for the proper execution of the work will be allowed in the work area. All vehicles and equipment shall be equipped with an omnidirectional amber flashing light. Vehicles within the airfield environment shall display company identification markings on both sides of the vehicle. Non-motorized equipment shall have reflective devices displayed on all sides. All supervisory and survey personnel operating unescorted within the airfield environment but outside the work area, shall have a company vehicle with an amber flashing light mounted on the roof of the cab and identifying markings, visible from 300 feet, mounted on both sides of the vehicle.

e) **Escorts.** Personnel and vehicles which have not been approved for working within the airfield environment will require a Contractor escort. Construction access to and from the work area shall only be by an Airport approved escort which has received the driver and two-way radio communication training outlined in this CSPP. When outside the work area, all Contractor personnel, vehicle, and equipment movement within the airfield environment shall be under control of the Contractor's personnel authorized to perform escort responsibilities with the Contractor's approved escort vehicle(s).

f) **Training Requirement for Vehicle Drivers.** The Contractor shall designate sufficient construction personnel (minimum of 3) to receive training on movement around the Airport during the construction Project. The designated trained personnel will be responsible for escorting non-trained construction personnel who will be working within the airfield environment. The designated construction personnel shall attend an airfield orientation/driver training class conducted by the Airport as part of the requirements to obtain authorization to operate on the airfield. The Contractor shall contact the Airport Operations Manager, a minimum of 48 hours in advance to schedule training class for the select construction personnel. Training classes will not be available on Saturdays or Sundays. Training classes will be limited to 15 people, maximum, per class. The approximate duration of the training class is one hour.

g) **Situational Awareness.** Yield the right of way to moving aircraft (whether under tow or their own power), emergency vehicles displaying rotating beacons (other than amber) and/or using sirens, and pedestrians. While driving or working within the airfield environment, personnel shall not wear any devices in or on their ears, other than those used to protect hearing or communicate company business. Texting while driving is prohibited. In the event of an emergency, be prepared to move workers, vehicles, and equipment immediately at the direction of the Airport Staff.

h) **Two-Way Radio Communication Procedures.** All activities within active movement areas will require two-way radio communication. In the event that the Contractor needs to access an active movement area and approval is granted by the Airport, all radio communications will be performed by the Airport or properly trained Contractor personnel using the Common Traffic Advisory Frequency (CTAF). During periods of closures due to Construction, the Contractor shall continuously monitor the CTAF. Additionally, if a sweeper is being used in the movement area and an escort/flagger is not coordinating his/her movements, the sweeper operator shall be properly trained and carry a radio. Frequencies that will be used by personnel are:

- CTAF – 118.70 MHz
- Ogden Ground – 121.70 MHz

i) **Airport Security.** In areas of work activities, the Contractor shall maintain security against unauthorized access to the airfield area through the security gate(s). Gates shall be locked or manned at all times. The gate shall be closed and locked when not in use. Where the Contractor's lock is used for access through Airport gates, the lock shall be marked to identify the ownership of the Contractor and placed in series with existing locks. Failure to adhere to these requirements will result in the Contractor's lock being removed by the Airport.

F. WILDLIFE MANAGEMENT

Procedures to maintain existing wildlife mitigation devices, limit wildlife attractants, and notify the Airport of wildlife encounters.

1) **Trash**. Receptacles shall be provided by the Contractor and equipped with metal, canvas, or plastic covers. Food scraps or other trash may not be disposed on the ground and must be collected and placed in the covered receptacles so not to attract wildlife.

2) **Standing Water**. The Work Area shall avoid attracting wildlife.

3) **Fencing and Gates**. Fences and/or gates that are unmaintained and/or left open and unattended permit unwanted wildlife to enter inside the Airport perimeter fence. Refer to Section E.2.i "Airport Security" for requirements of maintaining the secured area of the Airport. Contractor personnel shall immediately notify the Airport if any unwanted wildlife is observed inside the Airport perimeter fence.

G. FOREIGN OBJECT DEBRIS (FOD) MANAGEMENT AND DUST CONTROL

The Contractor shall be required to ensure the airfield environment is kept continuously free of construction debris, equipment and/or materials that might endanger or be ingested by an aircraft. The Contractor shall take extreme care to ensure that no work-related debris or other loose items are allowed to be blown by wind or aircraft engine blast. The Contractor shall be responsible for any resulting damage to aircraft engines and/or other property arising from failure to secure and/or protect debris, tools, supplies, or other loose items. Airfield pavements shall be kept free of material spillage and foreign matter

at all times. Haul routes that are shared with aircraft operations shall be continuously cleaned, as determined by Airport Staff.

Dust shall be controlled during the entire Contract period, including weekends and holidays. The Contractor shall provide the means and methods to prevent dust, grit and other waste products from becoming a nuisance in and around the working area. The Contractor shall take action as necessary, with the approval of the Airport, to reduce or eliminate such nuisance. The determination of nuisance is at the sole discretion of the Airport.

H. HAZARDOUS MATERIALS (HAZMAT) MANAGEMENT

1) If shipments of hazardous material (including hazardous debris, contaminated soil or water, and hazardous waste) will be unloaded onto or loaded from Airport property, the Contractor shall have a qualified person available onsite when shipments are received or prepared to ship, who is current with U.S. Department of Transportation (DOT) approved training for the transportation of hazardous materials. Contractor shall properly characterize and manifest waste material leaving Airport property for disposal. When the waste reaches its final destination, the owner or operator of the designated and permitted treatment, storage, and disposal (TSD) facility shall sign the manifest and return a copy to the Airport within 35 days to confirm receipt.

2) Minor spills can be controlled by the first responder at the discovery of the spill. Use absorbent materials on small spills rather than hosing down or burying the spill. First responder should contain the spread of the spill, recover spilled materials, clean the contaminated area, and properly dispose of contaminated materials. For minor spills, consult the products Material Safety Data Sheets (MSDS) for recommended actions for spills or container leaks. Additionally, MSDSs shall provide emergency phone numbers and occupational health hazard information.

3) Semi-significant spills can be controlled by the first responder along with the aid of other personnel such as laborers, the foreman, etc. Notify the Airport of semi-significant spills. Spills should be cleaned up immediately. Contain the spread of the spill and notify the Project foreman immediately. If the spill occurs on paved or impermeable surfaces, clean up by using dry methods (absorbent materials, cat litter and/or rags). Contain the spill by encircling with absorbent materials and do not let the spill spread widely. If the spill occurs in dirt areas, immediately contain the spill by constructing an earthen dike. Dig up and properly dispose of contaminated soil. If the spill occurs during rain, cover spill with tarps or other material to prevent contaminating runoff.

4) Significant/Hazardous spills that cannot be controlled by personnel in the immediate vicinity must be reported to the local emergency response by dialing 911. In addition to 911, the Contractor shall notify the Airport, proper County officials, and the state Emergency Services Warning Center. The services of a Spills Contractor or a HAZMAT team should be obtained immediately. Construction personnel should not attempt to clean up until the appropriate and qualified staff arrives at the jobsite. Other agencies that may need to be consulted include, but are not limited

to, the Fire Department, the Public Works Department, the Highway Patrol, the local Police Department, and the Department of Toxic Substance.

5) Ensure that hazardous goods and material delivered to or from the construction site meet applicable DOT labeling and placarding requirements. Upon request from the Airport, supply MSDS for all hazardous material being delivered to the site.

6) The storage and shipment of hazardous waste shall also comply with the requirements of this section.

7) It is emphasized, however, that although spills resulting from incidents or accidents should be responded to, securing the well-being of people shall be the first priority.

8) Good housekeeping practices should be utilized during equipment fueling and maintenance operations. Inspect fueling equipment for leaks prior to dispensing. Fueling operations shall be continuously attended to while dispensing fuel. Fueling and maintenance operations shall not be performed within 50 feet of a storm drain, inlet, ditch, surface water, wetland, etc. to allow adequate time for containment in the event of a spill.

I. NOTIFICATION OF CONSTRUCTION ACTIVITIES

If conditions at the airport are such that the operational safety of the airport is adversely affected, the airport must be notified immediately.

1) Responsible Representatives / Points of Contact:

Staff Member	Title	Phone/Office
Lynn Hinrichs	Project Coordinator	801-629-8224

Additional points of contact may be provided at the Preconstruction Meeting.

2) Notices to Air Missions (NOTAM). Only the Airport Staff may initiate or cancel a NOTAM on Airport conditions and is the only entity that can close or open a runway.

Point of contact for issuing NOTAMS is Lynn Hinrichs.

3) Emergency Contact Information.

- **a)** Emergency – Dial 911
- **b)** Airport Operations – 801-629-8262
- **c)** Ogden City Police Department – 801-629-8056
- **d)** Ogden City Fire Department – 801-629-8069
- **e)** Ogden Regional Medical Center (6.5 mi) 5475 S 500 E, Ogden, UT – 801-479-2111
- **f)** Poison Control Center – 1-800-222-1222

In the event of an emergency requiring assistance from other than on-site support agencies, instruct the dispatcher to have them meet at the airport terminal, where they will be met by a designated representative that will escort them onto the airfield.

4) **Coordination with Aircraft Rescue and Fire Fighting (ARFF) Personnel and Emergency Personnel.** The proposed Project does not deactivate waterlines or hydrants and is not anticipated to include the use of hazardous materials. Airfield emergency routes shall not be blocked while a runway is open. Emergency personnel will be briefed by the Airport as to the construction schedule. If additional notification is required, the Contractor shall contact the Airport Manager.

5) **Notification to the FAA.**
   a) **Part 77.** The Airport will submit a FAA Form 7460-1, "Notice of Proposed Construction or Alteration" for specific elements of the work. Any equipment (cranes, graders, other equipment) used by the Contractor that exceeds the height limitation in Section IV.R, "Other Limitations on Construction" must also have a Form 7460-1 airspace evaluation and determination prior to use. Any vehicle exceeding part 77 surfaces shall be marked or lighted according to FAA AC 70/7460-1.

   b) **Airport owned/FAA maintained NAVAIDS.** Construction operations will not impact NAVAIDS owned by the Airport and maintained by the FAA.

   c) **FAA owned NAVAIDS.** Construction operations will not impact NAVAIDS owned by the FAA.

   d) **NAVAID EMERGENCY.** In the event of an unanticipated utility outage or cable cut impacting either airport owned, or FAA owned navigational aids, notify Airport Staff immediately who will then be responsible for contacting the FAA.

J. INSPECTION REQUIREMENTS

1) **Daily Inspections.** Inspections are to be conducted by the Contractor and airport operator at least daily, but more frequently if necessary, to ensure conformance with the CSPP. No areas will be shared by construction traffic and air traffic. Supplement 2 contains a Daily Safety Inspection Checklist that may be used by the Contractor or Airport.

2) **Interim Inspections.** The Contractor must ensure that all construction materials have been secured, pavements have been swept clean, and all surfaces are appropriately marked for the safety of aircraft operations. The Contractor must have workforce and equipment available at the work area to complete additional clean up tasks if requested by the airport operator during the interim inspection.

3) **Final Inspections.** A final inspection shall be conducted by the Airport prior to project completion. The Airport will have the final authority in determining if the area is suitable for occupancy.

K. UNDERGROUND UTILITIES AND NOTIFICATION RESPONSIBILITIES.

Contractor must notify the Blue Stakes of Utah by calling 811 (https://www.bluestakes.org/), and any other owners of underground utilities within the construction area or within affected public rights-of-way or easements in advance of the commencement of excavation activities. The Airport shall also be notified to provide the on-airport and FAA ATO/Technical Operation utility locations.

Contractor shall not cross electrical or communication cables, or any other essential utility, unless protected by approved means. In the event of interruption to field-located utility services, promptly notify the Airport first, and then the proper authority. Cooperate with said authority in restoring service as promptly as possible. If required, the Contractor shall install suitable temporary service until permanent repair is completed.

L. PENALTIES

The Contractor is responsible for maintaining security during construction as detailed herein. The Airport is subject to fines up to $20,000 for security violations. The Contractor shall be responsible for any fines caused by their failure to observe the security requirements contained herein or required by the SPCD. Violations, including those of driving regulations, may be cause for the Project to be stopped and Project safety procedures evaluated. Contractor working days will continue to be charged, even if the Airport ceases construction operations. The Airport will decide when work will continue. Enforcement of these regulations will be by the Police and/or Airport Operations Staff.

M. SPECIAL CONDITIONS

1) An aircraft in distress may require the Contractor to immediately move equipment away from an aircraft movement area. The Airport will notify the Contractor in the unlikely event of an aircraft in distress. The Contractor will be required to comply with all Airport instructions.

2) Various circumstances, such as an aircraft accident, security breach, or other unforeseen events may require suspension of the construction. The Airport will notify the Contractor when suspension of the work will be required. See Section IV.I, “Notification of Construction Activities,” for emergency contact information.

3) A Vehicle / Pedestrian Deviation (VPD) is any entry or movement on the movement area by a vehicle or pedestrian that has not been authorized. In the event of a VPD, the Airport reserves the right to suspend the work or any portion thereof and continue suspension until the completion of any investigation or evaluation by the Airport and full compliance with any corrective measures that the Airport may reasonably require. In addition, the Airport may require the Contractor to provide a written plan, satisfactory to the Airport, to demonstrate the Contractor’s ability to prevent future violations. See Section IV.E, “Contractor Access,” for vehicle and pedestrian operations and two-way radio communication requirements.

4) During any emergency air operations, the Contractor may be instructed to cease work or vacate specific areas of the Airport. Any delays caused by ordered cessation of work shall be grounds for

time extensions as approved by the Engineer. No additional payment shall be allowed for emergency cessation of work.

5) Low visibility conditions will trigger specific safety mitigation actions outlined in this CSPP. For the purposes of this project, low visibility conditions will exist when the prevailing visibility is less than 1 statute mile and/or the ceiling is less than 500 feet. The Airport will notify the Contractor when these conditions exist so adequate safety measures may be implemented.

6) less than 1 statute mile and/or the ceiling is less than 500 feet. The Airport will notify the Contractor when these conditions exist so adequate safety measures may be implemented.

N. RUNWAY AND TAXIWAY VISUAL AIDS

7) General. Temporary airport markings must be clearly visible to pilots, not misleading, confusing, or deceptive. All temporary markings must be secured in place to prevent movement by prop wash, jet blast, wing vortices, or other wind currents and constructed of materials that would minimize damage to an aircraft in the event of inadvertent contact. **The nature of this construction project and duration of closures will not require temporary lighting, signs, or visual NAVAIDs to be incorporated into this project.**

8) Markings

a) Temporarily Closed Taxiways. Temporarily closed taxiways shall have barricades placed outside the safety area of intersecting taxiways. For runway/taxiway intersections, place an X at the entrance to the closed taxiway from the runway. If the taxiway will be closed for an extended period, obliterate taxiway markings leading to a closed section. If the centerline markings will be reused upon reopening the taxiway, it is preferable to paint over the markings. Prior to reopening the taxiway, Contractor shall remove the paint and re-stripe the taxiway lead-in centerline marking. **There will be no required Temporarily Closed Taxiways**

b) Temporarily Closed Runways. Temporary runway closures will require temporary lighted Runway X's to be placed at both ends of the runway directly on or as near as practicable to the runway designation numbers. **There will be no required Temporarily Closed Runways.**

9) Lighting and visual NAVAIDs

a) Temporarily Closed Taxiways. If possible, deactivate the taxiway lighting circuits. When deactivation is not possible, cover the light fixture in a way as to prevent light leakage. Taxiway lights shall be covered during periods of closure. **Temporarily Closed Taxiways will not be necessary on this project.**

b) Temporarily Closed Runways. Runway exit signs are to be covered for closed runway exits. Outbound designation signs are to be covered for closed runway. Any time a sign does not serve its normal function or would provide conflicting information, it must be covered

or removed to prevent misdirecting pilots. Runway Edge Lights shall be deactivated during closure. **Temporarily Closed Runways will not be necessary on this project.**

c) **Orange Construction Signs**. Orange construction signs may help pilots to be aware of changed conditions and can be incorporated on movement area projects to increase situational awareness. Locate signs outside the taxiway safety area and ahead of the construction area. Temporary signs must meet the requirements of engineering brief 93, Guidance for the Assembly and Installation of Temporary Orange Construction Signs. Placement of construction signs shall be as shown on the phasing drawings included in plan set.

O. MARKING AND SIGNS FOR ACCESS ROUTES

The Contractor shall place traffic control signs and/or devices adjacent to the designated Airport entrance gate, as appropriate, to advise the Airport users of construction operations. Signs and/or devices shall conform to the Federal Highway Administration Manual on Uniform Traffic Control Devices (MUTCD), current edition at the time of bid opening.

P. HAZARD MARKING AND LIGHTING

1) Before starting work, provide and have available all signs, barricades, and lights necessary for protection of the work. Install and maintain adequate warning signs and lighted barricades to protect property and personnel in the work area. Barricades shall be weighted or anchored to prevent overturning from wind.

2) Low-profile barricades will be required to delineate the work area if the contractor accesses the air carrier apron. Low-profile barricades shall be 8 feet long, highly reflective, and be provided with two red omnidirectional flashers. Red flashers shall meet luminance requirements of UDOT. Low profile barricades shall be placed end-to-end or interconnected unless directed otherwise by the Airport.

3) Contractor-furnished lighted X runway closure markers shall not be required for this project.

4) All material stockpiles 18’ and taller must be marked with yellow flashing lights. Battery operated barricade lights are acceptable for this purpose.

5) The Contractor shall have a person on call 24 hours a day for emergency maintenance of Airport hazard lighting and barricades. The Contractor must file the contact person’s information with the Airport at the preconstruction meeting. Lighting shall be checked for proper operation at least once per day, preferably at dusk.

6) Open trenches and manholes, excavations, or obstructions not being actively worked shall be marked with lighted and weighted barricades that can be seen from a reasonable distance and shall be covered or removed prior to opening to airport traffic.

Q. PROTECTION OF RUNWAY AND TAXIWAY CRITICAL AREAS

If construction is performed during nighttime hours, lighting equipment must adequately illuminate the work area. All support equipment, except haul trucks, should be equipped with artificial illumination to safely illuminate the area immediately surrounding the work area. Lights shall be positioned to provide the most natural color illumination and contrast with minimal shadows. Determine light spacing in the field. If used, light towers should be positioned and adjusted to aim away from active runways to prevent blinding effects. Shielding may be necessary.

R. PROTECTION OF RUNWAY AND TAXIWAY CRITICAL AREAS

Only the Airport Operator may coordinate adjustments of RSA and TSA dimensions with applicable FAA organizations and issues local NOTAMS. **No adjustments to RSA or TSA dimensions are anticipated with this project.**

1) **Runway Safety Area (RSA).** No construction may occur within the existing RSA while the runway is open for aircraft operations. Open trenches or excavations are not permitted within the RSA while the runway is open. If possible, backfill trenches before the runway is opened. If the runway must be opened before excavations are backfilled, cover the excavations appropriately. Covering for open trenches must be designed to allow the safe operation of the heaviest aircraft (240,000 pound dual wheel load) operating on the runway across the trench without damage to the aircraft. Contractors must prominently mark open trenches and excavations at the construction site with red or orange flags, as approved by the Airport, and light them with red lights during hours of restricted visibility or darkness. Soil erosion must be controlled to maintain RSA standards, that is, the RSA must be cleared and graded and have no potentially hazardous ruts, humps, depressions, or other surface variations, and capable, under dry conditions, of supporting the occasional passage of aircraft without causing structural damage to the aircraft. The ground surface within the RSA shall not have edges exceeding 3 inches or slopes greater than 5 percent unless the runway is closed. The dimensions for Runway 3-21 RSA (Category C-III) are 250 feet each side of centerline. The Runway 3 RSA is 1,000 feet beyond the runway threshold. The Runway 21 RSA is 1,000 feet beyond the runway threshold. The dimensions for Runway 17-35 RSA (Category B-II) are 75 feet each side of centerline. The Runway 17 RSA is 300 feet beyond the runway threshold. The Runway 35 RSA is 300 feet beyond the runway threshold. The RSA for both runways are depicted on the work area Plans contained in the plan set. **No work will be conducted in the RSA of Runway 3/21 or Runway 17/35.**

2) **Runway Object Free Area (ROFA).** Construction, including excavations, may be permitted within the ROFA. However, equipment must be removed from the ROFA when not in use and material should not be stockpiled in the ROFA, unless necessary and approved, in advance, by the Airport. Stockpiling material in the ROFA requires submittal of a 7460-1 form and Airport approval. The dimension for the Runway 3-21 ROFA is 800 feet each side of the centerline. The Runway 3 ROFA is 1,000 feet beyond the runway threshold. The Runway 21 ROFA is 1,000 feet beyond the runway threshold. The dimension for the Runway 17-35 ROFA is 400 feet each side of the centerline. The Runway 17 ROFA is 1,000 feet beyond the runway threshold. The Runway

35 ROFA is 1,000 feet beyond the runway threshold. **Work inside the ROFA of either Runway 3-21 or Runway 17-35 is not anticipated.**

3) **Taxiway Safety Area (TSA).** No construction may occur in the TSA while the taxiway is open to aircraft operations, unless otherwise specified. Open trenches or excavations are not permitted within the TSA while the taxiway is open. If possible, trenches should be backfilled before the taxiway is opened. If the taxiway must be opened before excavations are backfilled, cover the excavations appropriately. Covering for open trenches must be designed to allow the safe operations of the heaviest aircraft (240,000 pound dual wheel loading) operating on the taxiway across the trench without damage to the aircraft. Contractors must prominently mark open trenches and excavations at the construction site with red or orange flags, as approved by the Airport, and light them with red lights during hours of restricted visibility or darkness. The ground surface within the TSA shall not have edges exceeding 3 inches or slopes greater than 5 percent unless the taxiway is closed. Soil erosion must be controlled to maintain TSA standards, that is, the TSA must be cleared and graded and have no potentially hazardous ruts, humps, depressions, or other surface variations, and be capable, under dry conditions, of supporting the occasional passage of aircraft without causing structural damage to the aircraft. The TSA for Taxiway A is 59 feet each side of centerline. TSAs are depicted on the work area Plans contained in the plan set. **Work within the airport TSA's is not anticipated.**

4) **Taxiway/Taxilane Object Free Area (TOFA).** No construction will be allowed within the TOFA while the taxiway is open to aircraft operations. The TOFA for Taxiway A is 93 feet on each side of the taxiway centerline. The TOFA's are depicted on the work area Plans contained in the plan set. **Work within the airport TOFA's is not anticipated.**

5) **Obstacle Free Zone (OFZ).** Personnel, material, and/or equipment may not penetrate the OFZ while the runway is open to aircraft operations. The dimension for Runway 3-21 OFZ is 200 feet each side of centerline. The Runway 3 OFZ is 200 feet beyond the runway threshold. The Runway 21 OFZ is 200 feet beyond the runway threshold. The dimension for Runway 17-35 OFZ is 200 feet each side of centerline. The Runway 3 OFZ is 200 feet beyond the runway threshold. The Runway 21 OFZ is 200 feet beyond the runway threshold. The runway OFZs are depicted on the work area Plans contained in the plan set**. Work inside the limits of the Runway 3-21 or 17-35 OFZs is not anticipated on this project**

6) **Runway Approach/Departure Surfaces.** When runway is open, all personnel, material, and/or equipment must remain clear of the threshold siting surfaces (approach and departure surfaces).
   a) **Runway 3-21 Approach Surface.** Runway 3-21 is a precision/visual runway. Using Table 3-2 and Figure 3-2 from AC 150/5300-13A for Runway Type 5/2, the resulting approach surface begins at the runway threshold and consists of a trapezoid with the following dimensions:
      - **Runway 3 (Precision)**
        - Width at inner departure – 800 feet
        - Width at outer departure – 3,800 feet

- Length of departure – 10,000 feet
- Approach slope – 20:1

- **Runway 21 (Visual)**
  - Width at inner departure – 250 feet
  - Width at outer departure – 700 feet
  - Length of departure – 2,250 feet
  - Approach slope – 20:1

b) Runway 3-21 Departure Surface. Runway 3-21 is a precision/visual runway. Using Table 3-2 and Figure 3-4 from AC 150/5300-13A for Runway Type 9, the resulting departure surface begins at the runway threshold and consists of a trapezoid with the following dimensions:

- Width at inner departure (runway threshold) – 1,000 feet
- Width at outer departure – 6,266 feet
- Length of departure – 10,200 feet
- Departure slope – 40:1
-

c) Runway 17-35 Approach Surface. Runway 17-35 is a visual runway. Using Table 3-2 and Figure 3-2 from AC 150/5300-13A for Runway Type 2, the resulting approach surface begins at the runway threshold and consists of a trapezoid with the following dimensions:

- Width at inner departure – 250 feet
- Width at outer departure – 700 feet
- Length of departure – 2,250 feet
- Approach slope – 20:1

d) Runway 17-35 Departure Surface. Runway 17-35 is a visual runway. Using Table 3-2 and Figure 3-4 from AC 150/5300-13A for Runway Type 9, the resulting departure surface begins at the runway threshold and consists of a trapezoid with the following dimensions:

- Width at inner departure (runway threshold) – 1,000 feet
- Width at outer departure – 6,466 feet
- Length of departure – 10,200 feet
- Departure slope – 40:1

S. OTHER LIMITATIONS ON CONSTRUCTION

1. Prohibitions.

a) Open flame welding or torches are prohibited unless fire safety precautions are provided, and the Airport has approved their use.

b) Electrical blasting caps are prohibited on or within 1,000 feet of the Airport property.

c) The use of flare pots is prohibited within the AOA.

d) No smoking will be allowed within the airfield environment except as designated by the Airport.

2. Restrictions

a) *Equipment*

1) Construction equipment that extends 15 feet or more above ground level shall be cleared through the Airport prior to moving onto site. Equipment that may be lowered readily shall be lowered at night, during reduced daytime visibility, and during other periods of storage to comply with the 15-foot height limitation.

2) If directed by the Airport, construction equipment that cannot be lowered below the 15-foot height limitation shall be lighted at night and during periods of reduced daytime visibility. The light shall be mounted on the highest point of equipment; shall be omnidirectional; and shall consist of, at a minimum, one 100-watt bulb enclosed within an aviation red lens. Also, for daytime operations, mount an FAA approved 3-foot square orange and white checkered flag at the highest point.

3) Height restrictions on temporary construction road not to exceed 15 feet.

b) *Cranes*

1) Crane's operations require approval from FAA Airspace System to determine impacts to airport operations. Crane operations may not limit or reduce airport approach or departure minimums.

2) Cranes may be positioned in the boundary shown by the red line in Exhibit 1 – Crane Placement Boundary and operate below 100 ft above finished grade. Cranes shall be marked with a flag or obstruction light and cranes will not be allowed to windmill outside of the construction boundary or over aircraft at any time. If the crane requires raising or lowering to avoid windmilling outside construction boundary or over aircraft the crane shall be lowered when not in operation. If raising or lowering the crane requires heights above 100 feet, see item 3.

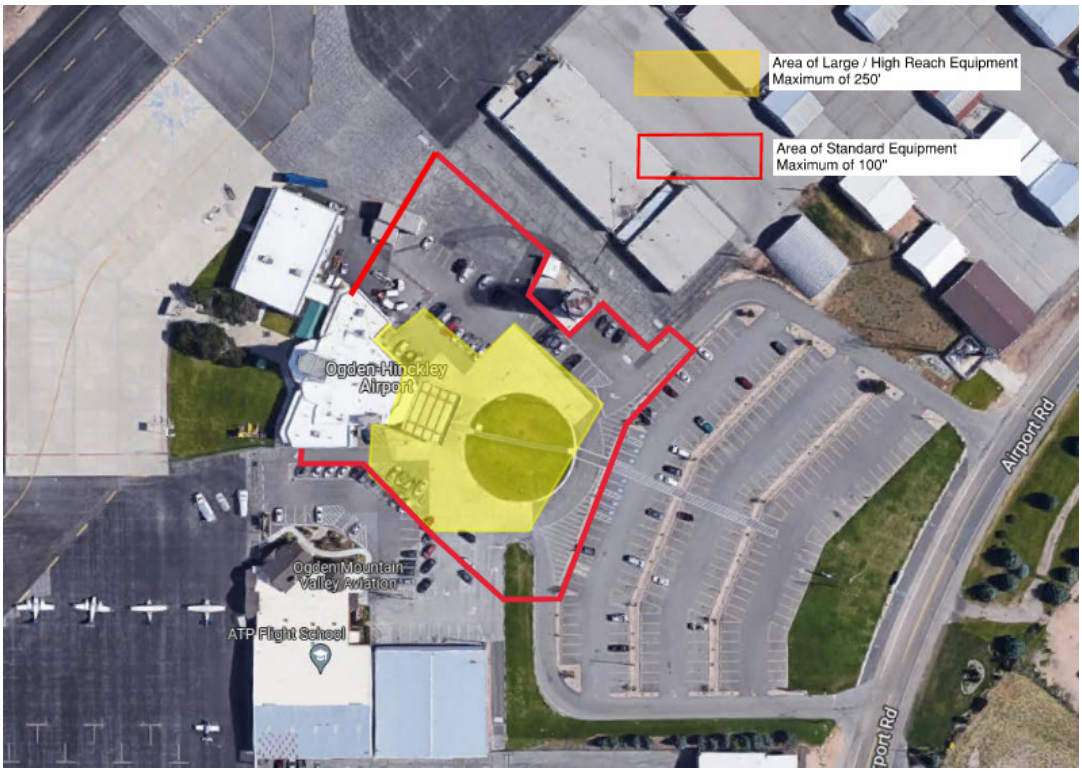

Exhibit 1 – Site Layout Plan

3) Operation of the crane over 100 feet, and up to 250 feet in height are limited to raising or lowering the crane and required coordination with airport operations to issue a NOTAM for obstruction notification. NOTAMs may not be issued for this activity at night and during periods of reduced daytime visibility due to impacts to airport approach and departure procedures.

4) During hours with severe visibility problems or heavy fog, cranes shall not operate. The Airport will determine when visibility problems exist.

5) Crane operations outside of these descriptions must also have a Form 7460-1 airspace evaluation and determination prior to use. Any vehicle exceeding part 77 surfaces shall be marked or lighted according to FAA AC 70/7460-1. Submittals of cases to the FAA Airspace System will submitted by the Airport and Consultant utilizing data prepared by the Contractor.

T. SAFETY PLAN COMPLIANCE DOCUMENT (SPCD).

The SPCD shall detail how the Contractor will comply with the CSPP. This shall include all Project specific Construction Safety Plan details not included in the CSPP, including construction equipment heights, any applicable hazard management requirements, and contact information for the Contractor's safety management staff responsible for monitoring the CSPP and SPCD during construction. The SPCD shall be a supplement to, and enhancement of, the Project CSPP. See Supplement 1 for example of SPCD.

The SPCD must include a statement that the Contractor understands the operational safety requirements of the CSPP and an assertion that the Contractor will not deviate from the approved CSPP and SPCD without written approval from the Airport. Any construction operation, activity, or practice proposed by the Contractor that does not conform to the CSPP and SPCD will require a revision to those documents. The revised CSPP must be submitted to FAA for review and approval prior to performing any activities that are not in compliance with a previously approved CSPP. Following FAA approval of the revised CSPP, the SPCD shall be submitted to the Airport for review and approval.

Copies of the approved CSPP and SPCD must be available on-site at all times. The Contractor shall ensure all construction personnel are familiar with safety procedures and regulations applicable to construction on the Airport. At least one of the Contractor's safety management staff must be on-site whenever active construction is ongoing to act as point of contact and immediate response coordinator to correct any construction-related activity that may adversely affect operational safety of the Airport.

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Supplement 1

SAFETY PLAN COMPLIANCE DOCUMENT (SPCD)

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CONTRACTOR'S

SAFETY PLAN COMPLIANCE DOCUMENT (SPCD)

(AC 150/5370-2G)

Project Information

Airport and Sponsor: Ogden Airport, Ogden City Corporation

Project ID: _____

Description of Project: Front Terminal Expansion

Type of Work: _____

FAA Project Manager: _____ Phone: _____

Airport Operator Contact: Lynn Hinrichs Phone: 801-629-8224

Contractor's Information

Prime Contractor: _____

Address: _____

Contractor Contact: _____ Phone: _____

Contractor's Responsibility

In accordance with Federal Aviation Administration (FAA) Advisory Circular (AC) 150/5370-2G, "Operational Safety during Airport Construction", a SPCD for a project must be submitted to the FAA and to the Airport Operator for review and approval prior to the issuance of a Notice-to-Proceed for Construction. The SPCD shall be prepared in a detailed written and graphical format that identifies the timing and methodology for the Contractor's compliance with the project's Construction Safety and Phasing Plan (CSPP).

The Contractor shall comply with all provisions contained herein and provide the following project-specific complementary and supplemental information to the FAA-approved Construction Safety and Phasing Plan:

1. Contractor shall have copies of the CSPP and SPCD available at all times for reference by the Airport Operator and its representatives, and by Contractor's and subcontractor's employees.

   Location(s) of CSPP and SPCD: _____

   _____

2. Provide contact information for the person responsible for initiating and coordinating an immediate response to correct any construction-related activity that may adversely affect the operational safety of the Airport. Project will require 24-hour coverage.

   Point of Contact: _____ Phone: _____

3. Provide list of Contractor's on-site employees responsible for monitoring compliance with the CSPP and SPCD whenever active construction is ongoing.

   Contact Person: _____ Phone: _____

   Contact Person: _____ Phone: _____

   Contact Person: _____ Phone: _____

   Contact Person: _____ Phone: _____

4. Contractor shall conduct inspections at least once daily, and more frequently if necessary to ensure construction personnel comply with the CSPP and SPCD and that there are no altered construction activities that could create potential safety hazards. A Construction Project Daily Safety Inspection Checklist is attached.

5. Describe details of Contractor's plan to restrict movement of construction vehicles and personnel to permitted construction areas by flagging, barricading, erecting temporary fencing, or providing escorts, as appropriate and as specified in the CSPP. Include the appropriate plan sheets to identify timing and/or location of control measures: [***Contractor to insert detailed description.]***

6. Describe details of Contractor's plan to ensure that no employees of Contractor, subcontractors, suppliers, or other persons enter any part of the Air Operations Area (AOA) unless authorized. [***Contractor to insert detailed description***.]

7. Provide a description and schedule of anticipated operation for all Contractor equipment over 18 feet in height (e.g. cranes, concrete pumps, other similarly tall equipment) and heights of stockpiles and haul routes when different from what is shown on previously filed CSPP. [***Contractor to insert detailed equipment list/stockpile heights as applicable.]***

   (As necessary, the Contractor must coordinate with the Airport Operator for the purpose of filing a supplemental submittal of FAA Form 7460-1 to the FAA for determination of whether or not an aeronautical study must be conducted prior to allowing tall equipment operations to begin.)

8. Provide a description of Contractor's plan to ensure that construction personnel are familiar with the safety procedures and regulations on the Airport, the CSPP, and the SPCD. [***Contractor to insert detailed description.]***

SPCD Amendment

The SPCD shall be amended when there is a construction practice proposed by the Contractor that does not conform to the CSPP and SPCD and may impact the Airport's operational safety. This will require a revision to the CSPP and SPCD and re-coordination with the Airport Operator and the FAA in advance.

Statement of Certification

I certify that we understand the operational safety requirements of the CSPP and assert that we will not deviate from the approved CSPP and SPCD unless written approval is granted by the Airport Operator and FAA.

Signature: _____ Date: _____

Print Name: _____ Title: _____

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Supplement 2

DAILY SAFETY INSPECTION CHECKLIST

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APPENDIX D. CONSTRUCTION PROJECT DAILY SAFETY INSPECTION CHECKLIST

The situations identified below are potentially hazardous conditions that may occur during airport construction projects. Safety area encroachments, unauthorized and improper ground vehicle operations, and unmarked or uncovered holes and trenches near aircraft operating surfaces pose the most prevalent threats to airport operational safety during airport construction projects. The list below is one tool that the airport operator or contractor may use to aid in identifying and correcting potentially hazardous conditions. It should be customized as appropriate for each project including information such as the date, time and name of the person conducting the inspection.

Table D-1. Potentially Hazardous Conditions

Item	Action Required (Describe)	No Action Required (Check)
Excavation adjacent to runways, taxiways, and aprons improperly backfilled.		
Mounds of earth, construction materials, temporary structures, and other obstacles near any open runway, taxiway, or taxi lane; in the related Object Free area and aircraft approach or departure areas/zones; or obstructing any sign or marking.		
Runway resurfacing projects resulting in lips exceeding 3 inch (7.6 cm) from pavement edges and ends.		
Heavy equipment (stationary or mobile) operating or idle near AOA, in runway approaches and departures areas, or in OFZ.		
Equipment or material near NAVAIDs that may degrade or impair radiated signals and/or the monitoring of navigation and visual aids. Unauthorized or improper vehicle operations in localizer or glide slope critical areas, resulting in electronic interference and/or facility shutdown.		
Tall and especially relatively low visibility units (that is, equipment with slim profiles) — cranes, drills, and similar objects — located in critical areas, such as OFZ and		

Item	Action Required (Describe)	No Action Required (Check)
approach zones.		
Improperly positioned or malfunctioning lights or unlighted airport hazards, such as holes or excavations, on any apron, open taxiway, or open taxi lane or in a related safety, approach, or departure area.		
Obstacles, loose pavement, trash, and other debris on or near AOA. Construction debris (gravel, sand, mud, paving materials) on airport pavements may result in aircraft propeller, turbine engine, or tire damage. Also, loose materials may blow about, potentially causing personal injury or equipment damage.		
Inappropriate or poorly maintained fencing during construction intended to deter human and animal intrusions into the AOA. Fencing and other markings that are inadequate to separate construction areas from open AOA create aviation hazards.		
Improper or inadequate marking or lighting of runways (especially thresholds that have been displaced or runways that have been closed) and taxiways that could cause pilot confusion and provide a potential for a runway incursion. Inadequate or improper methods of marking, barricading, and lighting of temporarily closed portions of AOA create aviation hazards.		
Wildlife attractants — such as trash (food scraps not collected from construction personnel activity), grass seeds, tall grass, or standing water — on or near airports.		
Obliterated or faded temporary markings on active operational areas.		
Misleading or malfunctioning obstruction lights. Unlighted or unmarked obstructions in the approach to any open runway pose aviation hazards.		

Item	Action Required (Describe)	No Action Required (Check)
Failure to issue, update, or cancel NOTAMs about airport or runway closures or other construction related airport conditions.		
Failure to mark and identify utilities or power cables. Damage to utilities and power cables during construction activity can result in the loss of runway / taxiway lighting; loss of navigation, visual, or approach aids; disruption of weather reporting services; and/or loss of communications.		
Restrictions on ARFF access from fire stations to the runway / taxiway system or airport buildings.		
Lack of radio communications with construction vehicles in airport movement areas.		
Objects, regardless of whether they are marked or flagged, or activities anywhere on or near an airport that could be distracting, confusing, or alarming to pilots during aircraft operations.		
Water, snow, dirt, debris, or other contaminants that temporarily obscure or derogate the visibility of runway/taxiway marking, lighting, and pavement edges. Any condition or factor that obscures or diminishes the visibility of areas under construction.		
Spillage from vehicles (gasoline, diesel fuel, oil) on active pavement areas, such as runways, taxiways, aprons, and airport roadways.		
Failure to maintain drainage system integrity during construction (for example, no temporary drainage provided when working on a drainage system).		

Item	Action Required (Describe)	No Action Required (Check)
Failure to provide for proper electrical lockout and tagging procedures. At larger airports with multiple maintenance shifts/workers, construction contractors should make provisions for coordinating work on circuits.		
Failure to control dust. Consider limiting the amount of area from which the contractor is allowed to strip turf.		
Exposed wiring that creates an electrocution or fire ignition hazard. Identify and secure wiring, and place it in conduit or bury it.		
Site burning, which can cause possible obscuration.		
Construction work taking place outside of designated work areas and out of phase.		

Supplement 3

DEFINITIONS OF TERMS

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APPENDIX B. TERMS AND ACRONYMS

Table B-1. Terms and Acronyms

Term	Definition
Form 7460-1	Notice of Proposed Construction or Alteration. For on-airport projects, the form submitted to the FAA regional or airports division office as formal written notification of any kind of construction or alteration of objects that affect navigable airspace, as defined in 14 CFR Part 77, *Safe, Efficient Use, and Preservation of the Navigable Airspace*. (See guidance available on the FAA web site at https://oeaaa.faa.gov.) The form may be downloaded at http://www.faa.gov/airports/resources/forms/, or filed electronically at: https://oeaaa.faa.gov.
Form 7480-1	Notice of Landing Area Proposal. Form submitted to the FAA Airports Regional Division Office or Airports District Office as formal written notification whenever a project without an airport layout plan on file with the FAA involves the construction of a new airport; the construction, realigning, altering, activating, or abandoning of a runway, landing strip, or associated taxiway; or the deactivation or abandoning of an entire airport The form may be downloaded at http://www.faa.gov/airports/resources/forms/.
Form 6000-26	Airport Sponsor Strategic Event Submission Form
AC	Advisory Circular
ACSI	Airport Certification Safety Inspector
ADG	Airplane Design Group
AIP	Airport Improvement Program
ALECP	Airport Lighting Equipment Certification Program
ANG	Air National Guard
AOA	Air Operations Area, as defined in 14 CFR Part 107. Means a portion of an airport, specified in the airport security program, in which security measures are carried out. This area includes aircraft movement areas, aircraft parking areas, loading ramps, and safety areas, and any adjacent areas (such as general aviation areas) that are not separated by adequate security systems, measures, or procedures. This area does not include the secured area of the airport terminal building.
ARFF	Aircraft Rescue and Fire Fighting
ARP	FAA Office of Airports
ASDA	Accelerate-Stop Distance Available
AT	Air Traffic
ATCT	Airport Traffic Control Tower
ATIS	Automatic Terminal Information Service
ATO	Air Traffic Organization
Certificated Airport	An airport that has been issued an Airport Operating Certificate by the FAA under

Term	Definition
	the authority of 14 CFR Part 139, *Certification of Airports*.
CFR	Code of Federal Regulations
Construction	The presence of construction-related personnel, equipment, and materials in any location that could infringe upon the movement of aircraft.
CSPP	Construction Safety and Phasing Plan. The overall plan for safety and phasing of a construction project developed by the airport operator, or developed by the airport operator's consultant and approved by the airport operator. It is included in the invitation for bids and becomes part of the project specifications.
CTAF	Common Traffic Advisory Frequency
Displaced Threshold	A threshold that is located at a point on the runway other than the designated beginning of the runway. The portion of pavement behind a displaced threshold is available for takeoffs in either direction or landing from the opposite direction.
DOT	Department of Transportation
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FOD	Foreign Object Debris/Damage
FSS	Flight Service Station
GA	General Aviation
HAZMAT	Hazardous Materials
HMA	Hot Mix Asphalt
IAP	Instrument Approach Procedures
IFR	Instrument Flight Rules
ILS	Instrument Landing System
LDA	Landing Distance Available
LOC	Localizer antenna array
Movement Area	The runways, taxiways, and other areas of an airport that are used for taxiing or hover taxiing, air taxiing, takeoff, and landing of aircraft, exclusive of loading aprons and aircraft parking areas (reference 14 CFR Part 139).
MSDS	Material Safety Data Sheet
MUTCD	Manual on Uniform Traffic Control Devices
NAVAID	Navigation Aid
NAVAID Critical Area	An area of defined shape and size associated with a NAVAID that must remain clear and graded to avoid interference with the electronic signal.
Non-Movement Area	The area inside the airport security fence exclusive of the Movement Area. It is important to note that the non-movement area includes pavement traversed by aircraft.

Term	Definition
NOTAM	Notices to Airmen
Obstruction	Any object/obstacle exceeding the obstruction standards specified by 14 CFR Part 77, subpart C.
OCC	Operations Control Center
OE / AAA	Obstruction Evaluation / Airport Airspace Analysis
OFA	Object Free Area. An area on the ground centered on the runway, taxiway, or taxi lane centerline provided to enhance safety of aircraft operations by having the area free of objects except for those objects that need to be located in the OFA for air navigation or aircraft ground maneuvering purposes. (See AC 150/5300-13 for additional guidance on OFA standards and wingtip clearance criteria.)
OFZ	Obstacle Free Zone. The airspace below 150 ft (45 m) above the established airport elevation and along the runway and extended runway centerline that is required to be clear of all objects, except for frangible visual NAVAIDs that need to be located in the OFZ because of their function, in order to provide clearance protection for aircraft landing or taking off from the runway and for missed approaches. The OFZ is subdivided as follows: Runway OFZ, Inner Approach OFZ, Inner Transitional OFZ, and Precision OFZ. Refer to AC 150/5300-13 for guidance on OFZ.
OSHA	Occupational Safety and Health Administration
OTS	Out of Service
P&R	Planning and Requirements Group
NPI	NAS Planning & Integration
PAPI	Precision Approach Path Indicator
PFC	Passenger Facility Charge
PLASI	Pulse Light Approach Slope Indicator
Project Proposal Summary	A clear and concise description of the proposed project or change that is the object of Safety Risk Management.
RA	Reimbursable Agreement
RE	Resident Engineer
REIL	Runway End Identifier Lights
RNAV	Area Navigation
ROFA	Runway Object Free Area
RSA	Runway Safety Area. A defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway, in accordance with AC 150/5300-13.
SDS	Safety Data Sheet
SIDA	Security Identification Display Area
SMS	Safety Management System

Term	Definition
SPCD	Safety Plan Compliance Document. Details developed and submitted by a contractor to the airport operator for approval providing details on how the performance of a construction project will comply with the CSPP.
SRM	Safety Risk Management
SSC	System Support Center
Taxiway Safety Area	A defined surface alongside the taxiway prepared or suitable for reducing the risk of damage to an airplane unintentionally departing the taxiway, in accordance with AC 150/5300-13.
TDG	Taxiway Design Group
Temporary	Any condition that is not intended to be permanent.
Temporary Runway End	The beginning of that portion of the runway available for landing and taking off in one direction, and for landing in the other direction. Note the difference from a displaced threshold.
Threshold	The beginning of that portion of the runway available for landing. In some instances, the landing threshold may be displaced.
TODA	Takeoff Distance Available
TOFA	Taxiway Object Free Area
TORA	Takeoff Run Available. The length of the runway less any length of runway unavailable and/or unsuitable for takeoff run computations. See AC 150/5300-13 for guidance on declared distances.
TSA	Taxiway Safety Area, or Transportation Security Administration
UNICOM	A radio communications system of a type used at small airports.
VASI	Visual Approach Slope Indicator
VGSI	Visual Glide Slope Indicator. A device that provides a visual glide slope indicator to landing pilots. These systems include precision approach path indicator (PAPI), visual approach slope indicator (VASI), and pulse light approach slope indicator (PLASI).
VFR	Visual Flight Rules
VOR	Very High Frequency Omnidirectional Radio Range
VPD	Vehicle / Pedestrian Deviation

Supplement 4

CONSTRUCTION SAFETY AND PHASING PLAN SHEET

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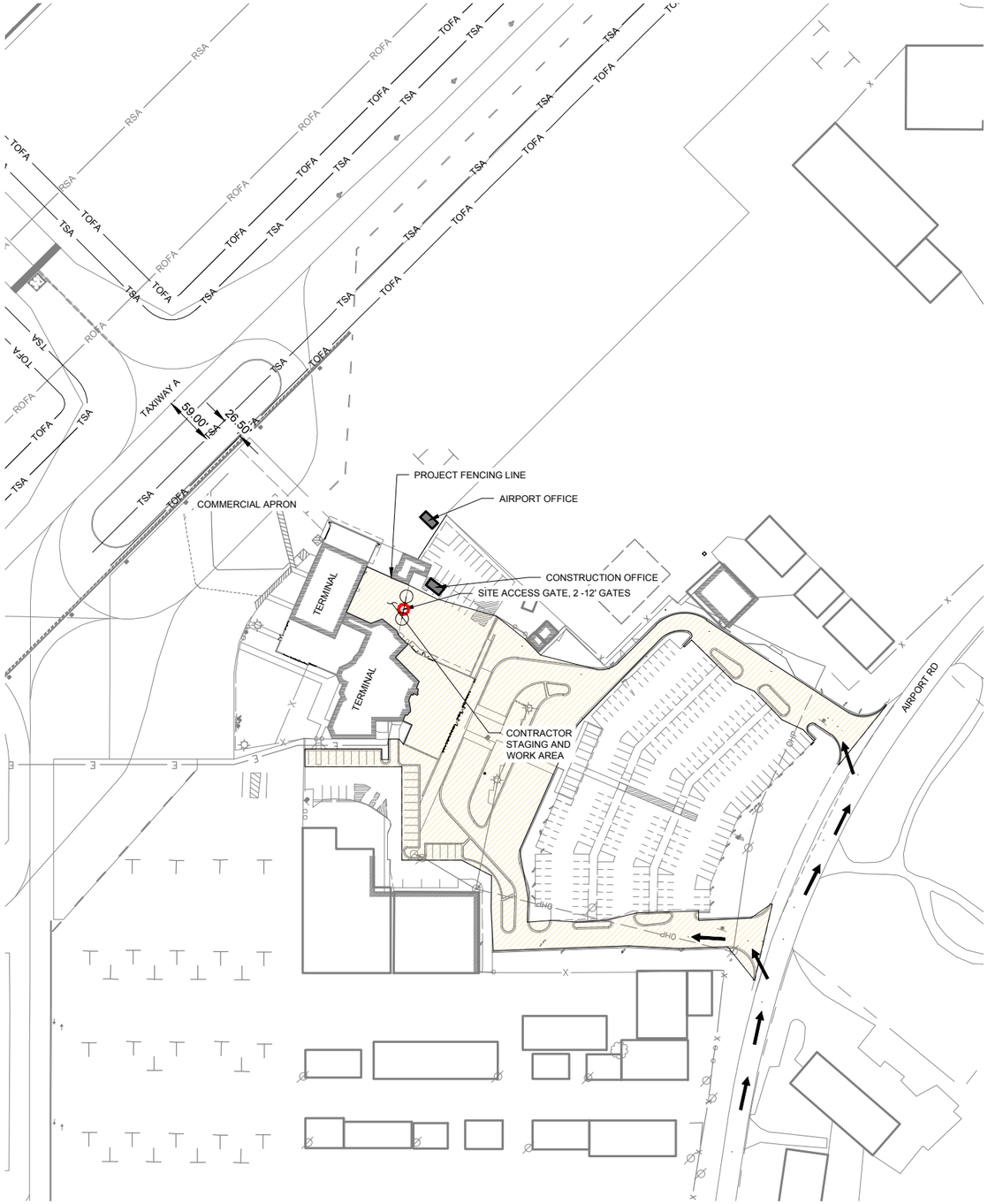
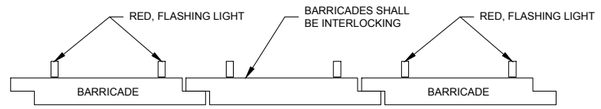
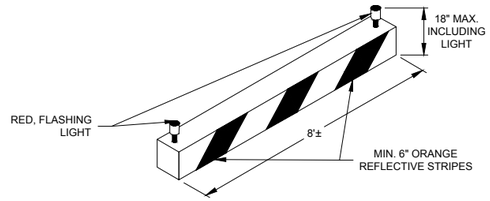


NOTE: PRINT IN COLOR

PHASING LEGEND	
	WORK AREA A
	TEMPORARY BUILDING
	LIGHTED LOW PROFILE BARRICADES
	CONTRACTOR ACCESS ROUTE
	CHAINLINK FENCE GATE
x	CHAINLINK FENCE
ROFA	RUNWAY OBJECT FREE AREA
TOFA	TAXIWAY OBJECT FREE AREA
TSA	TAXIWAY SAFETY AREA
TLOFA	TAXILANE OBJECT FREE AREA
	AOA GATE ACCESS



LOW PROFILE BARRICADE SPACING DETAIL



1 LOW-PROFILE BARRICADE
NO SCALE

NOTE:
- BARRICADES MUST BE IN GOOD, WORKING CONDITION.
- BARRICADES TO BE FILLED WITH WATER & CONSTANTLY MONITORED.
- IF REQUIRED, BARRICADES SHALL BE WEIGHTED BY SANDBAGS OR OTHER MEANS TO KEEP BARRICADE STATIONARY.
- LOW PROFILE BARRICADE TO MEET MOST CURRENT EDITION OF FAA AC 150/5370-2 < 18" HEIGHT.
- UV RESISTANT POLYETHYLENE WATER FILLED, < 8' LENGTH, ORANGE AND WHITE, WITH FLASHING SOLAR AND BATTERY POWERED LIGHTS.

CONSTRUCTION SAFETY PHASING PLAN NOTES

PHASES	MAJOR WORK TO BE COMPLETED	GENERAL NOTES
PHASE I	WORK AREA A • DEMOLITION • STRUCTURAL STEEL CONCRETE SITE WORK • ARCHITECTURAL • MECHANICAL • ELECTRICAL	1. WORK ON THE PROJECT WILL NOT BE PERMITTED UNTIL THE AIRPORT HAS ISSUED A NOTICE TO PROCEED (NTP). THE CONTRACTOR SHALL COMPLETE THE PHASES AND WORK AREAS IN THE GENERAL SEQUENCE AND WITHIN THE TIME ALLOTTED FOR EACH PHASE AND WORK AREA AS SPECIFIED IN THE CONTRACT DOCUMENTS. SEPARATE NTP'S WILL BE ISSUED BY THE AIRPORT FOR EACH WORK AREA. 2. ALL AOA AIRCRAFT PAVEMENT SURFACES SHALL BE OPEN TO AIRCRAFT OPERATIONS AT ALL TIMES OTHER THAN THE DESIGNATED CLOSURES. 3. THE CONTRACTOR SHALL NOT MOVE PERSONNEL, EQUIPMENT, OR MATERIALS ONTO THE AOA WITHOUT PRIOR AIRPORT APPROVAL. 4. THE CONTRACTOR SHALL NOT ENTER ANY ACTIVE RSA, TSA, TOFA, OR ACTIVE AIRPORT MOVEMENT AREA WITHOUT AUTHORIZATION FROM THE AIRPORT. 5. DAILY SAFETY INSPECTION SHALL BE PERFORMED BY THE CONTRACTOR AS IDENTIFIED IN THE CSPP. 6. A PROJECT SUPERINTENDENT OR DESIGNATED PROJECT REPRESENTATIVE SHALL BE ON-SITE AT ALL TIMES WHILE CREWS ARE IN THE FIELD. THIS INCLUDES A PRIME CONTRACTOR REPRESENTATIVE DURING ALL WORK BEING PERFORMED BY SUBCONTRACTORS. 7. ALL COMPONENTS OF THE EXISTING AIRFIELD LIGHTING SYSTEM OUTSIDE OF THE PROJECT LIMITS SHALL REMAIN OPERATIONAL WHILE THOSE FACILITIES ARE OPEN FOR AIRCRAFT USE. 8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR FURNISHING, DEPLOYING, MAINTAINING, RELOCATING, AND REMOVING THE LOW-PROFILE BARRICADES AS SHOWN ON THE PLANS, AND AS DIRECTED BY THE AIRPORT. 9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE INSTALLATION OF ANY TEMPORARY DRAINAGE SYSTEMS WITHIN EACH PHASE AND WORK AREA LIMIT AS NECESSARY TO MAINTAIN EXISTING DRAINAGE PATTERNS. THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER FOR REVIEW A PLAN FOR ANY PROPOSED DRAINAGE SYSTEMS. NO MODIFICATIONS TO THE DRAINAGE WILL BE ALLOWED WITHOUT THE APPROVAL OF THE ENGINEER. ANY SUCH TEMPORARY DRAINAGE SYSTEMS AND MEASURES SHALL NOT IMPACT AOA OPERATIONS. 10. NO RUNWAY OR TAXIWAY CLOSURES ARE INCLUDED IN THIS PROJECT. 11. THE INTEGRITY AND CONTINUITY OF ALL AIRFIELD LIGHTING AND NAVAID CIRCUITS SHALL BE MAINTAINED, AND UNINTERRUPTED AT ALL TIMES. 12. THE CONTRACTOR SHALL FOLLOW ALL REQUIREMENTS OF THE CSPP. CONTRACTOR IS REQUIRED TO SUBMIT A SPCD, AS OUTLINED IN THE CSPP, AT THE PRE-CONSTRUCTION MEETING. 13. THE CONTRACTOR SHALL MAINTAIN PERIMETER ACCESS FOR AIRPORT OPERATIONS DURING CONSTRUCTION. 14. MATERIAL STOCKPILES AND EQUIPMENT STORAGE IS PROHIBITED WITHIN THE TAXIWAY OBJECT FREE AREA UNLESS THE TAXIWAY CLOSURE IS ALLOWED BY PROJECT PHASING. 15. CONTRACTOR WILL BE RESPONSIBLE FOR OBTAINING NECESSARY RIGHT-OF-WAY AND GRADING AND DRAINAGE PERMITS FROM THE TOWN OF OGDEN AND WEBER COUNTY. 16. LOW PROFILE BARRICADES SHALL BE IN PLACE PRIOR TO BEGINNING WORK IN THE AFFECTED WORK AREA. 17. CONTRACTOR SHALL GIVE RIGHT OF WAY TO ALL AIRCRAFT AND ARFF VEHICLES AT ALL TIMES. 18. TEMPORARY CONSTRUCTION FENCE SHALL CONSIST OF 8-FOOT CHAIN-LINK FENCE WITH 3-STRAND BARBED WIRE. FENCE PANELS SHALL BE BOLTED TOGETHER WITH GAPS BETWEEN PANELS NO MORE THAN 2-INCHES. FENCE PANELS SHALL BE WEIGHTED WITH SAND BAGS OR OTHER METHOD APPROVED BY THE AIRPORT. LOCKING GATES SHALL BE 8-FEET IN HEIGHT WITH 3-STRAND BARBED WIRE AND LOCATED AS SHOWN ON THIS PLAN, WITH NO GREATER THAN 3-INCH GAP OPENING IN GATE. 19. CONTRACTOR SHALL ADHERE TO AIRPORT SECURITY REQUIREMENTS AT ALL TIMES. ANY GATES UTILIZED FOR CONSTRUCTION PURPOSES SHALL BE GUARDED BY CONTRACTOR SUPPLIED PERSONNEL OR LOCKED AT ALL TIMES. 20. ARFF TRUCKS WILL HAVE UNIMPEDED ACCESS TO THE AOA.

Mead & Hunt
Mead and Hunt, Inc.
999 18th Street,
Suite 2300 South Tower
Denver, CO 80202
phone: 303-825-8844
meadhunt.com

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OGDEN AIRPORT
FRONT TERMINAL EXPANSION

3909 AIRPORT ROAD
OGDEN, UT 84405

ISSUED

NOT FOR CONSTRUCTION

M&H NO.: 3132200-211851.01
DATE: JUNE 29, 2024
DESIGNED BY: DAB
DRAWN BY: DAB
CHECKED BY: JKL
DO NOT SCALE DRAWINGS

SHEET CONTENTS
CONSTRUCTION SAFETY AND PHASING PLAN - OVERALL

SHEET NO.
C-101

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6/28/2024 3:28:24 PM

Y² Geotechnical, P.C.
Geotechnical, Geologic & Environmental

P.O. Box 983
Layton, UT 84041-0983
Phone: (801) 546-6505 • Fax: (801) 546-3367
Toll-Free: 1-866-771-4209
E-Mail: y2geo@y2geotech.com

GEOTECHNICAL STUDY
OGDEN AIRPORT
TERMINAL EXPANSION
3909 AIRPORT ROAD
OGDEN, UTAH

Prepared By:

Y² GEOTECHNICAL, P.C.
PO BOX 983
LAYTON, UT 84041
(801) 546-6505

Y² JOB NUMBER: 12G-028

Prepared for:

RIDGELINE DESIGN
1708 EAST 5550 SOUTH #20
SOUTH OGDEN, UTAH 84403

May 29, 2012

TABLE OF CONTENTS
Y^2 JOB NUMBER: 12G-028

1.0 INTRODUCTION. 1

2.0 PROPOSED CONSTRUCTION. 1

3.0 CONCLUSIONS. 2

4.0 SITE CONDITIONS. 2

5.0 FIELD INVESTIGATION. 2

6.0 LABORATORY TESTING. 3

7.0 SUBSURFACE CONDITIONS. 3

8.0 SITE GRADING. 4
- 8.1 General Site Grading. 4
- 8.2 Excavations. 4
- 8.3 Structural Fill. 4
- 8.4 Backfill. 5
- 8.5 Fill Placement and Compaction. 5

9.0 SEISMIC CONSIDERATIONS. 6
- 9.1 Faulting. 6
- 9.2 Seismic Design Criteria. 7
- 9.3 Liquefaction. 7

10.0 FOUNDATIONS. 7
- 10.1 Footing Design. 7
- 10.2 Estimated Settlement. 8

11.0 LATERAL EARTH PRESSURES. 8

12.0 FLOOR SLABS 9

13.0 SURFACE DRAINAGE. 10

14.0 GENERAL CONDITIONS. 10

TABLE OF CONTENTS CONTINUED
Y^2 JOB NUMBER: 12G-028

TABLES

TABLE 1: STRUCTURAL FILL COMPACTION..... 5

TABLE 2: LATERAL EARTH PRESSURES 9

FIGURES

FIGURE 1 : VICINITY MAP
FIGURE 2 : SITE PLAN SHOWING BOREHOLE LOCATIONS
FIGURES 3 AND 4: BOREHOLE LOGS

LABORATORY RESULTS

GRAIN SIZE DISTRIBUTIONS
SUMMARY OF LABORATORY TESTING

1.0 INTRODUCTION

This report presents the results of a geotechnical investigation for the proposed expansion of the Terminal Building at the Ogden Airport located at 3909 Airport Road in Ogden, Utah. The general location of the site, with respect to existing roadways, is shown on Figure No. 1, *Vicinity Map*, at the end of this report.

This investigation was done to assist in evaluating the subsurface conditions and engineering characteristics of the foundation soils and in developing our opinions and recommendations concerning appropriate foundation types and floor slabs. This report presents the results of our geotechnical investigation including field exploration, laboratory testing, engineering analysis, and our opinions and recommendations. Data from the study is summarized on Figures 3 and 4, and in the Laboratory Results.

2.0 PROPOSED CONSTRUCTION

We understand that the proposed project will consist of a new free standing building adjacent to the existing terminal building. The proposed building is expected to be one to two story slab on grade structure approximately 80 by 60 feet in size. We estimate that the maximum loads for the proposed structure will not exceed 8 kips per linear foot for bearing walls, 150 kips for columns, and 150 to 200 pounds per square foot for floor slabs.

It is anticipated that utilities may be constructed to service the building and that exterior concrete flatwork may be placed in the form of curb and gutter, and sidewalks.

If structural loads are significantly greater than those discussed herein or if the project is substantially different than described above, our office should be notified so that we may review our recommendations, and if necessary, make modifications.

3.0 CONCLUSIONS

The following is a brief summary of our findings and conclusions:

1. The subject site is suitable for the proposed construction provided the recommendations presented in this report are followed.

2. Based upon the 2 boreholes drilled for this investigation, this site is covered with 12 inches of topsoil and sod. The native soil below the topsoil consisted o medium dense to dense poorly graded gravel with silt and sand (GP-GM) extending 14 feet below the current site grade where a medium dense silty sand (SM) was encountered which extended to the maximum depth investigated (22 ft). Water was not encountered in our boreholes at the time of the investigation.

3. Conventional strip and spread footings are recommended for support of the proposed building. Footings founded on the native soils or properly placed, compacted and tested structural fill extending to the undisturbed native soils may be designed for a maximum allowable soil bearing capacity of 2,600 psf. Additional information on footing design is given in Section 10.0 in this report.

4.0 SITE CONDITIONS

The project area is currently a grass area adjacent to the terminal building. The proposed building is to be located north and west of the existing building. The project area is relatively level with no visible grade. The project area is covered with lawn. The project area site is bound to the north and west by concrete and asphalt aprons, to the south by concrete flat work and more landscaped areas, and to the east by the existing building and parking lot. No standing water or surface water sources were observed on the site during our investigation.

5.0 FIELD INVESTIGATION

The field investigation consisted of drilling 2 boreholes to depths of 5½ to 22 feet below current site grades at the approximate locations shown on Figure 2, at the end of this report. The soils encountered at the site were continuously logged by a professional engineer from our office. Due to

the granular nature of the soils only disturbed samples were obtained and returned to our laboratory for testing.

6.0 LABORATORY TESTING

The samples obtained during the field investigation were sealed and returned to our laboratory where samples were selected for laboratory testing. Laboratory tests included natural moisture determinations and grain size distribution analyses. The results of these tests are shown at the end of this report.

Samples will be retained in our laboratory for 30 days following the date of this report at which time they will be disposed of unless a written request for additional holding time is received prior to the disposal date.

7.0 SUBSURFACE CONDITIONS

Based upon the 2 boreholes drilled for this investigation, this site is covered with 12 inches of topsoil and sod. The native soil below the topsoil consisted o medium dense to dense poorly graded gravel with silt and sand (GP-GM) extending 14 feet below the current site grade where a medium dense silty sand (SM) was encountered which extended to the maximum depth investigated (22 ft). Water was not encountered in our boreholes at the time of the investigation.

Graphical representations of the soil conditions encountered are shown on the Borehole Logs, Figure 3 and 4. The stratification lines shown on the Borehole Log represent the approximate boundaries between soil units; the actual transition may be gradual.

8.0 SITE GRADING

8.1 General Site Grading

Prior to construction unsuitable soils and vegetation should be removed from below areas which will ultimately support structural loads. This includes areas below foundations, floor slabs, and concrete flatwork. Unsuitable soils consist of topsoil, organic soils, undocumented fill, soft, loose or disturbed native soils, material associated with demolition of any existing facilities, and any other deleterious materials. Up to 6 inches of topsoil was encountered in our boreholes. All topsoil, uncontrolled fill, or other unsuitable soils should be completely removed.

8.2 Excavations

Due to the nature of the soils at this site, we recommend that temporary construction slopes for excavations into the native soils, less than five feet in depth, not be made steeper than ½ :1 (horizontal:vertical). Excavations deeper than 5 feet should be sloped at 1:1 or be shored prior to anyone entering the excavation. If unstable conditions or groundwater seepage are encountered, flatter slopes or shoring and bracing may be required. All excavations should meet applicable OSHA[1] Health and Safety Standards for type C soils.

8.3 Structural Fill

All fill placed below the structure should be compacted structural fill. All other fills should be considered as backfill. All structural fill should meet the requirements of the agency under which approval will be granted. Unless more restrictive criteria are given, structural fill may consist of the native soils or imported structural fill. Imported structural fill material should consist of well-graded sandy gravels to silty sands with a maximum particle size of 4 inches and 5 to 20 percent fines (materials passing the No. 200 sieve). The liquid limit of the fines should not exceed 35 and the plasticity index should be below 15. Clean gravel ranging from pea gravel to 6 inches with less than

[1] Occupational Safety and Health Administration

5 percent fines and sand combined may also be used as structural fill. All fill soils should be free from topsoils, highly organic material, frozen soil, and other deleterious materials.

8.4 Backfill

The native soils may be used as backfill in utility trenches and against outside foundation walls as long as they are properly moisture conditioned, placed, and compacted. Backfill, not under structural elements, should be placed in lift heights suitable to the compaction equipment used and compacted to at least 90 percent of the maximum dry density (ASTM D-1557).

8.5 Fill Placement and Compaction

The thickness of each lift should be appropriate for the compaction equipment that is used. We recommend a maximum lift thickness of 6 inches for hand operated equipment, 8 inches for most "trench compactors", and 12 inches for larger rollers, unless it can be demonstrated by in-place density tests that the required compaction can be obtained throughout a thicker lift. The full thickness of each lift of structural fill placed should be compacted to at least the percentages of the maximum dry density, shown in Table 1 below, as determined by ASTM D-1557:

TABLE 1: STRUCTURAL FILL COMPACTION

Structural fill	Percent of Maximum Dry Density
Below foundations, flatwork, and pavements:	95%
For fills thicker than 6 feet:	98%
In landscape areas not supporting structural loads:	90%

Generally, placing and compacting fill at a moisture content within 2% of the optimum moisture content, as determined by ASTM D-1557, will facilitate compaction. The further the moisture

content is from the optimum, the more difficult it will generally be to achieve the required compaction.

Clean gravel fill used as structural fill may be placed in loose lifts up to 2 feet thick. The gravel will need to be compacted with at least 4 passes of a vibratory plate or slow moving vibratory smooth drum compactor. Typically, the gravel will settle 1 to 3 inches per foot when properly compacted. Gravel compaction should be verified by either an engineer from Y^2 Geotechnical, P.C. or a materials testing technician from Intermountain Testing Inc., trained in proper gravel placement techniques.

We recommend that fill be tested frequently during placement by a qualified materials testing technician. Early testing is recommended to demonstrate that placement and compaction methods are achieving the required compaction for the entire depth of fill. It is the contractor's responsibility to ensure that fill materials and compaction efforts are consistent so that tested areas are representative of the entire fill.

9.0 SEISMIC CONSIDERATIONS

9.1 Faulting

Based on published data, no active faults are known to traverse the site and no faulting was indicated during our field investigation. The nearest known active fault is the Wasatch Fault, located about 3½ miles east of the property[2].

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[2] Black, B.D., DuRoss, C.B., Hylland, M.D., McDonald, G.N., and Hecker, S., compilers, 2004, Fault number 2351e, Wasatch fault zone, Weber section, in Quaternary fault and fold database of the United States: U.S. Geological Survey website, http://earthquakes.usgs.gov/regional/qfaults

9.2 Seismic Design Criteria

The structures should be designed in accordance with the IBC building codes. According to section 1613.5.2 of the IBC, this site is classified as a Site Class D.

9.3 Liquefaction

Liquefaction is a phenomenon where soils lose their intergranular strength due to an increase of pore pressures during a dynamic event such as an earthquake. The potential for liquefaction is based on several factors, including 1) the grain size distribution of the soil, 2) the plasticity of the fine fraction of the soil (material passing the No. 200 sieve), 3) relative density of the soil, 4) earthquake strength (magnitude) and duration, and 5) overburden pressures. In addition, the soils must be near saturation for liquefaction to occur. According to the Weber County liquefaction map[3], this site is in an area classified as having moderate potential for liquefaction. Based on the density of the soils encountered and the depth of the water table we expect the risk of liquefaction induced settlement to be low.

10.0 FOUNDATIONS

10.1 Footing Design

The native soils at this site are capable of supporting the proposed structures if the recommendations presented in this report are followed. The recommendations presented below should be utilized during design and construction of this project:

1. Conventional strip and spread footings are recommended for support of the proposed building. Footings founded on the native soils or properly placed, compacted and tested structural fill extending to the undisturbed native soils may be designed for a maximum allowable soil bearing capacity of 2,600 psf. A one-third increase is allowed for short term transient loads such as wind and seismic events. Footings should be uniformly loaded.

---

[3] Utah Geologic Survey, Selected Critical Facilities and Geologic Hazards, Weber County, Utah

2. Continuous and spot footings should have minimum widths of 18 and 30 inches, respectively.

3. Exterior footings should be placed below frost depth which is determined by local building codes. Generally 30 inches is adequate in this area. Interior footings, not subject to frost, should extend at least 18 inches below the lowest adjacent final grade.

4. Foundation walls on continuous footings should be well reinforced both top and bottom. We suggest a minimum amount of steel equivalent to that required for a simply supported span of 12 feet.

5. Footing excavations should be observed by a geotechnical engineer from Y^2 Geotechnical prior to placement of structural fill and construction of footings to evaluate whether suitable bearing soils have been exposed and verify that excavation bottoms are free of fill, loose, or disturbed soils.

10.2 Estimated Settlement

If footings are designed and constructed in accordance with the recommendations presented above, the risk of total settlement exceeding 1 inch and differential settlement exceeding 0.5 inch for a 25-foot span will be low. Additional settlement may be expected during a strong seismic event.

11.0 LATERAL EARTH PRESSURES

Resistance to lateral loads (including those due to wind or seismic loads) on foundations may be achieved by frictional resistance between the foundations and underlying soils, and by passive earth pressures of backfill soils placed against the sides of foundations. Retaining walls and below grade walls act as soil retaining structures and should be designed to resist pressures induced by the backfill soils.

The lateral pressures imposed on a retaining structure are dependant on the rigidity of the structure and its ability to resist rotation. Retaining walls which are free to rotate at least 0.2 percent of the

wall height, develop an active lateral soil pressure condition. Structures that are not allowed to rotate or move laterally, develop an at-rest lateral earth pressure condition. Lateral pressures applied to structures may be computed by multiplying the vertical depth of backfill material by the appropriate equivalent fluid density. Any surcharge loads in excess of the soil weight applied to the backfill should be multiplied by the appropriate lateral pressure coefficient and added to the soil pressure. The lateral pressures presented in Table 2, *Lateral Earth Pressures* below, are based on drained, horizontally placed soils as backfill material. For computing lateral forces we recommend the following equivalent fluid densities:

TABLE 2: LATERAL EARTH PRESSURES

Condition	Static Lateral Pressure Coefficient	Static Equivalent Fluid Pressure (pcf)	Seismic Equivalent Fluid Pressure (pcf)
Active	0.28	34	54
At-Rest	0.44	53	72
Passive	3.53	424	405

The friction acting along the base of foundations may be computed by using a coefficient of friction of 0.45 for contact with the native soils. The values presented above are based on drained conditions and are ultimate, therefore, an appropriate factor of safety should be applied to these values for design purposes.

12.0 FLOOR SLABS

The native soils below floor slabs should be proof rolled and a minimum 4 inch thick layer of free-draining gravel or imported structural fill should be placed immediately below the floor slab to help distribute floor loads, break the rise of capillary water, and aid in the concrete curing process. For slab design, we recommend a modulus of subgrade reaction of 200 psi/in be used. Floor slabs should

be evaluated by a structural engineer to determine what measures are appropriate to control shrinkage and stress cracking and provide desired support.

Special precautions should be taken during placement and curing of concrete slabs and flatwork. Excessive slump (high water-cement ratios) of the concrete and/or improper finishing and curing procedures used during hot or cold weather conditions may lead to excessive shrinkage, cracking, spalling, or curling of slabs. We recommend all concrete placement and curing operations be performed in accordance with American Concrete Institute (ACI) codes and practices.

13.0 SURFACE DRAINAGE

Wetting of the foundation soils may cause some degree of volume change within the soil should be prevented after construction. We recommend that the following precautions be taken at this site:

1. The ground surface should be graded to drain away from the structures in all directions. We recommend a minimum fall of 6 inches in the first 10 feet for landscaped areas and 1 inch in the first 20 feet for paved surfaces.

2. Roof runoff should be collected in rain gutters with down spouts designed to discharge well outside of the backfill limits.

3. Sprinkler heads, should be aimed away and kept at least 12 inches from foundation walls.

4. Provide adequate compaction of foundation backfill i.e. a minimum of 90% of ASTM D-1557. Water consolidation methods should not be used.

5. Other precautions which may become evident during design and construction should be taken.

14.0 GENERAL CONDITIONS

The exploratory data presented in this report was collected to provide geotechnical design recommendations for this project only and is not intended for application to other sites or projects.

Borehole conditions may not be indicative of subsurface conditions outside the study area and thus have limited value in depicting subsurface conditions for contractor bidding. If it is necessary to define subsurface conditions in sufficient detail to allow accurate bidding we recommend an additional study be conducted which is designed for that purpose. An experienced geotechnical engineer or technician should observe fill placement and conduct testing as required to confirm the use of proper structural fill materials and placement procedures.

Variations from the conditions portrayed in the boreholes may occur and can only be confirmed during earthwork and foundation construction. The topsoil and fill conditions indicated in this report represent what was encountered during the site investigation. Subsequent changes to the site may result in fill or topsoil amounts varying from what is represented in this report. If fill, topsoil, or subsurface conditions are found to be different than those presented in this report, we should be notified immediately to determine if changes in the recommendations are required. If Y^2 Geotechnical, P.C., is not contacted about variations in the soil conditions, we cannot be responsible for the impact of those conditions on the performance of the project.

It should be remembered that geotechnical engineering conclusions and recommendations are generated through analytical methods which are not an exact science. Conclusions and recommendations presented in a geotechnical engineering report are not based only on the analytical empirical tools generally used but rely on engineering judgment in conjunction with the tools. The fact that professional judgments must be used in making recommendations means that the conclusions, solutions and recommendations presented in the geotechnical evaluation should not be considered risk-free and, more importantly, are not a guarantee that the interaction between the soils and the proposed structure will perform as planned. The conclusions and recommendations presented in this report represent the Y^2 Geotechnical, P.C. professional findings regarding the proposed

structures and pavements on this project based on the information generated and referenced during this evaluation and Y^2 Geotechnical, P.C.'s experience in working with these conditions.

The geotechnical investigation as presented in this report was conducted within the limits prescribed by our client. The finding and recommendations which have been presented in this report have been made in accordance with generally accepted professional geotechnical engineering practice in the area at the time of report preparation. Standards of practice are subject to change with time. No other warranty or representation, either expressed or implied is intended in our proposals, contracts or report.

This geotechnical report has been prepared for Ridgeline Design for use in the design and construction of the Ogden Airport Terminal Expansion project. This report is site specific and should not be relied upon for use in other investigations and is not for the use or benefit of, nor may it be relied upon by any other person or entity, for any purpose without the advance and express written consent of Ridgeline Design and Y^2 Geotechnical, P.C.; therefore, any use or reliance upon this geotechnical evaluation by a party other than the Client shall be solely at the risk of such third party and without legal recourse against Y^2 Geotechnical, P.C., its employees, officers, or directors, regardless of whether the action in which recovery of damages is brought is based upon contract, tort, statue, or otherwise. The client has the responsibility to see that all parties to the project including the designer, contractor, subcontractor, and building official, etc., are aware of the geotechnical report in its complete form. Y^2 Geotechnical, P.C., assumes no responsibility or liability for work or testing performed by others.

We appreciate the opportunity of providing our services on this project. If we can answer questions or be of further service, please call.

Respectfully;
Y² GEOTECHNICAL, P.C.
Not Official Unless Stamped and dated.

Lori S. Yahne, P.E.
Principal Geotechnical Engineer

Reviewed by,

R. Jay Yahne, P.E.
Principal Geotechnical Engineer

3 copies sent

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Geotechnical, Geologic, & Environmental

NORTH

Figure 1: VICINITY MAP

GEOTECHNICAL STUDY
Ogden Airport Terminal Expansion
Ogden, Weber County, Utah

Y² Job No. 12G-028

Y² Geotechnical, P.C.
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NORTH

Figure 2: TEST HOLE LOCATIONS

GEOTECHNICAL STUDY
Ogden Airport Terminal Expansion
Ogden, Weber County, Utah

Y² Job No. 12G-028

Project No. 12G-028

LOG OF BOREHOLE NO. B-1

Figure 3

PROJECT: Ogden Airport Terminal Expansion

CLIENT: Ridgeline Design

LOCATION: 3909 Airport Dr, Ogden, UT

Surface Elev.:

Modified California Sampler; Standard Penetration Test

Depth in Feet	Graphic Log	Sample Type	SOIL DESCRIPTION	SPT (N) Blows/Foot	Moisture Content, %	Liquid Limit, %	Plasticity Index, %	Gravel, %	Sand, %	Fines, %
			12" Topsoil.							
			Poorly Graded Gravel with Silt and Sand (GP-GM) - medium dense, slightly moist, brown.	16						
5				17						
				33						
10			Dense below 12 feet.	36						
			Silty Sand (SM) - medium dense, slightly moist, brown.							
15				19	5.8	NP	NP	2.5	83.6	13.9
20				16						
			End of borehole at 22 feet.							
25										
30										

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WATER LEVELS					
None 5/24/12	STARTED	5/24/12	FINISHED	5/24/12
	DRILL CO.	Y-Squared	DRILL RIG	AMS VTR 9500
	DRILL TYPE	10" Hollow Stem		
	LOGGED BY	R. Jay Yahne, P.E.		

LOG OF BOREHOLE/TEST PIT 12G-028 GINT.GPJ Y2 GEOTECH.GDT 5/29/12

Project No. 12G-028

LOG OF BOREHOLE NO. B-2

Figure 4

PROJECT: **Ogden Airport Terminal Expansion**

CLIENT: **Ridgeline Design**

LOCATION: **3909 Airport Dr, Ogden, UT**

Surface Elev.:

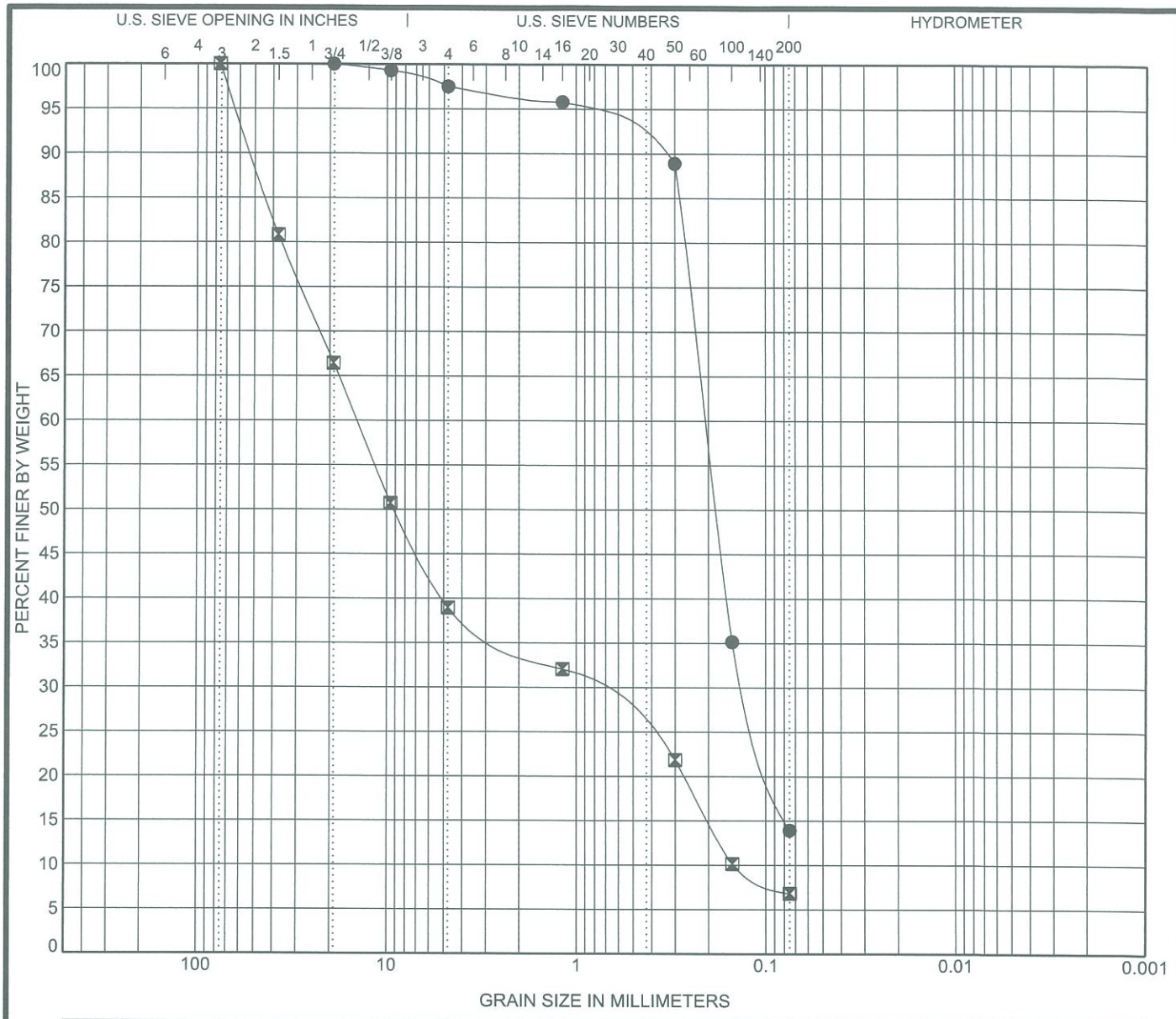
Modified California Sampler

Depth in Feet	Graphic Log	Sample Type	SOIL DESCRIPTION	SPT (N) Blows/Foot	Moisture Content, %	Liquid Limit, %	Plasticity Index, %	Gravel, %	Sand, %	Fines, %
0			12" Topsoil.							
			Poorly Graded Gravel with Silt and Sand (GP-GM) - medium dense, slightly moist, brown.							
5				32	3.1	NP	NP	60.7	32.1	6.8
			End of borehole at 5.5 feet.							
10										
15										
20										
25										
30										

Y² Geotechnical, P.C.
Geotechnical, Geologic & Environmental

WATER LEVELS			
None 5/24/12	STARTED 5/24/12	FINISHED 5/24/12	
	DRILL CO. Y-Squared	DRILL RIG AMS VTR 9500	
	DRILL TYPE 10" Hollow Stem		
	LOGGED BY R. Jay Yahne, P.E.		

LOG OF BOREHOLE/TEST PIT 12G-028 GINT.GPJ Y2 GEOTECH.GDT 5/29/12



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	B-1	16.0	SILTY SAND(SM)	NP	NP	NP		
⊠	B-2	4.0	POORLY GRADED GRAVEL with SILT and SAND(GP-GM)	NP	NP	NP	0.38	98.58

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-1	16.0	19.1	0.207	0.127		2.5	83.6	13.9	
⊠	B-2	4.0	76.2	14.386	0.898	0.146	60.7	32.1	6.8	

Y^2 *Geotechnical, P.C.*
Geotechnical, Geologic & Environmental

GRAIN SIZE DISTRIBUTION

Project: Ogden Airport Terminal Expansion
Location: 3909 Airport Dr Ogden, UT
Number: 12G-028

US GRAIN SIZE 12G-028 GINT.GPJ Y2 GEOTECH.GDT 5/29/12

Borehole	Depth	Liquid Limit	Plastic Limit	Plasticity Index	Maximum Size (mm)	%<#200 Sieve	Class-ification	Water Content (%)	Dry Density (pcf)	Satur-ation (%)	Void Ratio
B-1	16.0	NP	NP	NP	19.1	14	SM	5.8			
B-2	4.0	NP	NP	NP	76.2	7	GP-GM	3.1			

Y^2 *Geotechnical, P.C.*
Geotechnical, Geologic & Environmental

Summary of Laboratory Results

Project: Ogden Airport Terminal Expansion

Location: 3909 Airport Dr Ogden, UT

Number: 12G-028

US LAB SUMMARY 12G-028 GINT.GPJ Y2 GEOTECH.GDT 5/29/12

November 3, 2022

Mr. Shane Sanders, AIA NCARB
Sanders Associates Architects
2668 Grant Avenue
Ogden, Utah 84401

Subject: Geotechnical Consultation
Ogden-Hinckley Airport Terminal Expansion
3909 Airport Road
Ogden, Utah

INTRODUCTION

As requested, the undersigned engineer from CMT Engineering Laboratories (CMT) has reviewed the original getechnical study[1] prepared by others for the existing building and a cursory review of the design plans for the proposed 8,448 square foot airport terminal expansion.

RECOMMENDATIONS

The structural plans provided indicate utilizing spread footings for the addition with a design soil bearing pressure of 2,000 pounds per square foot over natural undisturbed soils. In the referenced geotechnical report, native soils encountered consisted of granular soil comprised of silty GRAVEL with sand extending to a depth of about 14 feet underlain by silty SAND extending to the full depth penetrated of 22 feet at bore hole B-1. No groundwater was encountered within this depth at the time of the report. The design bearing pressure given in the referenced report was on the order of 2,600 pounds per square foot (see page 7 of the geotechnical report) for footings installed on undisturbed natural granular soil or structural fill extending to undisturbed natural granular soil.

Based on the above information, the proposed foundation has been designed within the given soil bearing pressure limits. We recommend that CMT be contracted to review the exposed natural subgrade soils prior to structural fill and/or footing installation to verify existing soil conditions meet the requirement of the report.

[1] "Geotechnical Study Ogden Airport, Terminal Expansion 3909 Airport Road, Ogden, Utah," Y[2] Geotechnical P.C. Job No. 12G-028, May 29, 2012.

CLOSURE

We appreciate the opportunity to work with you on this project. Please let us know if we can be of further assistance.

Sincerely,
CMT Engineering Laboratories

Bryan N. Roberts, P.E.
Senior Geotechnical Engineer

CONSTRUCTION AGREEMENT

THIS AGREEMENT, entered into as of the __ day of_____, 2024, by and between **OGDEN CITY CORPORATION,** a municipal corporation of the State of Utah, hereinafter "City," and _____. , herein after "Contractor."

WITNESSETH:

WHEREAS, City has established a need for General Contractor/Construction Manager services to provide and oversee renovation and remodeling of properties owned by Ogden City; and

WHEREAS, Contractor has proposed to provide such services.

NOW, THEREFORE, in consideration of the mutual covenants and agreements stated herein and of the payments for services hereinafter described, the parties hereto do mutually agree as follows:

1. **Performance of Services.** City hereby agrees to engage Contractor, and Contractor hereby agrees to perform the services set forth in the plans and specifications dated _____, incorporated herein by reference. This involves the expansion and remodel of the airport terminal building at 3909 Airport Road, Ogden, UT 84405 .

2. **Time of Performance.** This Agreement shall commence on the date first noted above . Contractor shall complete the Scope of Work under this Agreement no later than **300 calendar days after the start of construction**. This Agreement shall terminate upon completion of the Work. For each day that the construction work remains uncompleted beyond the specified completion date, the sum of TWO-HUNDRED FIFTHY DOLLARS ($250.00) shall, at the option of the City, be retained as and for stipulated and agreed upon liquidated damages.

3. **Compensation.** For such services, Contractor shall be paid as specified in Exhibit B – Schedule of Values, attached hereto and by this reference made a part hereof. The total compensation shall not exceed _____ **Dollars** (**$XXXXXXX.00**). Said total shall constitute full payment for all services rendered and costs incurred by Contractor in performing this Agreement.

4. **Specific Representations And Warranties**. By executing this Agreement, Contractor makes the following express representations and warranties to Owner:

A. Contractor is professionally qualified to act as the general contractor/construction manager for the Project and has, and shall maintain, any and all licenses, permits, and other authorizations necessary to act as the construction manager for the Project and to perform the Services required hereunder.

B. Contractor has become familiar with all design and construction documents generated to date and will become familiar with all generated hereafter, and has become familiar with the Project site and the local conditions under which the Project is to be constructed.

C. Contractor has the capability and experience, including sufficient qualified and competent supervisory personnel, to efficiently and timely accomplish the Work and perform the Services, and Contractor will continuously furnish sufficient personnel to accomplish the Work and perform the Services in a timely and proper manner.

D. Contractor shall comply, and shall cause all Subcontractors to comply, with all Applicable Laws.

E. Contractor assumes full responsibility to Owner for the acts and omissions of its officers, employees, Subcontractors, consultants, and others employed or retained by it or them in connection with the performance of the Services or the Work.

F. Contractor warrants to Owner that all labor furnished to perform the Work under the Contract Documents will be competent to perform the tasks undertaken, that the product of such labor will yield only first-class results, that materials and equipment furnished will be of good quality and new unless otherwise permitted by the Contract Documents, and that the Work will be

of good quality, free from faults and defects, and in strict conformance with the Contract Documents. Any Work not strictly conforming to these requirements may be considered defective.

G. All obligations related to or arising from all representations and warranties made in the Contract Documents shall be obligations of, and shall be deemed incorporated in, the performance bond furnished by Contractor.

H. The representations and warranties enumerated in this paragraph operate in addition to, and shall in no way supersede, limit, or restrict any other duty, responsibility, representation, or warranty, express or implied, created or required by the Contract Documents or by law.

5. Correction Of Defective Work. If within one (1) year after Final Completion any of the Work is found to be defective or not in strict accordance with the Contract Documents or industry standards (two (2) years for roofing), Construction Manager shall correct such Work promptly upon receipt of written notice from Owner, or subsequent Owner. This obligation shall survive Final Payment by Owner and termination of this Agreement.

6. No Period Of Limitation Established. Nothing contained in paragraph 5 shall establish any period of limitation with respect to Contractor's other obligations and warranties under the contract establishment of the time period in paragraph 5 above relates only to Contractor's specific duty to correct or complete the Work.

7. Termination of Agreement for Cause. If, through any cause, Contractor shall fail to fulfill, in a timely and proper manner, its obligations under this Agreement, or if Contractor shall violate any of the covenants, agreements or stipulations of this Agreement, City shall have the right to terminate this Agreement by giving written notice to Contractor of such termination and specifying the effective date thereof. In the event of termination for cause, Contractor shall be entitled to receive only the share of the total compensation which is equal to any satisfactory work completed as of the date of termination. Notwithstanding the above, Contractor shall not be relieved of liability to City for damages sustained by City by virtue of any breach of the Agreement by Contractor, and City may withhold any payments to Contractor for the purpose of setoff until such time as the exact amount of damages due City from Contractor is determined.

8. Termination for Convenience. The City or Contractor may terminate the Agreement at any time by giving written notice to the other and specifying the effective date thereof, at least thirty (30) days before the effective date of such termination. If the Agreement is terminated by City as provided herein, City shall pay Contractor for all work performed as of the date of termination.

9. Non-assignability. Contractor shall not assign any interest in this Agreement, and shall not transfer any interest in the same (whether by assignment or novation) without the prior written consent of the City thereto.

10. Interest of Contractor. Contractor covenants that Contractor presently has no interest and shall not acquire any interest, direct or indirect, in any property, service, or working relationship which would conflict in any manner or degree with the performance of the services hereunder. Contractor further covenants that in the performance of this Agreement no person having such interest shall be employed.

11. Insurance Requirements. Contractor shall procure and maintain for the duration of the contract insurance against claims for injuries to persons or damages to property which may arise from or in connection with the performance of the work hereunder by Contractor, its agents, representatives, employees or subcontractors. The cost of such insurance shall be included in Contractor's bid. The amount of insurance shall not be less than:

Commercial General Liability: $1,000,000 combined single limit per occurrence and $3,000,000 aggregate for bodily injury, personal injury and property damage. The limits of liability shall apply per project.

Business Automobile Liability: $1,000,000 combined single limit per accident for bodily injury and property damage.

Workers' Compensation and Employers' Liability: Workers' compensation limits as required by the labor code of the State of Utah and employers liability with limits of $1,000,000 per accident.

Insurance is to be placed with insurers acceptable to and approved by the City. Contractor's insurer must be authorized to do business in Utah at the time the contract is executed (and throughout the time period the contract is maintained), unless otherwise agreed in writing by the City. Failure to maintain or renew coverage or to provide evidence of renewal will be treated by City as a material breach of contract.

Limits of liability amounts must meet contract requirements before contract is initiated.

The City, and its elected officials, officers, employees, agents and volunteers are to be named as additional insureds with primary coverage and not contributing.

The City shall be furnished with original certificates of insurance and endorsements effecting coverage required within, signed by a person authorized by that insurer to bind coverage on its behalf. All certificates and endorsements are to be received by the City before work commences.

The City reserves the right to require complete, certified copies of all required insurance policies at any time.

Each policy shall be endorsed to state that coverage shall not be suspended, voided, canceled, reduced in coverage or in limits except after thirty days prior written notice by certified mail, return receipt requested, has been given to the City.

Contractor's insurance shall be primary insurance and any insurance or self insurance maintained by the City, its officers, officials, employees, and volunteers shall be excess of Contractor's insurance and shall not contribute with it.

Contractor shall include all subcontractors as insured under its policies or shall furnish separate certificates and endorsements for each subcontractor. All coverages for subcontractors shall be subject to all of the requirements stated herein.

Any deductibles or self-insured retentions must be declared to and approved by the City. At the option of the City, either: the insurer shall reduce or eliminate such deductibles or self-insured retentions as respects the City, its elected officials, officers, employees, agents and volunteers; or Contractor shall provide a financial guarantee satisfactory to the City guaranteeing payment of losses and related investigations claim administration and defense expenses.

12. **Payment & Performance Bonds. (For Contracts in excess of $50,000)**

A. Prior to City executing the Agreement, Contractor shall file with the City a good and sufficient performance bond and a payment bond, each in the sum of not less that 100 percent of the Contract Price.

B. The bonds shall be executed by the Contractor and secured by a company duly and regularly authorized to do a general surety business in the State of Utah and named in the current list of Companies holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies as published in current Circular 570 (amended) by the Audit Staff Bureau of Accounts, U.S. Treasury Department, with an underwriting limitation equal to or greater than the Contract Price which the bond guarantees or with a current "A-" rating or better in A.M. Best Co., Inc.'s, Best Insurance Reports, Property and Casualty Edition.

C. Said bonds shall guarantee the faithful performance of the Construction Contract by the Contractor and payment of labor and materials. They shall inure by their terms to the

benefit of the City. Neither this nor any other provision requiring a performance bond shall be construed to create any rights in any third party claimant as against the City for performance of the work under this Agreement.

D. If the surety on any bond furnished by Contractor is subject to any proceeding under the Bankruptcy Code (Title 11, United States Code) or becomes insolvent or its right to do business is terminated in the State of Utah or it ceases to meet the requirements of this paragraph, Contractor shall, within 15 days thereafter, substitute another bond and surety, both of which must be acceptable to the City.

13. Final Payment

After completion of all work and punch list items, City shall pay the Compensation amount after deducting therefrom all previous payments, unit price quantity adjustments, penalties, liquidated damages, and other amounts to be retained. All prior progress payments shall be subject to correction in the final payment. The final payment shall not be due and payable until the expiration of 30 days from the approval of the request for final payment of Contractor by the City's finance department. Final payment, constituting the entire unpaid balance of the contract sum, shall be paid by the City to the Contractor when the work has been completed, the contract fully performed, and the final certificate for payment has been issued by the City. Final payment shall not become due until the Contractor submits to the City, (1) an affidavit that all payrolls, bills for materials and equipment and other indebtedness connected with the work for which the City might in any way be responsible, have been paid or otherwise satisfied; (2) consent of surety to final payment,; (3) if required by the City, other data establishing payment or satisfaction of all such obligations, such as receipts, releases and waivers of liens arising out of the contract, to the extent and in such form as may be designated by the City. If after substantial completion of work, final completion thereof is materially delayed through no fault of the Contractor or by the issuance of change orders affecting final completion, and the City so confirms, the City shall, upon application by the Contractor and certification by the City that without terminating the contract, make payment of the balance due for that portion of the work fully completed and accepted. The making of final payment shall constitute a waiver of all claims by the City except those arising from (1) unsettled liens; (2) faulty or defective work; (3) failure of the work to comply with the requirements of the contract documents; or (4) terms of any special warranties required by the contract documents. The acceptance of final payment shall constitute a waiver of all claims by the Contractor. All provisions of this Agreement, including without limitation those establishing obligations and procedures, shall remain in full force and effect notwithstanding the making or acceptance of final payment. The payment and acceptance of the final Compensation due and the adjustments and payment for any work done in accordance with any alterations of the same, shall release the City from any and all claims of Contractor on account of work performed under the Agreement or any modification thereof, except for those claims specifically agreed to in writing as reserved and unresolved by the City.

Furnishing of W-9. Payment under this Agreement is contingent upon Contractor furnishing City with a signed and completed W-9 IRS tax form. Such form shall be attached hereto and incorporated herein. Contractor shall cooperate with City in furnishing any additional information City may need to comply with rules and regulations of the Internal Revenue Service.

14. Indemnification. Contractor agrees to indemnify, save harmless and defend City and its elected officials, authorized agents, officers, employees, and volunteers from and against any and all claims, damages, demands, actions, costs and charges arising out of or by reason of Contractor's performance or failure to perform this agreement.

15. Contract Documents.

A. The Contract Documents shall include this Agreement, the Design for Construction if existing, any supplemental conditions, any special conditions, Change Orders and field orders, any written amendments to this Agreement, and all documents expressly annexed hereto as part of this Agreement including "General Specifications for Housing Rehabilitation Projects" established by Ogden City, the original Request for Qualification and the Proposal Submitted by the Contractor in response to the Request for Qualification. Documents not expressly listed above are not Contract Documents and do not constitute part of the contract between the parties.

B. Priority Of Documents. In the event of any conflict, discrepancy, or inconsistency among any of the Contract Documents, interpretation will be based on the following descending order of priority:

1. This Agreement including Exhibits except that if any conflict arises between any Exhibit and the primary Agreement, the primary Agreement takes precedence.
2. Supplemental or Special Conditions (if any).
3. Specifications.
4. Plans, and among the Plans, the following:
   a. As between figures given on plans and scaled measurements, the figures shall govern;
   b. As between large scale plans and small scale plans, the large scale plans shall govern.
5. General Specifications for Housing Rehabilitation Projects

C. Substitutions. If Owner elects to accept any items proposed by Contractor as a substitution, Contractor shall assume full responsibility for the proper performance of such substituted items and shall assume the costs of any changes in the Work which may be due to such substitution.

16. Attorney's Fees. In the event either party institutes litigation to enforce its rights under this Agreement, the prevailing party in such litigation shall be entitled to an award of its reasonable attorney's fees and costs.

17. Notice. Any notice, or notices, required or permitted to be given pursuant to this Agreement, may be personally served on the other party by the party giving such notice, or may be served by certified mail, return receipt requested, to the following addresses:

City: OGDEN CITY CORPORATION
Community Development Division
2549 Washington Blvd. Suite 120
Ogden, Utah 84401
(801) 629-8940

Contractor:

18. Independent Contractor. Contractor is independent of the City and shall perform all services according to its own methods without being subject to the control of the City except as to the results obtained. The City shall not carry Workers Compensation insurance or any health or accident insurance to cover Contractor. The City shall not pay nor be responsible for any contribution to Social Security, unemployment insurance, federal or state withholding taxes, nor provide any other contributions or benefits which might be expected in an employer-employee relationship. Contractor, as an independent contractor, shall provide and be responsible for any and all of Contractor, and its employees or agents, Workers Compensation contributions, federal and state withholding, unemployment compensation contributions and social security tax withholding, etc. Contractor agrees to report and pay any contributions for taxes, unemployment insurance, Social Security and other benefits.

19. When Rights and Remedies Not Waived. In no event shall any payment by City hereunder constitute or be construed to be a waiver by City of any breach of conditions or any default which may then exist, or while any such breach or default shall exist, in no way impair or prejudice any right or remedy available to City with respect to such breach or default.

20. Integrated Document. This Agreement embodies the entire agreement between City and Contractor for the scope of services and the terms and conditions. No verbal agreements or conversations with any officer, agent or employee of City prior to the execution of this Agreement shall affect or modify any of the terms or obligations contained in any documents comprising this Agreement. Any such verbal agreement shall be considered as unofficial information and in no way binding upon City.

21. Compliance with Laws. Contractor shall comply with all laws, ordinances, regulations, rules, etc., of the federal, state and local governments in connection with the performance of this Agreement.

22. Severability of Provisions. If any provisions of this Agreement are held invalid, the remainder of this Agreement shall not be affected thereby if such remainder would then continue to conform to the terms and requirements of applicable law.

23. Modifications. No oral modifications or amendments to this Agreement shall be effective, but this Agreement may be modified or amended by written agreement.

24. Governing Law. This Agreement, its terms and conditions, shall be governed by Utah law.

IN WITNESS WHEREOF, the parties hereto execute the foregoing instrument as of the day and year first above written.

OGDEN CITY CORPORATION

By:_____
Mara Brown, CAO

ATTEST:

_____
City Recorder

CONTRACTOR:

By:_____
ITS

011000 SUMMARY
012300 ALTERNATES
012302 CONTRACTOR MARKUP LIMITS
012500 SUBSTITUTION PROCEDURES
012600 CONTRACT MODIFICATION PROCEDURES
012900 PAYMENT PROCEDURES
013100 PROJECT MANAGEMENT & COORDINATION
013200 CONSTRUCTION PROGRESS DOCUMENTATION
013300 SUBMITTAL PROCEDURES
014000 QUALITY REQUIREMENTS
014200 REFERENCES
015000 TEMPORARY FACILITIES & CONTROLS
016000 PRODUCT REQUIREMENTS
016001 BUY AMERICAN PERFERENCE REQUIREMENTS (AIP)
017300 EXECUTION
017419 CONSTRUCTION WASTE MANAGEMENT & DISPOSAL
017700 CLOSEOUT PROCEDURES
017823 OPERATION & MAINTENANCE DATA
017839 PROJECT RECORD DOCUMENTS
017900 DEMONSTRATION AND TRAINING

GENERAL REQUIREMENTS

division 1

SAA

SANDERS ASSOCIATES ARCHITECTS

SECTION 011000 – SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Access to site.
4. Work restrictions.
5. Specification and Drawing conventions.

B. Related Requirements:

1. Section 015000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.2 PROJECT INFORMATION

A. Project Identification: **OGDEN CITY REGIONAL AIRPORT – HINCKLEY TEMINAL EXPANSION**

1. Project Location: 3909 Airport Road, Ogden, Utah.

B. Owner: UNIVERSITY FEDERAL CREDIT UNION

1. Owner's Representative: Lynn Hinrichs.

C. Architect: **SANDERS ASSOCIATES ARCHITECTS**, 2668 Grant Ave., Ogden Utah, 84401.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

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

1. The Project includes, but not limited to, site work, footings and foundations, structural steel frame and steel roof deck, membrane roofing, finishes, mechanical, plumbing and electrical systems, fire sprinkler system, landscaping and other Work indicated in the Contract Documents.

B. Type of Contract:

1. Project will be constructed under a single prime contract.

1.4 ACCESS TO SITE

A. General: Contractor shall have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of Project.

B. Use of Site: Limit use of Project site to Work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1.5 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.

B. Restricted Substances: Use of tobacco products and other controlled substances Project site is not permitted.

1.6 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

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

END OF SECTION 011000

SECTION 012300 – ALTERNATES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for alternates.

1.2 DEFINITIONS

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be **ADDED** to the base bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
2. The cost or credit for each alternate is the net addition to the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.3 PROCEDURES

A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.

1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated revisions to alternates.

C. Execute accepted alternates under the same conditions as other work of the Contract.

D. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. **Additive Alternate No. 1: "BASEMENT REMODEL."**

1. Additive Alternate: Provide an additive alternate bid for the basement remodel. Includes, but not limited to: Toilet rooms, demolition, finishes, mechanical, electrical, etc.

END OF SECTION 012300

SECTION 012302

CONTRACTOR MARK UP

PART 1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes requirements for Contractor Mark up on Change Orders.

1.3 DEFINITIONS

A. Contractor Markup: A percentage fee paid to any contractor on self-performed work.

PART 2 - PRODUCTS - NOT USED

PART 3 – EXECUTION

3.1 CONTRACTOR MARKUP LIMITS

A. General Contractor: **Maximum 8% mark up for direct pass thru changes.**
B. General Contractor or Sub-Contractor self-performing work: **Maximum 10% markup.**

END OF SECTION 012302

SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

B. Related Requirements:

1. Section 016000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.2 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.3 ACTION SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
   a. Submit Substitution Request Form: Use CSI Form 13.1A.
   b. Statement indicating why specified product or fabrication or installation method cannot be provided, if applicable.
   c. 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.
   d. 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.
   e. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
   f. Samples, where applicable or requested.
   g. Certificates and qualification data, where applicable or requested.

h. List of similar installations for completed projects, with project names and addresses as well as names and addresses of architects and owners.
i. Material test reports from a qualified testing agency, indicating and interpreting test results for compliance with requirements indicated.
j. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
k. 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.
l. Cost information, including a proposal of change, if any, in the Contract Sum.
m. 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.
n. 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.

2. 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: Architect will consider requests for substitution if received within 60 days after commencement of the Work. Requests received after that time may be considered or rejected at discretion of Architect.

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 offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
b. Requested substitution does not require extensive revisions to the Contract Documents.
c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
d. Substitution request is fully documented and properly submitted.
e. Requested substitution will not adversely affect Contractor's construction schedule.
f. Requested substitution has received necessary approvals of authorities having jurisdiction.
g. Requested substitution is compatible with other portions of the Work.
h. Requested substitution has been coordinated with other portions of the Work.
i. Requested substitution provides specified warranty.
j. 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.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 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, "Architect's Supplemental Instructions."

1.3 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 for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
2. Within 7 days after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

    a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
    b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
    c. Include costs of labor and supervision directly attributable to the change.
    d. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

B. Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes 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 Division 01 Section "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.

C. Proposal Request Form: Use AIA Document G709 for Proposal Requests.

1.4 CHANGE ORDER PROCEDURES

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

1.5 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 012600

SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.

1.2 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.

1. Coordinate line items in the schedule of values with items required to be indicated as separate activities in Contractor's construction schedule.
2. Submit the schedule of values to Architect at earliest possible date, but no later than seven days before the date scheduled for submittal of initial Applications for Payment.

B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.

1. Arrange schedule of values consistent with format of AIA Document G703.
2. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.
3. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

    a. Differentiate between items stored on-site and items stored off-site.

4. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
5. Overhead Costs: Show cost of temporary facilities and other major cost items that are not direct cost of actual work-in-place as separate line items.
6. Closeout Costs, (Retention). Include separate line items under Contractor and principal subcontracts for Project closeout requirements in an amount totaling five percent of the Contract Sum and subcontract amount.
7. Schedule of Values Revisions: Revise the schedule of values when Change Orders or Construction Change Directives result in a change in the Contract Sum. Include at least one separate line item for each Change Order and Construction Change Directive.

1.3 APPLICATIONS FOR PAYMENT

A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.

B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.

1. Submit draft copy of Application for Payment seven days prior to due date for review by Architect.

C. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.

D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.

1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.

E. Transmittal: Submit electronic document signed and notarized of each Application for Payment to Architect by a method ensuring receipt within 24 hours. Include waivers of lien and similar attachments if required.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

F. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.

1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
2. When an application shows completion of an item, submit conditional final or full waivers.
3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
5. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.

G. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.
2. Schedule of values.
3. Contractor's construction schedule (preliminary if not final).
4. Products list (preliminary if not final).
5. Sustainable design action plans, including preliminary project materials cost data.
6. Schedule of unit prices.
7. Submittal schedule (preliminary if not final).
8. List of Contractor's staff assignments.

9. List of Contractor's principal consultants.
10. Copies of building permits.
11. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
12. Initial progress report.
13. Report of preconstruction conference.

H. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

I. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.
2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
3. Updated final statement, accounting for final changes to the Contract Sum.
4. AIA Document G706.
5. AIA Document G706A.
6. AIA Document G707.
7. Evidence that claims have been settled.
8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
9. Final liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. General coordination procedures.
2. Coordination drawings.
3. RFIs.
4. Digital project management procedures.
5. Project meetings.

B. Related Requirements:

1. Section 017300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
2. Section 019113 "General Commissioning Requirements" for coordinating the Work with Owner's Commissioning Authority.

1.2 DEFINITIONS

A. BIM: Building Information Modeling.

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

1.3 INFORMATIONAL SUBMITTALS

A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:

1. Name, address, 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.

1.4 GENERAL COORDINATION PROCEDURES

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included in different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

B. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and scheduled activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's construction schedule.
2. Preparation of the schedule of values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.

1.5 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely indicated on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.

1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:

    a. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
    b. Indicate dimensions shown on Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternative sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Coordination Drawing Organization: Organize coordination drawings as follows:

1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within plenums to accommodate layout of light fixtures and other components indicated on Drawings. Indicate areas of conflict between light fixtures and other components.

3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Review: Architect will review coordination drawings to confirm that, in general, the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility.

C. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:

1. File Submittal Format: Submit or post coordination drawing files using PDF format.
2. Architect will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files.

    a. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
    b. Digital Data Software Program: Drawings are available in AutoCAD
    c. Contractor shall execute a data licensing agreement in the form of Agreement included in this Project Manual.

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 so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

1. Project name.
2. Project number.
3. Date.
4. Name of Contractor.
5. Name of Architect.
6. RFI number, numbered sequentially.
7. RFI subject.
8. Specification Section number and title and related paragraphs, as appropriate.
9. Drawing number and detail references, as appropriate.
10. Field dimensions and conditions, as appropriate.
11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
12. Contractor's signature.

13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

C. RFI Forms: Software-generated form with substantially the same content as indicated above, acceptable to Architect.

D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.

1. The following Contractor-generated RFIs will be returned without action:

    a. Requests for approval of submittals.
    b. Requests for approval of substitutions.
    c. Requests for approval of Contractor's means and methods.
    d. Requests for coordination information already indicated in the Contract Documents.
    e. Requests for adjustments in the Contract Time or the Contract Sum.
    f. 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 Architect's time for response will date from time of receipt by Architect of additional information.
3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 "Contract Modification Procedures."

    a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.

E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Software log with not less than 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 CAD drawings 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. Digital Drawing Software Program: Contract Drawings are available in AutoCAD.
4. Contractor shall execute a data licensing agreement in the form of Agreement included in Project Manual.

    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. 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.

B. Preconstruction Conference: 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 the Contract Documents.
    m. Submittal procedures.
    n. Preparation of Record Documents.
    o. Use of the premises.
    p. Work restrictions.

q. Working hours.
r. Owner's occupancy requirements.
s. Responsibility for temporary facilities and controls.
t. Procedures for moisture and mold control.
u. Procedures for disruptions and shutdowns.
v. Construction waste management and recycling.
w. Parking availability.
x. Office, work, and storage areas.
y. Equipment deliveries and priorities.
z. First aid.
aa. Security.
bb. 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 biweekly 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.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

SECTION 013200 - 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. Construction schedule updating reports.
3. Daily construction reports.
4. Site condition reports.

1.2 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction Project. Activities included in a construction schedule consume time and resources.

1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
2. Predecessor Activity: An activity that precedes another activity in the network.
3. Successor Activity: An activity that follows another activity in the network.

B. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

C. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

D. Event: The starting or ending point of an activity.

E. Float: The measure of leeway in starting and completing an activity.

1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

1.3 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required submittals in the following format:

1. PDF file.

B. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.

C. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

D. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.

1. Activity Report: List of activities sorted by activity number and then early start date, or actual start date if known.
2. Logic Report: List of preceding and succeeding activities for each activity, sorted in ascending order by activity number and then by early start date, or actual start date if known.
3. Total Float Report: List of activities sorted in ascending order of total float.

E. Construction Schedule Updating Reports: Submit with Applications for Payment.

F. Daily Construction Reports: Submit at weekly intervals.

G. Site Condition Reports: Submit at time of discovery of differing conditions.

1.4 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. Secure time commitments for performing critical elements of the Work from entities involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

1.5 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

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

B. Time Frame: Extend schedule from date established for commencement of the Work to date of final completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

C. Activities: Treat each floor or separate area as a separate numbered activity for each main element of the Work. Comply with the following:

1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.

2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.

    a. Metal Building Structure.
    b. Cranes.
    c. Electrical Gear Equipment.
    d. Mechanical Systems

3. Submittal Review Time: Include review and resubmittal times indicated in Section 013300 "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. Commissioning Time: Include no fewer than 15 days for commissioning.
6. 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.
7. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.

D. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.

1. Phasing: Arrange list of activities on schedule by phase.
2. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Section 011000 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
3. Work Restrictions: Show the effect of the following items on the schedule:

    a. Partial occupancy before Substantial Completion.
    b. Use-of-premises restrictions.
    c. Provisions for future construction.
    d. Seasonal variations.
    e. Environmental control.

E. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion.milestones:]

F. 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.

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

H. 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.

I. 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.

1.6 GANTT-CHART SCHEDULE REQUIREMENTS

A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's Construction Schedule within 30days of date established for commencement of the Work.

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

1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

1.7 CPM SCHEDULE REQUIREMENTS

A. General: Prepare network diagrams using AON (activity-on-node) format.

B. Startup Network Diagram: Submit diagram within 14 days of date established for commencement of the Work. Outline significant construction activities for the first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

C. CPM Schedule: Prepare Contractor's Construction Schedule using a time-scaled CPM network analysis diagram for the Work.

1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than 60 days after date established for commencement of the Work.

a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates.

2. Conduct educational workshops to train and inform key Project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.
3. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
4. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule to coordinate with the Contract Time.

D. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the startup network diagram, prepare a skeleton network to identify probable critical paths.

1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:

a. Preparation and processing of submittals.
b. Mobilization and demobilization.
c. Purchase of materials.
d. Delivery.
e. Fabrication.
f. Utility interruptions.
g. Installation.
h. Work by Owner that may affect or be affected by Contractor's activities.
i. Testing and inspection.
j. Commissioning.
k. Punch list and final completion.
l. Activities occurring following final completion.

2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.

a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.

E. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall Project schedule.

F. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. Prepare tabulated reports showing the following:

1. Contractor or subcontractor and the Work or activity.
2. Description of activity.
3. Main events of activity.

4. Immediate preceding and succeeding activities.
5. Early and late start dates.
6. Early and late finish dates.
7. Activity duration in workdays.
8. Total float or slack time.
9. Average size of workforce.
10. Dollar value of activity (coordinated with the schedule of values).

G. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:

1. Identification of activities that have changed.
2. Changes in early and late start dates.
3. Changes in early and late finish dates.
4. Changes in activity durations in workdays.
5. Changes in the critical path.
6. Changes in total float or slack time.
7. Changes in the Contract Time.

H. Value Summaries: Prepare two cumulative value lists, sorted by finish dates.

1. In first list, tabulate activity number, early finish date, dollar value, and cumulative dollar value.
2. In second list, tabulate activity number, late finish date, dollar value, and cumulative dollar value.
3. In subsequent issues of both lists, substitute actual finish dates for activities completed as of list date.
4. Prepare list for ease of comparison with payment requests; coordinate timing with progress meetings.

    a. In both value summary lists, tabulate "actual percent complete" and "cumulative value completed" with total at bottom.

1.8 REPORTS

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

1. List of subcontractors at Project site.
2. List of separate contractors at Project site.
3. Approximate count of personnel at Project site.
4. Equipment at Project site.
5. Material deliveries.
6. High and low temperatures and general weather conditions, including presence of rain or snow.
7. Testing and inspection.
8. Accidents.
9. Meetings and significant decisions.
10. Stoppages, delays, shortages, and losses.
11. Meter readings and similar recordings.
12. Emergency procedures.
13. Orders and requests of authorities having jurisdiction.
14. Change Orders received and implemented.

15. Construction Change Directives received and implemented.
16. Services connected and disconnected.
17. Equipment or system tests and startups.
18. Partial completions and occupancies.
19. Substantial Completions authorized.

B. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013200

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

B. See Division 01 Section "Construction Progress Documentation" for submitting schedules and reports, including Contractor's Construction Schedule.

C. See Division 01 Section "Quality Requirements" for submitting test and inspection reports.

D. See Division 01 Section "Closeout Procedures" for submitting warranties.

E. See Division 01 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.

F. See Division 01 Section "Operation and Maintenance Data" for submitting operation and maintenance manuals.

1.2 DEFINITIONS

A. Action Submittals: Written and graphic information that requires Architect's responsive action.

B. Informational Submittals: Written information that does not require Architect's responsive action. Submittals may be rejected for not complying with requirements.

1.3 SUBMITTAL PROCEDURES

A. General: Electronic copies of Architect's CAD files will **not** be provided to Contractor for Contractor's use in connection with Project.

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

    a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Submittals Schedule: Comply with requirements in Division 01 Section "Construction Progress Documentation" for list of submittals and time requirements for scheduled performance of related construction activities.

D. Processing Time: Allow enough 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 10 days business 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 10 additional business days for review of each resubmittal.

E. Identification: Place a permanent label or title block on each submittal for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Provide a space approximately 4 by 5 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
3. Include the following information on label for processing and recording action taken:

    a. Project name.
    b. Date.
    c. Name and address of Architect.
    d. Name and address of Contractor.
    e. Name and address of subcontractor.
    f. Name and address of supplier.
    g. Name of manufacturer.
    h. Drawing number and detail references, as appropriate.
    i. Location(s) where product is to be installed, as appropriate.
    j. Other necessary identification.

F. Deviations: Notify the Architect in writing with a letter attached to the submittal of any deviations in the submittal from requirements of the Contract Documents. Product substitutions must be proposed in writing prior to submission of any shop drawings, product data in accordance with other Division 1 sections.

1. Highlight, encircle, or otherwise specifically identify deviations from the Contract Documents on submittals.

G. Additional Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.

H. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will discard submittals received from sources other than Contractor.

1. Transmittal Form: Provide the following information.

    a. Project name.
    b. Date.
    c. Destination (To:).
    d. Source (From:).
    e. Names of subcontractor, manufacturer, and supplier.
    f. Category and type of submittal.

g. Submittal purpose and description.
h. Submittal and transmittal distribution record.
i. Remarks.

I. 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.

J. 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.

K. Use for Construction: Use only final submittals with mark indicating taken by Architect.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

A. General: Prepare and submit Action Submittals required by individual Specification Sections.

B. 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 printed data are not suitable 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 written recommendations.
b. Manufacturer's product specifications.
c. Manufacturer's installation instructions.
d. Manufacturer's catalog cuts.
e. Wiring diagrams showing factory-installed wiring.
f. Printed performance curves.
g. Operational range diagrams.
h. Compliance with specified referenced standards.
i. Testing by recognized testing agency.

4. Number of Copies: Submit three copies of Product Data, unless otherwise indicated. Architect will return two copies. Mark up and retain one returned copy as a Project Record Document.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

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

a. Dimensions.
b. Identification of products.

c. Fabrication and installation drawings.
d. Roughing-in and setting diagrams.
e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
f. Shopwork manufacturing instructions.
g. Templates and patterns.
h. Schedules.
i. Notation of coordination requirements.
j. Notation of dimensions established by field measurement.
k. Relationship to adjoining construction clearly indicated.
l. Seal and signature of professional engineer if specified.
m. Design calculations.
n. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches (215 by 280 mm) but no larger than 30 by 40 inches (750 by 1000 mm).
3. Number of Copies: Submit two opaque (bond) copies of each submittal. Architect will return one copy.

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

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:

a. Generic description of Sample.
b. Product name and name of manufacturer.
c. Sample source.
d. Number and title of appropriate Specification Section.

3. 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.
4. 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(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.

5. 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 sets; remainder will be returned.

E. Application for Payment: Comply with requirements specified in Division 01 Section "Payment Procedures."

F. Schedule of Values: Comply with requirements specified in Division 01 Section "Payment Procedures."

G. 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.

1. Indicate related specification number with company address and phone numbers.

2.2 INFORMATIONAL SUBMITTALS

A. General: Prepare and submit Informational Submittals required by other Specification Sections.

1. Number of Copies: Submit one copies of each submittal, unless otherwise indicated. Architect will not return copies.
2. Certificates and Certifications: Provide a notarized 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.
3. Test and Inspection Reports: Comply with requirements specified in Division 01 Section "Quality Requirements."

B. Coordination Drawings: Comply with requirements specified in Division 01 Section "Project Management and Coordination."

C. Contractor's Construction Schedule: Comply with requirements specified in Division 01 Section "Construction Progress Documentation."

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

E. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.

F. Installer Certificates: Prepare 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.

G. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

H. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

I. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

J. Material Test Reports: Prepare 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.

K. Product Test Reports: Prepare written reports indicating 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.

L. Research/Evaluation Reports: Prepare written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project.

M. Preconstruction Test Reports: Prepare 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.

N. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

O. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, 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.

P. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements specified in Division 01 Section "Operation and Maintenance Data."

Q. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

R. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer.

S. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:

1. Statement on condition of substrates and their acceptability for installation of product.
2. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
3. Results of operational and other tests and a statement of whether observed performance complies with requirements.

T. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.

U. Material Safety Data Sheets (MSDSs): Submit information directly to Owner; do not submit to Architect.

1. Architect will not review submittals that include MSDSs and will return them for resubmittal.

2.3 DELEGATED DESIGN

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

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

B. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit three copies of a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

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

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. 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. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.

B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken.

C. 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.

D. Submittals not required by the Contract Documents will not be reviewed and may be discarded.

E. Partial submittals are not acceptable, will be considered nonresponsive, and will be returned without review.

F. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION 013300

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

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

B. Testing and inspection services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and quality-control procedures that facilitate compliance with the Contract Document requirements.
2. Requirements for Contractor to provide quality-assurance and quality-control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

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. Field Quality-Control Tests: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

C. 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 trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).

D. Mockups: Full-size physical assemblies that are constructed on-site either as freestanding temporary built elements or as part of permanent construction. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

1. Laboratory Mockups: Full-size physical assemblies constructed and tested at testing facility to verify performance characteristics.

E. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.

F. Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) according to 29 CFR 1910.7, by a testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

G. Source Quality-Control Tests: Tests and inspections that are performed at the source; for example, plant, mill, factory, or shop.

H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

I. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

J. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Contractor's quality-control services do not include contract administration activities performed by Architect.

1.3 DELEGATED-DESIGN SERVICES

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

1.4 CONFLICTING REQUIREMENTS

A. Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements are 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 direction before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.5 ACTION SUBMITTALS

A. Delegated-Design Services Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit a statement signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or

certified by a design professional, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.

1.6 INFORMATIONAL SUBMITTALS

A. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility submitted to authorities having jurisdiction before starting work on the following systems:

1. Seismic-force-resisting system, designated seismic system, or component listed in the Statement of Special Inspections.
2. Main wind-force-resisting system or a wind-resisting component listed in the Statement of Special Inspections.

B. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

C. 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.

1.7 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, telephone number, and email address of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspection.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

B. Manufacturer's 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. Statement on condition of substrates and their acceptability for installation of product.
2. Statement that products at Project site comply with requirements.

3. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
4. Results of operational and other tests and a statement of whether observed performance complies with requirements.
5. Other required items indicated in individual Specification Sections.

C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:

1. Statement that equipment complies with requirements.
2. Results of operational and other tests and a statement of whether observed performance complies with requirements.
3. Other required items indicated in individual Specification Sections.

1.8 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units. 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 are similar in material, design, and extent to those indicated for this Project.

F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspection indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

H. 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.

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

J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:

1. Contractor responsibilities include the following:

    a. Provide test specimens representative of proposed products and construction.
    b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
    c. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
    d. When testing is complete, remove test specimens and test assemblies, do not reuse products on Project.

2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

K. 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.
3. Notify Architect seven days in advance of dates and times when mockups will be constructed.
4. Employ supervisory personnel who will oversee mockup construction. Employ workers that 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. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
8. Demolish and remove mockups when directed unless otherwise indicated.

L. Laboratory Mockups: Comply with requirements of preconstruction testing and those specified in individual Specification Sections.

1.9 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspection they are engaged to perform.
2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities, whether specified or not, to verify and document that the Work complies with requirements.

1. Engage a qualified testing agency to perform quality-control services.

    a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.

2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspection will be performed.
3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
4. Testing and inspection requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

D. Testing Agency Responsibilities: Cooperate with Architect, and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the locations from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform duties of Contractor.

E. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 013300 "Submittal Procedures."

F. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

G. Associated Contractor Services: Cooperate with agencies and representatives performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspection. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Preliminary design mix proposed for use for material mixes that require control by testing agency.
6. Security and protection for samples and for testing and inspection equipment at Project site.

H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspection.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

1.10 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Owner will engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, and as follows:

1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
2. Notifying Architect, and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect, with copy to Contractor and to authorities having jurisdiction.
4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6. Retesting and reinspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

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

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's, reference during normal working hours.

1. Submit log at Project closeout as part of Project Record Documents.

3.2 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 017300 "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 014000

SECTION 014200 - 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.

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: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall 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."

B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.

1. AABC - Associated Air Balance Council; www.aabc.com.
2. AAMA - American Architectural Manufacturers Association; www.aamanet.org.
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; (Formerly: ACI International); www.concrete.org
9. ACPA - American Concrete Pipe Association; www.concrete-pipe.org.
10. AEIC - Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
11. AF&PA - American Forest & Paper Association; www.afandpa.org.
12. AGA - American Gas Association; www.aga.org.
13. AHAM - Association of Home Appliance Manufacturers; www.aham.org.
14. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); www.ahrinet.org.
15. AI - Asphalt Institute; www.asphaltinstitute.org.
16. AIA - American Institute of Architects (The); www.aia.org.
17. AISC - American Institute of Steel Construction; www.aisc.org.
18. AISI - American Iron and Steel Institute; www.steel.org.
19. AITC - American Institute of Timber Construction; www.aitc-glulam.org.
20. AMCA - Air Movement and Control Association International, Inc.; www.amca.org.
21. ANSI - American National Standards Institute; www.ansi.org.
22. AOSA - Association of Official Seed Analysts, Inc.; www.aosaseed.com.
23. APA - APA - The Engineered Wood Association; www.apawood.org.
24. APA - Architectural Precast Association; www.archprecast.org.
25. API - American Petroleum Institute; www.api.org.
26. ARI - Air-Conditioning & Refrigeration Institute; (See AHRI).
27. ARI - American Refrigeration Institute; (See AHRI).
28. ARMA - Asphalt Roofing Manufacturers Association; www.asphaltroofing.org.
29. ASCE - American Society of Civil Engineers; www.asce.org.
30. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
31. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; www.ashrae.org.
32. ASME - ASME International; (American Society of Mechanical Engineers); www.asme.org.
33. ASSE - American Society of Safety Engineers (The); www.asse.org.
34. ASSE - American Society of Sanitary Engineering; www.asse-plumbing.org.
35. ASTM - ASTM International; www.astm.org.
36. ATIS - Alliance for Telecommunications Industry Solutions; www.atis.org.

37. AWEA - American Wind Energy Association; www.awea.org.
38. AWI - Architectural Woodwork Institute; www.awinet.org.
39. AWMAC - Architectural Woodwork Manufacturers Association of Canada; www.awmac.com.
40. AWPA - American Wood Protection Association; www.awpa.com.
41. AWS - American Welding Society; www.aws.org.
42. AWWA - American Water Works Association; www.awwa.org.
43. BHMA - Builders Hardware Manufacturers Association; www.buildershardware.com.
44. BIA - Brick Industry Association (The); www.gobrick.com.
45. BICSI - BICSI, Inc.; www.bicsi.org.
46. BIFMA - BIFMA International; (Business and Institutional Furniture Manufacturer's Association); www.bifma.org.
47. BISSC - Baking Industry Sanitation Standards Committee; www.bissc.org.
48. BWF - Badminton World Federation; (Formerly: International Badminton Federation); www.bissc.org.
49. CDA - Copper Development Association; www.copper.org.
50. CE - Conformite Europeenne; http://ec.europa.eu/growth/single-market/ce-marking/
51. CEA - Canadian Electricity Association; www.electricity.ca.
52. CEA - Consumer Electronics Association; www.ce.org.
53. CFFA - Chemical Fabrics and Film Association, Inc.; www.chemicalfabricsandfilm.com.
54. CFSEI - Cold-Formed Steel Engineers Institute; www.cfsei.org.
55. CGA - Compressed Gas Association; www.cganet.com.
56. CIMA - Cellulose Insulation Manufacturers Association; www.cellulose.org.
57. CISCA - Ceilings & Interior Systems Construction Association; www.cisca.org.
58. CISPI - Cast Iron Soil Pipe Institute; www.cispi.org.
59. CLFMI - Chain Link Fence Manufacturers Institute; www.chainlinkinfo.org.
60. CPA - Composite Panel Association; www.pbmdf.com.
61. CRI - Carpet and Rug Institute (The); www.carpet-rug.org.
62. CRRC - Cool Roof Rating Council; www.coolroofs.org.
63. CRSI - Concrete Reinforcing Steel Institute; www.crsi.org.
64. CSA - Group; www.csa.ca.
65. CSA - CSA International; (Formerly: IAS - International Approval Services); www.csa-international.org.
66. CSI - Construction Specifications Institute (The); www.csinet.org.
67. CSSB - Cedar Shake & Shingle Bureau; www.cedarbureau.org.
68. CTI - Cooling Technology Institute; (Formerly: Cooling Tower Institute); www.cti.org.
69. CWC - Composite Wood Council; (See CPA).
70. DASMA - Door and Access Systems Manufacturers Association; www.dasma.com.
71. DHI - Door and Hardware Institute; www.dhi.org.
72. ECA - Electronic Components Association; (See ECIA).
73. ECAMA - Electronic Components Assemblies & Materials Association; (See ECIA).
74. ECIA - Electronic Components Industry Association; www.eciaonline.org.
75. EIA - Electronic Industries Alliance; (See TIA).
76. EIMA - EIFS Industry Members Association; www.eima.com.
77. EJMA - Expansion Joint Manufacturers Association, Inc.; www.ejma.org.
78. ESD - ESD Association; (Electrostatic Discharge Association); www.esda.org .
79. ESTA - Entertainment Services and Technology Association; (See PLASA).
80. ETL - Intertek (See Intertek); www.intertek.com.
81. EVO - Efficiency Valuation Organization; www.evo-world.org.
82. FCI - Fluid Controls Institute; www.fluidcontrolsinstitute.org.
83. FIBA - Federation Internationale de Basketball; (The International Basketball Federation); www.fiba.com.
84. FIVB - Federation Internationale de Volleyball; (The International Volleyball Federation); www.fivb.org.

85. FM Approvals - FM Approvals LLC; www.fmglobal.com.
86. FM Global - FM Global; (Formerly: FMG - FM Global); www.fmglobal.com.
87. FRSA - Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc.; www.floridaroof.com.
88. FSA - Fluid Sealing Association; www.fluidsealing.com.
89. FSC - Forest Stewardship Council U.S.; www.fscus.org.
90. GA - Gypsum Association; www.gypsum.org.
91. GANA - Glass Association of North America; www.glasswebsite.com.
92. GS - Green Seal; www.greenseal.org.
93. HI - Hydraulic Institute; www.pumps.org.
94. HI/GAMA - Hydronics Institute/Gas Appliance Manufacturers Association; (See AHRI).
95. HMMA - Hollow Metal Manufacturers Association; (See NAAMM).
96. HPVA - Hardwood Plywood & Veneer Association; www.hpva.org.
97. HPW - H. P. White Laboratory, Inc.; www.hpwhite.com.
98. IAPSC - International Association of Professional Security Consultants; www.iapsc.org.
99. IAS - International Accreditation Service; www.iasonline.org.
100. IAS - International Approval Services; (See CSA).
101. ICBO - International Conference of Building Officials; (See ICC).
102. ICC - International Code Council; www.iccsafe.org.
103. ICEA - Insulated Cable Engineers Association, Inc.; www.icea.net.
104. ICPA - International Cast Polymer Alliance; www.icpa-hq.org.
105. ICRI - International Concrete Repair Institute, Inc.; www.icri.org.
106. IEC - International Electrotechnical Commission; www.iec.ch.
107. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); www.ieee.org.
108. IES - Illuminating Engineering Society; (Formerly: Illuminating Engineering Society of North America); www.ies.org.
109. IESNA - Illuminating Engineering Society of North America; (See IES).
110. IEST - Institute of Environmental Sciences and Technology; www.iest.org.
111. IGMA - Insulating Glass Manufacturers Alliance; www.igmaonline.org.
112. IGSHPA - International Ground Source Heat Pump Association; www.igshpa.okstate.edu.
113. ILI - Indiana Limestone Institute of America, Inc.; www.iliai.com.
114. Intertek - Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); www.intertek.com.
115. ISA - International Society of Automation (The); (Formerly: Instrumentation, Systems, and Automation Society); www.isa.org.
116. ISAS - Instrumentation, Systems, and Automation Society (The); (See ISA).
117. ISFA - International Surface Fabricators Association; (Formerly: International Solid Surface Fabricators Association); www.isfanow.org.
118. ISO - International Organization for Standardization; www.iso.org.
119. ISSFA - International Solid Surface Fabricators Association; (See ISFA).
120. ITU - International Telecommunication Union; www.itu.int/home.
121. KCMA - Kitchen Cabinet Manufacturers Association; www.kcma.org.
122. LMA - Laminating Materials Association; (See CPA).
123. LPI - Lightning Protection Institute; www.lightning.org.
124. MBMA - Metal Building Manufacturers Association; www.mbma.com.
125. MCA - Metal Construction Association; www.metalconstruction.org.
126. MFMA - Maple Flooring Manufacturers Association, Inc.; www.maplefloor.org.
127. MFMA - Metal Framing Manufacturers Association, Inc.; www.metalframingmfg.org.
128. MHIA - Material Handling Industry of America; www.mhia.org.
129. MIA - Marble Institute of America; www.marble-institute.com.
130. MMPA - Moulding & Millwork Producers Association; www.wmmpa.com.
131. MPI - Master Painters Institute; www.paintinfo.com.
132. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry Inc.; www.mss-hq.org.

133. NAAMM - National Association of Architectural Metal Manufacturers; www.naamm.org.
134. NACE - NACE International; (National Association of Corrosion Engineers International); www.nace.org.
135. NADCA - National Air Duct Cleaners Association; www.nadca.com.
136. NAIMA - North American Insulation Manufacturers Association; www.naima.org.
137. NBGQA - National Building Granite Quarries Association, Inc.; www.nbgqa.com.
138. NBI - New Buildings Institute; www.newbuildings.org.
139. NCAA - National Collegiate Athletic Association (The); www.ncaa.org.
140. NCMA - National Concrete Masonry Association; www.ncma.org.
141. NEBB - National Environmental Balancing Bureau; www.nebb.org.
142. NECA - National Electrical Contractors Association; www.necanet.org.
143. NeLMA - Northeastern Lumber Manufacturers Association; www.nelma.org.
144. NEMA - National Electrical Manufacturers Association; www.nema.org.
145. NETA - InterNational Electrical Testing Association; www.netaworld.org.
146. NFHS - National Federation of State High School Associations; www.nfhs.org.
147. NFPA - National Fire Protection Association; www.nfpa.org.
148. NFPA - NFPA International; (See NFPA).
149. NFRC - National Fenestration Rating Council; www.nfrc.org.
150. NHLA - National Hardwood Lumber Association; www.nhla.com.
151. NLGA - National Lumber Grades Authority; www.nlga.org.
152. NOFMA - National Oak Flooring Manufacturers Association; (See NWFA).
153. NOMMA - National Ornamental & Miscellaneous Metals Association; www.nomma.org.
154. NRCA - National Roofing Contractors Association; www.nrca.net.
155. NRMCA - National Ready Mixed Concrete Association; www.nrmca.org.
156. NSF - NSF International; www.nsf.org.
157. NSPE - National Society of Professional Engineers; www.nspe.org.
158. NSSGA - National Stone, Sand & Gravel Association; www.nssga.org.
159. NTMA - National Terrazzo & Mosaic Association, Inc. (The); www.ntma.com.
160. NWFA - National Wood Flooring Association; www.nwfa.org.
161. PCI - Precast/Prestressed Concrete Institute; www.pci.org.
162. PDI - Plumbing & Drainage Institute; www.pdionline.org.
163. PLASA - PLASA; (Formerly: ESTA - Entertainment Services and Technology Association); http://www.plasa.org.
164. RCSC - Research Council on Structural Connections; www.boltcouncil.org.
165. RFCI - Resilient Floor Covering Institute; www.rfci.com.
166. RIS - Redwood Inspection Service; www.redwoodinspection.com.
167. SAE - SAE International; www.sae.org.
168. SCTE - Society of Cable Telecommunications Engineers; www.scte.org.
169. SDI - Steel Deck Institute; www.sdi.org.
170. SDI - Steel Door Institute; www.steeldoor.org.
171. SEFA - Scientific Equipment and Furniture Association (The); www.sefalabs.com.
172. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (See ASCE).
173. SIA - Security Industry Association; www.siaonline.org.
174. SJI - Steel Joist Institute; www.steeljoist.org.
175. SMA - Screen Manufacturers Association; www.smainfo.org.
176. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; www.smacna.org.
177. SMPTE - Society of Motion Picture and Television Engineers; www.smpte.org.
178. SPFA - Spray Polyurethane Foam Alliance; www.sprayfoam.org.
179. SPIB - Southern Pine Inspection Bureau; www.spib.org.
180. SPRI - Single Ply Roofing Industry; www.spri.org.
181. SRCC - Solar Rating & Certification Corporation; www.solar-rating.org.
182. SSINA - Specialty Steel Industry of North America; www.ssina.com.

183. SSPC - SSPC: The Society for Protective Coatings; www.sspc.org.
184. STI - Steel Tank Institute; www.steeltank.com.
185. SWI - Steel Window Institute; www.steelwindows.com.
186. SWPA - Submersible Wastewater Pump Association; www.swpa.org.
187. TCA - Tilt-Up Concrete Association; www.tilt-up.org.
188. TCNA - Tile Council of North America, Inc.; www.tileusa.com.
189. TEMA - Tubular Exchanger Manufacturers Association, Inc.; www.tema.org.
190. TIA - Telecommunications Industry Association (The); (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance); www.tiaonline.org.
191. TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).
192. TMS - The Masonry Society; www.masonrysociety.org.
193. TPI - Truss Plate Institute; www.tpinst.org.
194. TPI - Turfgrass Producers International; www.turfgrasssod.org.
195. TRI - Tile Roofing Institute; www.tileroofing.org.
196. UL - Underwriters Laboratories Inc.; http://www.ul.com.
197. UNI - Uni-Bell PVC Pipe Association; www.uni-bell.org.
198. USAV - USA Volleyball; www.usavolleyball.org.
199. USGBC - U.S. Green Building Council; www.usgbc.org.
200. USITT - United States Institute for Theatre Technology, Inc.; www.usitt.org.
201. WA - Wallcoverings Association; www.wallcoverings.org
202. WASTEC - Waste Equipment Technology Association; www.wastec.org.
203. WCLIB - West Coast Lumber Inspection Bureau; www.wclib.org.
204. WCMA - Window Covering Manufacturers Association; www.wcmanet.org.
205. WDMA - Window & Door Manufacturers Association; www.wdma.com.
206. WI - Woodwork Institute; www.wicnet.org.
207. WSRCA - Western States Roofing Contractors Association; www.wsrca.com.
208. WWPA - Western Wood Products Association; www.wwpa.org.

C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. 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.

D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Information is subject to change and is up to date as of the date of the Contract Documents.

1. COE - Army Corps of Engineers; www.usace.army.mil.
2. CPSC - Consumer Product Safety Commission; www.cpsc.gov.
3. DOC - Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
4. DOD - Department of Defense; www.quicksearch.dla.mil.
5. DOE - Department of Energy; www.energy.gov.
6. EPA - Environmental Protection Agency; www.epa.gov.
7. FAA - Federal Aviation Administration; www.faa.gov.
8. FG - Federal Government Publications; www.gpo.gov/fdsys.
9. GSA - General Services Administration; www.gsa.gov.

10. HUD - Department of Housing and Urban Development; www.hud.gov.
11. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; www.eetd.lbl.gov.
12. OSHA - Occupational Safety & Health Administration; www.osha.gov.
13. SD - Department of State; www.state.gov.
14. TRB - Transportation Research Board; National Cooperative Highway Research Program; The National Academies; www.trb.org.
15. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
16. USDA - Department of Agriculture; Rural Utilities Service; www.usda.gov.
17. USDOJ - Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.
18. USP - U.S. Pharmacopeial Convention; www.usp.org.
19. USPS - United States Postal Service; www.usps.com.

E. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. 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 Government Printing Office; www.gpo.gov/fdsys.
2. DOD - Department of Defense; Military Specifications and Standards; Available from DLA Document Services; www.quicksearch.dla.mil.
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.quicksearch.dla.mil.

    a. Available from Defense Standardization Program; www.dsp.dla.mil.
    b. Available from General Services Administration; www.gsa.gov.
    c. Available from National Institute of Building Sciences/Whole Building Design Guide; www.wbdg.org/ccb.

6. MILSPEC - Military Specification 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).

F. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. CBHF; State of California; Department of Consumer Affairs; Bureau of Electronic and Appliance Repair, Home Furnishings and Thermal Insulation; www.bearhfti.ca.gov.
2. CCR; California Code of Regulations; Office of Administrative Law; California Title 24 Energy Code; www.calregs.com.
3. CDHS; California Department of Health Services; (See CDPH).
4. CDPH; California Department of Public Health; Indoor Air Quality Program; www.cal-iaq.org.
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; www.txforestservice.tamu.edu.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014200

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

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

B. Related Requirements:

1. Section 011000 "Summary" for work restrictions and limitations on utility interruptions.

1.2 USE CHARGES

A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities 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.

1.3 INFORMATIONAL SUBMITTALS

A. Site Utilization Plan: Show temporary facilities, temporary utility lines and connections, staging areas, construction site entrances, vehicle circulation, and parking areas for construction personnel.

B. Project Identification and Temporary Signs: Show fabrication and installation details, including plans, elevations, details, layouts, typestyles, graphic elements, and message content.

C. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.

D. Moisture-and Mold-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage and mold.

E. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Include the following:

1. Locations of dust-control partitions at each phase of work.
2. HVAC system isolation schematic drawing.
3. Location of proposed air-filtration system discharge.

4. Waste-handling procedures.
5. Other dust-control measures.

1.4 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

C. Accessible Temporary Egress: Comply with applicable provisions in the United States Access Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

1.5 PROJECT CONDITIONS

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

PART 2 - PRODUCTS

2.1 TEMPORARY FACILITIES

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

B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect, and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:

1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
2. Conference room of sufficient size to accommodate meetings of 10 individuals. Provide electrical power service and 120-V ac duplex receptacles, with no fewer than one receptacle on each wall. Furnish room with conference table, chairs, and 4-foot- (1.2-m-) square tack and marker boards.
3. Drinking water and private toilet.
4. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F (20 to 22 deg C).
5. Lighting fixtures capable of maintaining average illumination of 20 fc (215 lx) at desk height.

2.2 EQUIPMENT

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

B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.

C. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

PART 3 - EXECUTION

3.1 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.

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

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.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.

1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.

C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.

D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

E. Temporary Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

1. Provide temporary dehumidification systems when required to reduce ambient and substrate moisture levels to level required to allow installation or application of finishes and their proper curing or drying.

F. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.

G. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.

1. Install electric power service overhead unless otherwise indicated.

H. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

I. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install one land-based telephone line(s) for each field office.

J. Electronic Communication Service: Provide a desktop computer in the primary field office adequate for use by Architect and Owner to access Project electronic documents and maintain electronic communications. Equip computer with not less than the following:

3.4 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet (9 m) of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas within construction limits indicated on Drawings.

1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.

C. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.

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

E. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
2. Remove snow and ice as required to minimize accumulations.

F. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.

1. Identification Signs: Provide Project identification signs as indicated on Drawings.
2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.

    a. Provide temporary, directional signs for construction personnel and visitors.

3. Maintain and touch up signs so they are legible at all times.

G. Waste Disposal Facilities: Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."

H. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 017300 "Execution."

I. 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.

J. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.

K. Existing Stair Usage: Use of Owner's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.

1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas so no evidence remains of correction work.

L. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.

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.

1. Where access to adjacent properties is required in order to affect protection of existing facilities, obtain written permission from adjacent property owner to access property for that purpose.

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. Temporary Erosion and Sedimentation Control: Comply with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent and requirements specified in Section 311000 "Site Clearing."

D. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.

1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant-protection zones.
2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

E. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

F. Tree and Plant Protection: Comply with requirements specified in Section 015639 "Temporary Tree and Plant Protection."

G. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

H. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using materials approved by authorities having jurisdiction.

I. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people from easily entering site except by entrance gates.

1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.

J. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each workday.

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

L. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

M. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.

N. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.

1. Prohibit smoking in construction areas. Comply with additional limits on smoking specified in other Sections.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.6 MOISTURE AND MOLD CONTROL

A. Contractor's Moisture-Protection Plan: Describe delivery, handling, storage, installation, and protection provisions for materials subject to water absorption or water damage.

1. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.
2. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
3. Indicate methods to be used to avoid trapping water in finished work.

B. Exposed Construction Period: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:

1. Protect porous materials from water damage.
2. Protect stored and installed material from flowing or standing water.
3. Keep porous and organic materials from coming into prolonged contact with concrete.
4. Remove standing water from decks.
5. Keep deck openings covered or dammed.

C. Partially Enclosed Construction Period: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:

1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
2. Keep interior spaces reasonably clean and protected from water damage.
3. Periodically collect and remove waste containing cellulose or other organic matter.
4. Discard or replace water-damaged material.
5. Do not install material that is wet.
6. Discard and replace stored or installed material that begins to grow mold.
7. Perform work in a sequence that allows wet materials adequate time to dry before enclosing the material in gypsum board or other interior finishes.

D. Controlled Construction Period: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:

1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
2. Use temporary or permanent HVAC system to control humidity within ranges specified for installed and stored materials.
3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.

3.7 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

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

1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION 015000

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

B. Related Requirements:

1. Section 012500 "Substitution Procedures" for requests for substitutions.

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. Products salvaged or recycled from other projects are not considered new products.
3. Comparable Product: Product that is demonstrated and approved by Architect through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Basis-of-Design Product Specification: A specification in which a single manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation. 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.

1.3 ACTION SUBMITTALS

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

1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a comparable product

request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

a. Form of Architect's Approval of Submittal: As specified in Section 013300 "Submittal Procedures."
b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 013300 "Submittal Procedures." Show compliance with requirements.

1.4 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.

1.5 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 to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.

1.6 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
3. See other Sections for specific content requirements and particular requirements for submitting special warranties.

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 the Specifications establish salient characteristics of products.

B. Product Selection Procedures:

1. Sole Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

    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.

Comparable products or substitutions for Contractor's convenience will not be considered.

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. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.

   a. Limited list of products may be indicated by the phrase: "Subject to compliance with requirements, provide one of the following: …"

4. Non-Limited List of Products: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, which complies with requirements.

   a. Non-limited list of products is indicated by the phrase: "Subject to compliance with requirements, available products that may be incorporated in the Work include, but are not limited to, the following: …"

5. 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. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.

   a. Limited list of manufacturers is indicated by the phrase: "Subject to compliance with requirements, provide products by one of the following: …"

6. Non-Limited List of Manufacturers: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, which complies with requirements.

   a. Non-limited list of manufacturers is indicated by the phrase: "Subject to compliance with requirements, available manufacturers whose products may be incorporated in the Work include, but are not limited to, the following: …"

7. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

   a. For approval of products by unnamed manufacturers, comply with requirements in Section 012500 "Substitution Procedures" for substitutions for convenience.

C. Visual Matching Specification: Where Specifications require "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 012500 "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 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 these requirements:

1. 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. Detailed comparison of significant qualities of proposed product with those 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.
2. Evidence that proposed product provides specified warranty.
3. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
4. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

SECTION 016001 – BUY AMERICAN PREFERENCE REQUIREMENTS (AIP)

PART 1 - GENERAL

1.1 SUMMARY

A. The Buy American Preference requirements including provisions of 49 U.S.C. Section 50101 apply to this Project.

B. The Contractor agrees to comply with 49 USC § 50101, which provides that Federal funds may not be obligated unless all steel and manufactured goods used in AIP funded projects are produced in the United States, unless the Federal Aviation Administration has issued a waiver for the product; the product is listed as an Excepted Article, Material Or Supply in Federal Acquisition Regulation subpart 25.108; or is included in the FAA Nationwide Buy American Waivers Issued list. A bidder or offeror must complete and submit the Buy America certification included herein with their bid or offer. The Owner will reject as nonresponsive any bid or offer that does not include a completed Certificate of Buy American Compliance.

1. The Buy American Preferences under 49 U.S.C. Section 50101 require that all steel and manufactured goods used in Airport Improvement Program (AIP) funded projects be produced in the United States. In accepting AIP funding, grant recipients must certify that all steel or manufactured products used on any portion of the AIP-funded project are produced in the United States and are of 100 percent U.S. materials.

C. Waviers: Under 49 U.S.C. Section 50101(b), FAA has the authority to waive these Buy American Preferences if certain market or product conditions exist. These are:

1. Wavier Types:

a. Waver Type 1: (Not Applicable)
b. Wavier Type 2: (Nonavailability) The iron, steel, manufactured goods or construction materials or manufactured goods are not available in sufficient quantity or quality in the United States.
c. Wavier Type 3: The cost of item components and subcomponents produced in the United States is more than 60 percent of the cost of all components and subcomponents of the “facility/project.”
d. Wavier Type 4: (Unreasonable Costs) Applying this provision for irom, steel manufactured goods or construction materials would increase the cost of the overall project by more than 25 percent.

2. Buy American Wavier request documents are available at https:// www.faa.gov/airports/aip/buy_american/. Wavier documents are attached at the end of this section.

3. Buy American Conformance List:

a. The FAA Office of Airports maintains a listing of equipment that has received a nationwide waiver from the Buy American Preference requirements or that fully meet the Buy American requirements. The Nationwide Buy American Waiver List is available online at https://www.faa.gov/airports/aip/buy_american/ . Products

listed on the Buy American Conformance list do not require additional submittal of domestic content information under a project specific Buy American Preference waiver.

D. All products furnished for the Project shall comply with Buy American regardless of value.

E. If a lower tier contractor discovers that a specific product – whether indicated in a specification section or on a drawing – does not meet Buy American Preference requirements they shall immediately notify the General Contractor in writing.

F. Each lower tier contractor shall include a Certificate of Buy American Compliance for Total Facility with their product submittals using the attached form.

1.2 REFERENCES

A. CFR – Code of Federal Regulations (https://www.gpo.gov)
   1. 49 CFR Part 30.19 BUY AMERICAN ACT

B. FAA – Federal Aviation Administration: (AIP Buy American Preference Requirements) (https://www.faa.gov/airports/aip/buy-american/)

C. U.S.C. – United States Code (https://www.gpo.gov)
   1. 49 U.S.C. Section 50101

D. Buy American guidance is available at https:// www.faa.gov/airports/aip/buy_american/.
   1. Buy American Guidance (AIP Handbook, Change 1, Appendix X)
   2. Buy American Preferences (49 U.S.C Section 50101)

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 016001

BUY AMERICAN CERTIFICATION

(Title 49 U.S.C. Item 50101, Executive Order 14005, Bipartisan Infrastructure Law (Pub. L No. 117-58), Build America, Buy America (BABA))

Project name: Front Terminal Expansion

Airport name: Ogden Airport

AIP number: 03-49-0024-0XX-2024

The Contractor certifies that its bid/offer is in compliance with 49 USC § 50101, BABA and other related Made in America Laws, U.S. statutes, guidance, and FAA policies, which provide that Federal funds may not be obligated unless all iron, steel and manufactured goods used in AIP funded projects are produced in the United States, unless the Federal Aviation Administration has issued a waiver for the product; the product is listed as an Excepted Article, Material Or Supply in Federal Acquisition Regulation subpart 25.108; or is included in the FAA Nationwide Buy American Waivers Issued list.

The bidder or offeror must complete and submit the certification of compliance with FAA's Buy American Preference, BABA and Made in America laws included herein with their bid or offer. The Airport Sponsor/Owner will reject as nonresponsive any bid or offer that does not include a completed certification of compliance with FAA's Buy American Preference and BABA.

The bidder or offeror certifies that all constructions materials, defined to mean an article, material, or supply other than an item of primarily iron or steel; a manufactured product; cement and cementitious materials; aggregates such as stone, sand, or gravel; or aggregate binding agents or additives that are or consist primarily of: non-ferrous metals; plastic and polymer-based products (including polyvinylchloride, composite building materials, and polymers used in fiber optic cables); glass (including optic glass); lumber; or drywall used in the project are manufactured in the U.S.

Certificate of Compliance with FAA Buy American Preference

(Equipment / Building Projects)

As a matter of bid responsiveness, the bidder or offeror must complete, sign, date, and submit this certification statement with their proposal. The bidder or offeror must indicate how they intend to comply with 49 USC § 50101, and other Made in America Laws, U.S. statutes, guidance, and FAA policies by selecting one on the following certification statements. These statements are mutually exclusive. Bidder must select one or the other (not both) by inserting a checkmark (□) or the letter "X".

☐ Bidder or offeror hereby certifies that it will comply with 49 USC § 50101, BABA and other related U.S. statutes, guidance, and policies of the FAA by:

a) Only installing steel and manufactured products produced in the United States;
b) Only installing construction materials defined as: an article, material, or supply – other than an item of primarily iron or steel; a manufactured product; cement and cementitious materials; aggregates such as stone, sand, or gravel; or aggregate binding agents or additives that are or consist primarily of non-ferrous metals; plastic and

polymer-based products (including polyvinylchloride, composite building materials, and polymers used in fiber optic cables); glass (including optic glass); lumber or drywall that have been manufactured in the United States.

c) Installing manufactured products for which the Federal Aviation Administration (FAA) has issued a waiver as indicated by inclusion on the current FAA Nationwide Buy American Waivers Issued listing; or

d) Installing products listed as an Excepted Article, Material or Supply in Federal Acquisition Regulation Subpart 25.108.

By selecting this certification statement, the bidder or offeror agrees:

1. To provide to the Airport Sponsor or FAA evidence that documents the source and origin of the steel and manufactured product.
2. To faithfully comply with providing U.S. domestic product.
3. To furnish U.S. domestic product for any waiver request that the FAA rejects.
4. To refrain from seeking a waiver request after establishment of the contract, unless extenuating circumstances emerge that the FAA determines justified.

☐ The bidder or offeror hereby certifies it cannot comply with the 100 percent Buy American Preferences of 49 USC § 50101(a) but may qualify for a Type 3 waiver under 49 USC § 50101(b). By selecting this certification statement, the apparent bidder or offeror with the apparent low bid agrees:

1. To submit to the Airport Sponsor or FAA within 15 calendar days of being selected as the responsive bidder, a formal waiver request and required documentation that supports the type of waiver being requested.
2. That failure to submit the required documentation within the specified timeframe is cause for a non-responsive determination that may result in rejection of the proposal.
3. To faithfully comply with providing U.S. domestic products at or above the approved U.S. domestic content percentage as approved by the FAA.
4. To refrain from seeking a waiver request after establishment of the contract, unless extenuating circumstances emerge that the FAA determines justified.

Required Documentation

Type 2 Waiver (Nonavailability) - The iron, steel, manufactured goods or construction materials or manufactured goods are not available in sufficient quantity or quality in the United States. The required documentation for the Nonavailability waiver is

a) Completed Content Percentage Worksheet and Final Assembly Questionnaire

b) Record of thorough market research, consideration where appropriate of qualifying alternate items, products, or materials including;

c) A description of the market research activities and methods used to identify domestically manufactured items capable of satisfying the requirement, including the timing of the research and conclusions reached on the availability of sources.

Type 3 Waiver - The cost of the item components and subcomponents produced in the United States is more than 60 percent of the cost of all components and subcomponents of the "facility/project". The required documentation for a type 3 waiver is:

a) Completed Content Percentage Worksheet and Final Assembly Questionnaire including;

b) Listing of all manufactured products that are not comprised of 100 percent U.S. domestic content (excludes products listed on the FAA Nationwide Buy American Waivers Issued listing and products excluded by Federal Acquisition Regulation Subpart 25.108; products of unknown origin must be considered as non-domestic products in their entirety)
c) Cost of non-domestic components and subcomponents, excluding labor costs associated with final assembly and installation at project location.
d) Percentage of non-domestic component and subcomponent cost as compared to total "facility" component and subcomponent costs, excluding labor costs associated with final assembly and installation at project location.

Type 4 Waiver (Unreasonable Costs) – Applying this provision for iron, steel, manufactured goods or construction materials would increase the cost of the overall project by more than 25 percent. The required documentation for this waiver is:

a) A completed Content Percentage Worksheet and Final Assembly Questionnaire from
b) At minimum two comparable equal bids and/or offers;
c) Receipt or record that demonstrates that supplier scouting called for in Executive Order 14005, indicates that no domestic source exists for the project and/or component;
d) Completed waiver applications for each comparable bid and/or offer.

False Statements: Per 49 USC § 47126, this certification concerns a matter within the jurisdiction of the Federal Aviation Administration and the making of a false, fictitious or fraudulent certification may render the maker subject to prosecution under Title 18, United States Code.

Date	Signature
Company Name	Title

BUY AMERICA COST CALCULATION TABLE

(Title 49 USC § 50101 (b))

For Airfield Development Projects funded under the Airport Improvement Program

Instructions for Permissible Waivers

Nationwide Waivers: The FAA Office of Airports publishes national waivers for equipment and products that meet Buy American requirements under 49 USC 50101. Nationwide waivers are published at:

http://www.faa.gov/airports/aip/buy_american/

Section 50101(b)(1) & (b)(2) Waivers:

The bidder may request a waiver based upon the best interests of the public, Item 50101 (b)(1) or request a waiver based upon insufficient supply of U.S. manufactured products, Item 50101 (b)(2), however approval is rare and waivers may only be approved by the FAA Office of Airports in Washington DC.

Section 50101(b)(3) Waiver:

The bidder may request a waiver if 60% or more of the components are produced in the United States and final assembly occurs in the U.S. Bidder is hereby advised that the Owner's approval with the bidder's waiver request is contingent upon FAA approval.

1. "Equipment" in Item 50101 shall mean the following:

    a) Individual type "L" items (Airfield Lighting Equipment) as listed in FAA Advisory Circular 150/5345-53.
    b) Individual bid items as established within FAA Advisory Circular 150/5370-10.
    c) A waiver request may only address one specific equipment item. Submit separate requests for each equipment item for which a waiver.
    d) Items listed under the Nationwide Waiver referenced above do not require further review.

2. The bidder must base the U.S. percentage upon the value that results from completing a component cost calculation table similar to the attached format. The Bidder must submit the component cost calculation table as an attachment to the waiver request.

3. Components/subcomponents are the material and products composing the "equipment".

4. The final assembly of the AIP-funded "equipment" must be within the USA *(Item 50101(b)(3)(B))*. Final assembly is the substantial transformation of the components and subcomponents into the end product. The Bidder must submit the Final Assembly Questionnaire as an attachment to the waiver request.

5. All steel used in the "Equipment" must be produced in the United States.

6. The Buy American requirements apply to all tier contractors and subcontractors. All contractors/subcontractors are required to provide appropriate documentation that indicates origin of manufacturer and percentage of domestic made product.

7. The bidder is hereby advised there is no implied or expressed guarantee that a requested waiver will be issued by the Federal Aviation Administration (FAA). Less than 60% USA component/subcomponent proposed for this facility CANNOT be waived. Products made with foreign steel are not eligible for a waiver.

8. North America Free Trade Act (NAFTA): Free Trade Agreements such as NAFTA do not apply to the AIP. Products and material made in Canada or Mexico must be considered as foreign made products.

9. Preparation of a Component Cost Calculation Table is not necessary for equipment listed on the FAA national listing: http://www.faa.gov/airports/aip/buy_american/
   Bidder however shall submit a listing of any equipment it proposes to install on the project that is included on the National Buy American conformance list.

Instructions for Section 50101(b)(4) Waiver:

1. The bidder may request a waiver if application of Buy America preferences results in a 25% cost increase in the overall project. This waiver is rarely applicable. Consult the Owner before making this request.

BUY AMERICA COST CALCULATION TABLE

(Title 49 USC § 50101 (b))

For Airfield Development Projects funded under the Airport Improvement Program

COMPONENT COST CALCULATION TABLE (Type 3 Waiver)

- In lieu of completing this table, bidder may prepare a spreadsheet that addresses the same information and calculations as presented herein.
- https://www.faa.gov/airports/aip/buy_american/
- The component breakout shall be along major components of the equipment. Submit separate calculation for each different equipment types. Do not combine the component cost calculations of different types of equipment.
- For Airfield development projects, equipment is defined as the "L" items (Airfield Lighting Equipment) as listed in FAA Advisory Circular 150/5345-53 and the b) individual bid items as established within FAA Advisory Circular 150/5370-10. The individual bid item method may not be applied to the "L" type items.
- An authorized person shall attest under signature and date that the submitted information is accurate and complete.

U.S. Department of Transportation
Federal Aviation Administration

OMB CONTROL NUMBER: 2120-0569
EXPIRATION DATE: 6/30/2023

Buy American Project/Product Content Percentage Calculation – Worksheet

Applicant Information

Date of Application:

Applicant Name:

Applicant Type (choose one):
☐ Prime Contractor ☐ Manufacturer ☐ Supplier

Point of Contact (First and Last Name):

Applicant Business Address:

Email address:

Telephone: Extension:

Project/Product Information

FAA Eligible Project:

Airport Sponsor:

Airport LOCID:

FAA Award Number:

FAA Item Number (FAA Advisory Circular reference, if applicable):

Total Material Cost:

Total **U.S.** Material Content Cost: Percentage: %

Total **Non-U.S.** Material Content Cost: Percentage: %

FAA Buy American Preference (including Buy American Build American) Compliance

Does this project include any iron, steel or any of the following construction materials, not 100% produced in the United States?

☐ Yes ☐ No

If "Yes," indicate the cost and percentage of the project below.

Steel (e.g., structural steel, rebar)	Cost:		Percentage:	%
Iron	Cost:		Percentage:	%
Non-ferrous metals	Cost:		Percentage:	%
Plastic and polymer-based products	Cost:		Percentage:	%
Glass (including optic glass)	Cost:		Percentage:	%
Lumber	Cost:		Percentage:	%
Drywall	Cost:		Percentage:	%

Use of Non-Domestic Construction Materials Justification

Provide a description of your efforts to locate and secure a domestic source for those "construction materials" or final manufactured goods that are not 100% produced in the U.S., including use of the Manufacturing Extension Partnership (MEP) and market research.

– CONFIDENTIAL –

NOT SUBJECT TO DISCLOSURE UNDER EXEMPTION # 4 OF THE FREEDOM OF INFORMATION ACT

Level (0, 1, 2)	Part Number	Item Description	Quantity	Unit of Measure	Price/Unit of Measure	U.S. Origin Price/Unit of Measure	U.S. Origin Cost (Each)	Non-U.S. Price/Unit of Measure	Non-U.S. Cost (Each)	Country of Non-U.S. Materials

– CONFIDENTIAL –

NOT SUBJECT TO DISCLOSURE UNDER EXEMPTION # 4 OF THE FREEDOM OF INFORMATION ACT

Level (0, 1, 2)	Part Number	Item Description	Quantity	Unit of Measure	Price/Unit of Measure	U.S. Origin Price/Unit of Measure	U.S. Origin Cost (Each)	Non-U.S. Price/Unit of Measure	Non-U.S. Cost (Each)	Country of Non-U.S. Materials

– CONFIDENTIAL –

NOT SUBJECT TO DISCLOSURE UNDER EXEMPTION # 4 OF THE FREEDOM OF INFORMATION ACT

Level (0, 1, 2)	Part Number	Item Description	Quantity	Unit of Measure	Price/Unit of Measure	U.S. Origin Price/Unit of Measure	U.S. Origin Cost (Each)	Non-U.S. Price/Unit of Measure	Non-U.S. Cost (Each)	Country of Non-U.S. Materials

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SECTION 017300 - 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. Construction layout.
2. Field engineering and surveying.
3. Installation of the Work.
4. Cutting and patching.
5. Progress cleaning.
6. Starting and adjusting.
7. Protection of installed construction.

B. Related Requirements:

1. Section 011000 "Summary" for limits on use of Project site.
2. Section 017700 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, replacing defective work, and final cleaning.

1.2 QUALITY ASSURANCE

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

B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, notify 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.
4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

C. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

1. For projects requiring compliance with sustainable design and construction practices and procedures, use products for patching that comply with sustainable design requirements.

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.

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. 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 & Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 013100 "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.

B. General: Engage a professional engineer to lay out the Work using accepted surveying practices.

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
2. Establish limits on use of Project site.
3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
4. Inform installers of lines and levels to which they must comply.
5. Check the location, level and plumb, of every major element as the Work progresses.
6. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and

duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

A. Identification: Owner will identify existing benchmarks, control points, and property corners.

B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.

C. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.

1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.

D. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.

E. Final Property Survey: Engage a professional engineer to prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by professional engineer, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.

1. Recording: At Substantial Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

3.5 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

F. Tools and Equipment: 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.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

J. Remove and replace damaged, defective, or non-conforming Work.

3.6 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

C. Temporary Support: Provide temporary support of work to be cut.

D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 011000 "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. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
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.
4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.

I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F (27 deg C).
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

a. Use containers intended for holding waste materials of type to be stored.

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 according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 017419 "Construction Waste Management and Disposal."

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.

3.8 STARTING AND ADJUSTING

A. Coordinate startup and adjusting of equipment and operating components with requirements in Section 019113 "General Commissioning Requirements."

B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

E. Manufacturer's Field Service: Comply with qualification requirements in Section 014000 "Quality Requirements."

3.9 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 017300

SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for the following:

1. Salvaging nonhazardous construction waste.
2. Recycling nonhazardous construction waste.
3. Disposing of nonhazardous construction waste.

B. Related Requirements:

1. Section 042000 "Unit Masonry" for disposal requirements for masonry waste.
2. Section 311000 "Site Clearing" for disposition of waste resulting from site clearing and removal of above- and below-grade improvements.

1.2 DEFINITIONS

A. Construction Waste: Building, structure, and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building, structure, and site improvement materials resulting from demolition operations.

C. Disposal: Removal of demolition or construction waste and subsequent salvage, sale, recycling, or deposit in landfill, incinerator acceptable to authorities having jurisdiction, or designated spoil areas on Owner's property.

D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.3 WASTE MANAGEMENT PLAN

A. General: Develop a waste management plan according to requirements in this Section. Plan shall consist of waste identification and waste reduction work plan.

B. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

1. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
2. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
3. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location where materials separation will be performed.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

B. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.

C. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged and recycled.
2. Comply with Section 015000 "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 RECYCLING CONSTRUCTION WASTE, GENERAL

A. General: Recycle paper and beverage containers used by on-site workers.

B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Contractor.

C. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.

D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.

1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.

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 as often as required to prevent overfilling bins.

3.3 RECYCLING CONSTRUCTION WASTE

A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
2. Polystyrene Packaging: Separate and bag materials.
3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

B. Wood Materials:

1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.

C. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location.

1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.

D. Paint: Seal containers and store by type.

3.4 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged or recycled, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. General: Except for items or materials to be salvaged or recycled, remove waste materials and legally dispose of at designated spoil areas on Owner’s property.

C. Burning: Do not burn waste materials.

END OF SECTION 017419

SECTION 017700 - 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. Warranties.
4. Final cleaning.
5. Repair of the Work.

B. Related Requirements:

1. Section 017823 "Operation and Maintenance Data" for additional operation and maintenance manual requirements.
2. Section 017839 "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
3. Section 017900 "Demonstration and Training" for requirements to train the Owner's maintenance personnel to adjust, operate, and maintain products, equipment, and systems.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of cleaning agent.

B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

C. Certified List of Incomplete Items: Final submittal at final completion.

1.3 CLOSEOUT SUBMITTALS

A. Certificates of Release: From authorities having jurisdiction.

B. Certificate of Insurance: For continuing coverage.

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. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number.
5. Submit testing, adjusting, and balancing records.
6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days 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. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
3. Complete startup and testing of systems and equipment.
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. Submit demonstration and training video recordings specified in Section 017900 "Demonstration and Training."
6. Advise Owner of changeover in utility services.
7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
9. Complete final cleaning requirements.
10. 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 a minimum of 7 days prior to date the Work will be completed and ready for final inspection and tests. 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.

1.5 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 according to Section 012900 "Payment Procedures."
2. 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 shall state that each item has been completed or otherwise resolved for acceptance.

3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. 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.

1.6 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.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Submit list of incomplete items in the following format:
   a. PDF electronic file. Architect[, through Construction Manager,] will return annotated file.

1.7 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where warranties are indicated to commence on dates other than date of Substantial Completion, or when delay in submittal of warranties might limit Owner's rights under warranty.

B. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.

C. Warranty Electronic File: Provide warranties and bonds in PDF format. Assemble complete warranty and bond submittal package into a single electronic PDF file with bookmarks enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

1. Submit on digital media acceptable to Architect

D. Warranties in Paper Form: (If required by Owner)

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.

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. 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.
c. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
d. Sweep concrete floors broom clean in unoccupied spaces.
e. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
f. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
g. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
h. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
i. Leave Project clean and ready for occupancy.

C. Construction Waste Disposal: Comply with waste disposal requirements in Section 017419 "Construction Waste Management and Disposal."

3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations, before requesting inspection for determination of Substantial Completion.

B. Repair, or remove and replace, defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

END OF SECTION 017700

SECTION 017823 - 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. Operation and maintenance documentation directory manuals.
2. Emergency manuals.
3. Systems and equipment operation manuals.
4. Systems and equipment maintenance manuals.
5. 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 on digital media acceptable to Architect. Enable reviewer comments on draft submittals.
2. Submit three paper copies. Architect will return three copies. (Verify hard copy requirements with Owner).

C. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect will return copy with comments.

1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.

D. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

1.3 FORMAT OF OPERATION AND MAINTENANCE MANUALS

A. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.

1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
2. File Names and Bookmarks: Bookmark individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

B. Manuals, Paper Copy: Submit manuals in the form of hard-copy, bound and labeled volumes.

1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf or 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.
2. 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 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

A. Organization of Manuals: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

B. Title Page: Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name and contact information for Contractor.
6. Name and contact information for Construction Manager.
7. Name and contact information for Architect.
8. Name and contact information for Commissioning Authority.
9. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
10. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

1.5 EMERGENCY MANUALS

A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

B. Content: Organize manual into a separate section for each of the following:

1. Type of emergency.
2. Emergency instructions.
3. Emergency procedures.

C. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:

1. Fire.
2. Flood.
3. Gas leak.
4. Water leak.
5. Power failure.
6. Water outage.
7. System, subsystem, or equipment failure.
8. Chemical release or spill.

D. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

E. Emergency Procedures: Include the following, as applicable:

1. Instructions on stopping.
2. Shutdown instructions for each type of emergency.
3. Operating instructions for conditions outside normal operating limits.
4. Required sequences for electric or electronic systems.
5. Special operating instructions and procedures.

1.6 SYSTEMS AND EQUIPMENT OPERATION MANUALS

A. Systems and Equipment Operation Manual: Assemble a complete set of data indicating operation of each system, subsystem, and piece of equipment not part of a system. Include information required for daily operation and management, operating standards, and routine and special operating procedures.

B. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:

1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
2. Performance and design criteria if Contractor has delegated design responsibility.
3. Operating standards.
4. Operating procedures.
5. Operating logs.
6. Wiring diagrams.
7. Control diagrams.
8. Piped system diagrams.
9. Precautions against improper use.
10. License requirements including inspection and renewal dates.

C. Descriptions: Include the following:

1. Product name and model number. Use designations for products indicated on Contract Documents.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

D. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

E. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

F. Piped Systems: Diagram piping as installed, and identify color coding where required for identification.

1.7 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Systems and Equipment Maintenance Manuals: Assemble a complete set of data indicating maintenance of each system, subsystem, and piece of equipment not part of a system. Include manufacturers' maintenance documentation, preventive maintenance procedures and frequency, repair procedures, wiring and systems diagrams, lists of spare parts, and warranty information.

B. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranties and bonds, as described below.

C. Manufacturers' Maintenance Documentation: Include the following information for each component part or piece of equipment:

1. Standard maintenance instructions and bulletins; include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

    a. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.
4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

1. Test and inspection instructions.
2. Troubleshooting guide.
3. Precautions against improper maintenance.
4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
5. Aligning, adjusting, and checking instructions.
6. Demonstration and training video recording, if available.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance 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.

H. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.

1.8 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. 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.

D. 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.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. 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 017823

SECTION 017839 - 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.

B. Related Requirements:

1. Section 017300 "Execution" for final property survey.
2. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.2 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit one set of marked-up record prints.
2. Number of Copies: Submit copies of record Drawings as follows:

a. Initial Submittal:

1) Submit one paper-copy set(s) of marked-up record prints.
2) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.

b. Final Submittal:

1) Submit PDF electronic files of scanned record prints and three, (or number as required by Owner) set(s) of prints.

B. Record Specifications: Submit one paper copy or annotated PDF electronic file of Project's Specifications, including addenda and contract modifications.

C. Record Product Data: Submit PDF electronic files and directories of each submittal.

1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.

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. Depths of foundations.
    d. Locations and depths of underground utilities.
    e. Revisions to routing of piping and conduits.
    f. Revisions to electrical circuitry.
    g. Actual equipment locations.
    h. Duct size and routing.
    i. Locations of concealed internal utilities.
    j. Changes made by Change Order or Construction Change Directive.
    k. Changes made following Architect's written orders.
    l. Details not on the original Contract Drawings.
    m. Field records for variable and concealed conditions.
    n. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings 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. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:

1. Format: Annotated PDF electronic file with comment function enabled.
2. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
3. Refer instances of uncertainty to Architect for resolution.
4. Architect will furnish Contractor with one set of digital data files of the Contract Drawings for use in recording information.

    a. See Section 013100 "Project Management and Coordination" for requirements related to use of Architect's digital data files.
    b. Architect will provide data file layer information. Record markups in separate layers.

C. 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. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
3. Note related Change Orders, record Product Data, and record Drawings where applicable.

B. Format: Submit record Specifications as annotated PDF electronic file or scanned PDF electronic file(s) of marked-up paper copy of Specifications.

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.

C. Format: Submit record Product Data as annotated PDF electronic file or scanned PDF electronic file(s) of marked-up paper copy of Product Data.

1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

1.6 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

PART 3 - EXECUTION

END OF SECTION 017839

SECTION 017900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:

1. Instruction in operation and maintenance of systems, subsystems, and equipment.
2. Demonstration and training video recordings.

1.2 INFORMATIONAL SUBMITTALS

A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.

1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.

1.3 CLOSEOUT SUBMITTALS

A. Demonstration and Training Video Recordings: Submit two copies within seven days of end of each training module.

1. At completion of training, submit complete training manual(s) for Owner's use prepared in same paper and PDF file format required for operation and maintenance manuals specified in Section 017823 "Operation and Maintenance Data."

1.4 QUALITY ASSURANCE

A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.

B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 014000 "Quality Requirements," experienced in operation and maintenance procedures and training.

C. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination."

1.5 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.

B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data have been reviewed and approved by Architect.

1.6 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.

B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:

    a. System, subsystem, and equipment descriptions.
    b. Performance and design criteria if Contractor is delegated design responsibility.
    c. Operating standards.
    d. Regulatory requirements.
    e. Equipment function.
    f. Operating characteristics.
    g. Limiting conditions.
    h. Performance curves.

2. Documentation: Review the following items in detail:

    a. Emergency manuals.
    b. Systems and equipment operation manuals.
    c. Systems and equipment maintenance manuals.
    d. Product maintenance manuals.
    e. Project Record Documents.
    f. Identification systems.
    g. Warranties and bonds.
    h. Maintenance service agreements and similar continuing commitments.

3. Emergencies: Include the following, as applicable:

    a. Instructions on meaning of warnings, trouble indications, and error messages.
    b. Instructions on stopping.
    c. Shutdown instructions for each type of emergency.
    d. Operating instructions for conditions outside of normal operating limits.
    e. Sequences for electric or electronic systems.
    f. Special operating instructions and procedures.

4. Operations: Include the following, as applicable:

    a. Startup procedures.
    b. Equipment or system break-in procedures.
    c. Routine and normal operating instructions.
    d. Regulation and control procedures.
    e. Control sequences.
    f. Safety procedures.
    g. Instructions on stopping.
    h. Normal shutdown instructions.
    i. Operating procedures for emergencies.
    j. Operating procedures for system, subsystem, or equipment failure.
    k. Seasonal and weekend operating instructions.
    l. Required sequences for electric or electronic systems.
    m. Special operating instructions and procedures.

5. Adjustments: Include the following:

    a. Alignments.
    b. Checking adjustments.
    c. Noise and vibration adjustments.
    d. Economy and efficiency adjustments.

6. Troubleshooting: Include the following:

    a. Diagnostic instructions.
    b. Test and inspection procedures.

7. Maintenance: Include the following:

    a. Inspection procedures.
    b. Types of cleaning agents to be used and methods of cleaning.
    c. List of cleaning agents and methods of cleaning detrimental to product.
    d. Procedures for routine cleaning.
    e. Procedures for preventive maintenance.
    f. Procedures for routine maintenance.
    g. Instruction on use of special tools.

8. Repairs: Include the following:

    a. Diagnosis instructions.
    b. Repair instructions.
    c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
    d. Instructions for identifying parts and components.
    e. Review of spare parts needed for operation and maintenance.

1.7 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 017823 "Operation and Maintenance Data."

B. Set up instructional equipment at instruction location.

1.8 INSTRUCTION

A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.

B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

C. Scheduling: Provide instruction at mutually agreed-on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

1. Schedule training with Owner with at least seven days' advance notice.

D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.

E. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of an oral, and or, a demonstration performance-based test.

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

1.9 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

A. General: Engage a qualified commercial videographer to record demonstration and training video recordings. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.

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

B. Digital Video Recordings: Provide high-resolution, digital video in MPEG format, produced by a digital camera with minimum sensor resolution of 12 megapixels and capable of recording in full HD mode with vibration reduction technology.

1. Submit video recordings on CD-ROM or thumb drive.

C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to adequately cover area of demonstration and training. Display continuous running time.

D. Light Levels: Verify light levels are adequate to properly light equipment. Verify equipment markings are clearly visible prior to recording.

E. Preproduced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.

PART 2 - PRODUCTS

PART 3 - EXECUTION

END OF SECTION 017900

021500 SHORING & BRACING
024113 SELECTIVE SITE DEMOLITION
024119 SELECTIVE DEMOLITION

EXISTING CONDITIONS

division 2

SAA

SANDERS ASSOCIATES ARCHITECTS

SECTION 021500 - SHORING AND BRACING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes shoring and bracing work necessary to protect existing buildings, streets, walkways, utilities, and other improvements and excavation against loss of ground or caving embankments.
   1. Maintenance of shoring and bracing.
   2. Removal of shoring and bracing, as required.

B. Building excavation is specified in another Division-2 section.

C. Drawings and general provisions of Contract including General and Supplementary Conditions and Division-1 Specification sections, and the Uniform Standard Specifications and Details for Public Works Construction from authority having jurisdiction, apply to work of this section.

1.3 QUALITY ASSURANCE

A. Supervision: Engage and assign supervision of shoring and bracing work to a qualified foundation consultant.

B. Regulations: Comply with local codes and ordinances of governing authorities having jurisdiction.

1.4 JOB CONDITIONS

A. Before starting work, check and verify governing dimensions and elevations. Survey condition of adjoining properties. Take photographs, to record any prior settlement or cracking of structures, pavements, and other improvements. Prepare a list of such damages, verified by dated photographs, and signed by Contractor and others conducting investigation.

B. Survey adjacent structures and improvements, establishing exact elevations at fixed points. Clearly identify adjacent building benchmarks and record existing elevations. Locate this project's datum level used to establish benchmark elevations at sufficient distant so as not to be affected by movement resulting from excavation operations.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Provide suitable shoring and bracing materials which will support loads imposed. Materials need not be new, but should be in serviceable condition.

B. If wood is part of shoring system near existing structures, use pressure preservative

treated materials or remove before placement of backfill.

PART 3 - EXECUTION

3.1 SHORING

A. Locate shoring clear of permanent construction and to permit forming and finishing of concrete surfaces. Provide shoring system adequately anchored and braced to resist earth and hydrostatic pressures.

B. Shoring systems retaining earth on which the support or stability of existing structures is dependent must be left in place at completion of work.

3.2 BRACING

A. Locate bracing to clear columns, floor framing construction, and other permanent work. If necessary to move a brace, install new bracing prior to removal of original brace.

B. Do not place bracing where it will be cast into or included in permanent concrete work, except as otherwise acceptable to Architect.

C. Install internal bracing to prevent spreading or distortion to braced frames.

D. Maintain bracing until structural elements are rebraced by other bracing or until permanent floor construction is able to withstand lateral earth and hydrostatic pressures.

E. Remove sheeting, shoring and bracing in stages to avoid disturbance to underlying soils and damage to structures, pavements, facilities, and utilities.

F. Repair or replace, as acceptable by Architect, adjacent work damaged or displaced through the installation or removal of shoring and bracing work.

END OF SECTION 021500

SECTION 024113 SELECTIVE SITE DEMOLITION

PART 1 - GENERAL

0.1 SUMMARY:

A. Section includes requirement for demolition work.

1. Verify existing utilities to be removed as well as site features to be demolished with owner and engineer.

B. Demolition includes, but is not limited to, the removal of the following items within the demolition limit lines:

1. Sidewalks
2. Concrete Slabs
3. Building Structures (below and above grade)

C. Related Sections

1. Refer to Section 31200 for earthwork requirements.

D. Drawings and general provisions of contract, including general and supplementary Conditions and site clearing specifications apply to work in this section.

0.2 SUBMITTALS:

A. Schedule: Submit proposed methods and operations of demolition to review prior to start of work. Include in schedule coordination for shut-off, capping, and continuation of utility services as required.

B. Explosives: The use of explosives is not permitted.

C. Traffic: Conduct demolition operations and removal of debris to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities.

1. Do not close or obstruct streets, walks or other occupied or used facilities without permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulation.

D. Protections: Ensure safe passage of persons around area of demolition. Conduct operations to prevent injury to adjacent buildings, structures, other facilities, and persons.

1. Erect temporary covered passageways as required by authorities having jurisdiction.

2. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement or collapse of structures to be demolished and adjacent facilities to remain.

E. Damage: Promptly repair damage caused to adjacent facilities by demolition operations.

1. Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to governing authorities.

F. Hazardous Materials Removal:

1. When hazardous materials are encountered, notify the Owner immediately.

PART 1 - PRODUCTS

Not used.

PART 2 - EXECUTION

A. Demolition:

1. Pollution Controls: Use water sprinkling, temporary enclosures, and other suitable methods to limit dust and dirt rising and scattering in air to lowest practical level. Comply with governing regulations pertaining to environmental protection.
   a. Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, and pollution.
   b. Clean adjacent structures and improvements of dust, dirt, and debris caused by demolition operations, as directed by Architect or governing authorities. Return adjacent areas to condition existing prior to start of work.

B. Cutting Concrete and Concrete Block: Saw cut concrete slabs and concrete block walls with approved saws at lines and levels indicated on drawings. Saw cut concrete walks and curbs only if they cannot be removed to an existing control joint.

C. Capping and Abandonment: Cap all abandoned lines and conduits and drains in accordance with requirements of Utility Companies having jurisdiction. Remove abandoned lines, unless otherwise noted.

D. Permits: Contractor is required to obtain a Demolition Permit and Utility Disconnection Permits from the City and utility companies.

1. Record on Record Document location and extent of all capped and abandoned lines below grade.

E. Relocation: Relocate utilities as indicated. Work performed for relocation of utilities to conform to new utility line construction.

2.1 DISPOSAL OF DEMOLISHED MATERIALS:

A. General: remove from site debris, rubbish, and other materials resulting from demolition operations and dispose in a legal manner.

2.2 BACKFILL

A. Excavated areas associated with the removal of all substructures should be backfilled with a well-graded granular material having a maximum size of 2 inches and not more than 15 percent passing a #200 sieve. All earth materials placed in excavated areas should be placed in maximum eight inch loose lifts and densified to an in-place unit weight equal to 95% of the Maximum Laboratory Density as determined by ASTM D 1557-78.

1. Refer to section 31200 for placement and compaction requirements.

END OF SECTION 024113

SECTION 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Demolition and removal of selected portions of building or structure.
2. Salvage of existing items to be reused or recycled.

1.2 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.

1.3 PREINSTALLATION MEETINGS

A. Pre-demolition Conference: Conduct conference at Project site.

1.4 INFORMATIONAL SUBMITTALS

A. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection and for dust control. Indicate proposed locations and construction of barriers.

B. Schedule of selective demolition activities with starting and ending dates for each activity.

C. Pre-demolition photographs or video.

D. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician.

1.5 CLOSEOUT SUBMITTALS

A. Inventory of items that have been removed and salvaged.

1.6 QUALITY ASSURANCE

A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

1.7 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: It is not expected that hazardous materials will be encountered in the Work.

1. Hazardous materials will be removed by Owner before start of the Work.
2. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

E. Storage or sale of removed items or materials on-site 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.

G. Arrange selective demolition schedule so as not to interfere with Owner's operations.

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 ASSE A10.6 and NFPA 241.

C. Requirements for Building Reuse:

1. Maintain existing building structure (including structural floor and roof decking) and envelope (exterior skin and framing, excluding window assemblies) not indicated to be demolished; do not demolish such existing construction beyond indicated limits.
2. Maintain existing interior nonstructural elements (interior walls, doors and floor coverings) not indicated to be demolished; do not demolish such existing construction beyond indicated limits.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. Perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.

C. Inventory and record the condition of items to be removed and salvaged.

3.2 PREPARATION

A. Refrigerant: Before starting demolition, remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.3 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.

    a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
    b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
    c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
    d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
    e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
    f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
    g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.

3.4 PROTECTION

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

B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

C. Remove temporary barricades and protections where hazards no longer exist.

3.5 SELECTIVE DEMOLITION

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

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. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
4. Maintain fire watch during and for at least the amount of hours required by the DFCM Hot Work Permit after flame-cutting operations.

    a. Hot Work Permit and Program: A “Hot Work Permit” will be required each day that torch cutting or welding activities occur during demolition or construction. All precautions of the “DFCM Hot Work Program” must be applied prior to commencing any welding or hot work. This is for compliance with NFPA 51B, 2009 and OSHA CFR 29 Part 1910.252 requirements. Coordinate with the WSU Fire Marshal.

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. Comply with requirements in Section 017419 "Construction Waste Management and Disposal."

B. 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.

C. 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 on-Campus.

5. Protect items from damage during transport and storage.

D. 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.

E. 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.

a. Interior doors and frames. Cover and protect doors or frames that are to remain during construction.
b. Interior walls. Protect wall surfaces that are to remain. Repair any damage to finish surfaces.

3.6 CLEANING

A. Remove demolition waste materials from Project site and recycle or dispose of them according to Section 017419 "Construction Waste Management and Disposal."

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 017419 "Construction Waste Management and Disposal."

B. Burning: Do not burn demolished materials.

C. 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 024119

030500 COMMON WORK RESULTS FOR CONCRETE
033000 CAST-IN-PLACE CONCRETE
033300 ARCHITECTURAL CONCRETE
033543 POLISHED CONCRETE FINISHING

CONCRETE

division 3

SAA

SANDERS ASSOCIATES ARCHITECTS

SECTION 030500 - COMMON WORK RESULTS FOR CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.

B. Application of clear interior concrete sealers.

1.02 RELATED SECTIONS

B. Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

A. Section 033000 – Cast-In-Place Concrete

1.03 REFERENCES

A. ASTM C 309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

B. ASTM C 1315 - Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.

C. AASHTO M 148 - Liquid Membrane Forming Compounds for Curing Concrete.

D. USDA - United States Department of Agriculture.

1.04 SUBMITTALS

A. Comply with Section 013300 - Submittal Procedures.

B. Submit manufacturer's product data and application instructions.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. Store materials in a clean, dry area in accordance with manufacturer's instructions.

C. Keep product from freezing.

D. Avoid direct contact with this product as it may cause mild-to-moderate irritation of the eyes and/or skin.

E. Protect materials during handling and application to prevent damage or contamination.

F. Do not mix any compound containing solvent.

G. Do not mix or agitate aggressively as foaming can occur.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Do not apply product when air, surface, or material temperatures are expected to fall below 40° F (4° C) within four hours of expected application.

B. Do not apply to frozen concrete.

C. Do not use on dense or porous surfaces.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. Sherwin Williams Company

2.02 MATERIALS

A. CONCRETE SEALER CLEAR ACRYLIC CONCRETE SEALER: Basis-of-Design Product: Subject to compliance with requirements, provide Sherwin Williams Company; H&C Concrete Sealer Wet-Look Water-Based.

1. Color; Clear.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine surfaces to receive curing and sealing compound. Notify architect if surfaces are not acceptable. Do not begin surface preparation or application until unacceptable conditions have been corrected.

3.02 SURFACE PREPARATION

A. Protect adjacent surfaces not designated to receive curing and sealing compound.

B. Clean and prepare surfaces to receive curing and sealing compound in accordance with manufacturer's instructions.

C. Ensure concrete surface is clean and dry, with all stains, oil, grease, dust, and dirt removed.

D. Concrete surface water should be dissipated when used on new concrete.

D. Concrete surfaces should not be marred by walking workers.

3.03 APPLICATION

A. Apply curing and sealing compound in accordance with manufacturer's instructions.

B. Ensure product is mixed for optimum performance. Avoid aggressive mixing as foaming may occur.

C. Use an industrial sprayer with a 5916 tip that produces a flow rate of 1/10 of one gallon per minute.

D. Alternatively apply using a lint-free roller or lamb's wool roller.

E. Avoid puddling in low areas.

3.04 PROTECTION

A. Restrict foot traffic for at least four hours; 12 hours is preferable.

END OF SECTION 030500

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Design Mixtures: For each concrete mixture.

C. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement.

1.3 INFORMATIONAL SUBMITTALS

A. Material certificates.

B. Material test reports.

C. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

B. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

1.5 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on concrete mixtures.

1.6 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with ACI 306.1.

1. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

B. Hot-Weather Placement: Comply with ACI 301 (ACI 301M) and ACI 305.1).

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301 (ACI 301M).
2. ACI 117 (ACI 117M).

2.2 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

2.3 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

B. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.

C. Epoxy-Coated Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed bars, epoxy coated, with less than 2 percent damaged coating in each 12-inch (300-mm) bar length.

D. Plain-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, plain, fabricated from as-drawn steel wire into flat sheets.

E. Epoxy-Coated Welded-Wire Reinforcement: ASTM A 884/A 884M, Class A coated, Type 1, plain steel.

F. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice."

2.4 CONCRETE MATERIALS

A. Cementitious Materials:
1. Portland Cement: ASTM C 150/C 150M, Type I/II, gray.
2. Fly Ash: ASTM C 618, Class F.
3. Slag Cement: ASTM C 989/C 989M, Grade 100 or 120.

B. Normal-Weight Aggregates: ASTM C 33/C 33M, graded.
   1. Maximum Coarse-Aggregate Size: **1 inch (25 mm)** nominal.
   2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Air-Entraining Admixture: ASTM C 260/C 260M.

D. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

   1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
   2. Retarding Admixture: ASTM C 494/C 494M, Type B.
   3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
   4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
   5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
   6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

E. Water: ASTM C 94/C 94M and potable.

2.5 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

2.6 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.

2.7 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301 (ACI 301M).

B. Cementitious Materials: Use fly ash, pozzolan, slag cement, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.

C. Admixtures: Use admixtures according to manufacturer's written instructions.

   1. Use water-reducing, high-range water-reducing, or plasticizing admixture in concrete, as required, for placement and workability.

2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a w/c ratio below 0.50.

2.8 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Normal-Weight Concrete:

1. Minimum Compressive Strength: As shown on Structural Drawings.
2. Maximum W/C Ratio: As shown on Structural Drawings.
3. Slump Limit: **4 inches (100 mm)** or **8 inches (200 mm)** **for concrete with verified slump of 2 to 4 inches (50 to 100 mm) before adding high-range water-reducing admixture or plasticizing admixture**, plus or minus 1 inch (25 mm).
4. Air Content: As shown on Structural Drawings.

2.9 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.10 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK INSTALLATION

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301 (ACI 301M), to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117 (ACI 117M).

C. Chamfer exterior corners and edges of permanently exposed concrete.

3.2 EMBEDDED ITEM INSTALLATION

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.3 STEEL REINFORCEMENT INSTALLATION

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

3.4 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch (3.2 mm). Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2-mm-) wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

3.5 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.

B. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301 (ACI 301M).

3.6 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.7 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, re-straightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces indicated.
2. **Finish and measure surface, so concrete surface has a Floor Flatness (FF 45) and Floor Levelness (FL 35) according to ASTM E 1155.**

C. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated. While concrete is still plastic, slightly scarify surface with a fine broom.

1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

D. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.8 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 305.1 for hot-weather protection during curing.

B. Concrete Finishing Coordination: Coordinate curing compounds for concrete hardener material. Remove curing compound if not compatible. Refer to Section 033500 Concrete Finishing.

C. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

D. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for remainder of curing period.

E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days.
2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

    a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound does not interfere with bonding of floor covering used on Project.

4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.9 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

3.10 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

END OF SECTION 033000

SECTION 033300 - ARCHITECTURAL CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes cast-in-place architectural concrete, including form facings, reinforcement and accessories, concrete materials, concrete mixture design, placement procedures, and finishes to obtain specified architectural appearance. 'Architectural Concrete' includes portions of the basement walls as indicated, retaining walls, light wells, and planter walls exposed above grade.

B. Related Sections:

1. Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Design Mixtures: For each concrete mixture.

C. Formwork Shop Drawings.

1.3 INFORMATIONAL SUBMITTALS

A. Material certificates.

B. Material test reports.

1.4 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on concrete mixtures.

1.5 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with ACI 306.1.

B. Hot-Weather Placement: Comply with ACI 301 (ACI 301M).

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301 (ACI 301M).
2. ACI 303.1.

2.2 FORM-FACING MATERIALS

A. General: Comply with Section 033000 "Cast-in-Place Concrete" for formwork and other form-facing material requirements.

B. Form-Facing Panels for As-Cast Finishes: Steel and glass-fiber-reinforced plastic, or other approved nonabsorptive panel materials that provide continuous, true, and smooth architectural concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

C. Rustication Strips (if noted on Drawings): Metal, dressed wood, or rigid plastic, or with sides beveled and back kerfed; nonstaining; in longest practicable lengths.

D. Chamfer Strips: Metal, rigid plastic, elastomeric rubber, or dressed wood, 3/4 by 3/4 inch (19 by 19 mm), minimum; nonstaining; in longest practicable lengths. See drawings for details and locations.

E. Form Joint Tape: Compressible foam tape; pressure sensitive; AAMA 800; minimum 1/4 inch (6 mm) thick.

F. Form Joint Sealant: Elastomeric sealant complying with ASTM C 920, Type M or S, Grade NS, that adheres to form joint substrates.

G. Form Release Agent: Commercially formulated form-release agent that will not bond or adversely affect architectural concrete surfaces and will not impair subsequent treatments of those surfaces.

H. Form Ties: Factory-fabricated, internally disconnecting or removable ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
1. Furnish ties that, when removed, will leave holes no larger than 1” (25mm) in diameter on concrete surface.

2.3 REINFORCEMENT ACCESSORIES

A. General: Comply with Section 033000 "Cast-in-Place Concrete" for steel reinforcement and other requirements for reinforcement accessories.

B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire fabric in place; manufactured according to CRSI's "Manual of Standard Practice."

1. Where legs of wire bar supports contact forms, use CRSI Class 1, gray, plastic-protected or CRSI Class 2, stainless-steel bar supports.

2.4 CONCRETE MATERIALS

A. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

B. Cementitious Materials:

1. Portland Cement: ASTM C 150/C 150M, Type I/II, gray.
2. Fly Ash: ASTM C 618, Class F.
3. Slag Cement: ASTM C 989/C 989M, Grade 100 or Grade 120.
4. Silica Fume: ASTM C 1240 amorphous silica.

C. Normal-Weight Aggregates: Refer to Division 3 Section ‘Cast-in-place Concrete’.

D. Water: Potable, complying with ASTM C 94/C 94M, except free of wash water from mixer washout operations.

E. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that does not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.5 CONCRETE MIXTURES:

A. Prepare design mixtures for each type and strength of cast-in-place architectural concrete proportioned on basis of laboratory trial mixture or field test data, or both, according to ACI 301 (ACI 301M).
1. Use a qualified independent testing agency for preparing and reporting proposed design mixtures based on laboratory trial mixtures.

B. Cementitious Materials: For cast-in-place architectural concrete exposed to deicers, limit percentage, by weight, of cementitious materials other than portland cement according to ACI 301 (ACI 301M) requirements. Use fly ash, pozzolan, slag cement, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.

C. Concrete Mixtures:

1. Compressive Strength (28 Days): As indicated in Structural Drawings.
2. Maximum W/C Ratio: 0.46 or as indicated in Structural Drawings.

3. Slump Limit: 4 inches (100 mm) or 8 inches (200 mm) for concrete with verified slump of 2 to 4 inches (50 to 100 mm) before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch (25 mm).
4. Air Content: As indicated in Structural Drawings.

2.6 CURING MATERIALS:

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.

2.7 CONCRETE MIXING:

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver cast-in-place architectural concrete according to ASTM C 94, and furnish batch mixing ticket information.
1. When air temperature is between 85 and 95 deg F (30 and 32 deg C), reduce mixing and delivery time from 90 to 75 minutes; when air temperature is above 90 F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK

A. General: Comply with Section 033000 "Cast-in-Place Concrete" for formwork, embedded items, and shoring and reshoring.

B. In addition to ACI 303.1 limits on form-facing panel deflection, limit cast-in-place architectural concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:

1. Class B, 1/8 inch (3 mm)

C. Fabricate forms for easy removal without hammering or prying concrete surfaces. Provide crush or wrecking plates where stripping may damage cast-in-place surfaces. Provide top forms for inclined surfaces stepper than 1.5 horizontal to 1 vertical. Kerf wood rustications, keyways, reglets, recesses, and the like, for easy removal.
1. Do not use rust-stained, steel, forming-facing materials.

D. Chamfer exterior corners and edges of cast-in-place architectural concrete where detailed or if not detailed chamfer edges as directed by Architect.

E. Coat contact surfaces of wood rustications and chamfer strips with sealer before placing reinforcement.

F. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in work. Determine sizes and locations from trades providing such items.

G. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

H. Seal form joints and penetrations at form joint tape or form joint sealant to prevent mortar leaks.

I. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

J. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 REINFORCEMENT AND INSERTS

A. General: Comply with Section 033000 "Cast-in-Place Concrete" for fabricating and installing steel reinforcement. Securely fasten steel reinforcement and wire ties against shifting during concrete placement.

B. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

3.3 REMOVING AND REUSING FORMS

A. Formwork, for sides of walls and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.

B. Clean and repair surfaces of forms to be used in the work. Do not use split, frayed, delaminated, or otherwise damaged form-facing material. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for cast-in-place architectural concrete surfaces.

3.4 JOINTS

A. Construction Joints: Install construction joints true to line, with faces perpendicular to surface plane of cast-in-place architectural concrete, so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated.

2. Use bulkhead forms with keys of plywood, wood, or expanded galvanized steel sheet, unless otherwise indicated. Embed keys at least 1-1/2" (38mm) into concrete. Align construction joint within rustications attached to form-facing material.

3. Space vertical joints in walls as indicated. Locate joints beside piers intergral with walls, near corners, and in concealed locations where possible.

4. Use bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

B. Contraction Joints: Form weakened-plane contraction joints true to line, with faces perpendicular to surface plane of cast-in-place architectural concrete, so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

3.5 CONCRETE PLACEMENT

A. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.

B. Deposit concrete continuously between construction joints. Deposit concrete to avoid segregation.

C. Deposit concrete in forms in horizontal layers no deeper than 24 inches (600mm) and in a manner to avoid inclined construction joints.
   1. Consolidate placed concrete with mechanical vibrating equipment. Use equipment and procedures for consolidating concrete recommended by ACI 309R.
   2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than visible effectiveness of the vibrator. Place vibrators to rapidly penetrate placed layer and at least 6 inches (150mm) into proceeding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mix constituents to segregate.

D. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
   1. When air temperature has fallen to or is expected to fall below 40 deg F (4.4 deg C), uniformly heat water and aggregate before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.
   2. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
   3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

E. Hot-Weather Placement: Place concrete according to recommendations in ACI 305R and as follows, when hot weather conditions exist:
   1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F (32 deg C) at time of placement.
   2. Cover steel reinforcement with water soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
   3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.6 FINISHES, GENERAL

A. Architectural Concrete Finish: As approved by Architect.

B. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces.

1. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

C. Maintain uniformity of special finishes over construction joints unless otherwise indicated.

3.7 AS-CAST FORMED FINISHES

A. Smooth Formed Finish: As cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defective areas. Remove fins and other projections exceeding 1/8 inch (3mm) in height. Do not apply rubbed finish to smooth-formed finish.

3.8 CONCRETE CURING

A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

B. Begin curing immediately after removing forms from concrete. Cure according to ACI 308.1, by one or a combination of the following methods that will not mottle, discolor, or stain concrete:

1. Curing Compound: Mist concrete surfaces with water. Apply curing compound uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.9 FIELD QUALITY CONTROL

A. General: Comply with field quality-control requirements in Section 033000 "Cast-in-Place Concrete."

3.10 REPAIR, PROTECTION, AND CLEANING

A. Repair and cure damaged finished surfaces of cast-in-place architectural concrete when approved by Architect. Match repairs to color, texture, and uniformity of surrounding surfaces and to repairs on approved mockups.

1. Remove and replace cast-in-place architectural concrete that cannot be repaired and cured to Architect's approval.

B. Protect corners, edges, and surfaces of cast-in-place architectural concrete from damage; use guards and barricades.

C. Protect cast-in-place architectural concrete from staining, laitance, and contamination during remainder of construction period.

D. Clean cast-in-place architectural concrete surfaces after finish treatment to remove stains, markings, dust, and debris.

E. Wash and rinse surfaces according to concrete finish applicator's written recommendations. Protect other work from staining or damage due to cleaning operations.
   1. Do not use cleaning materials or processes that could change the appearance of cast-in-place architectural concrete finishes.

F. Caulk Joints to protect against sand and temperature induced heaving.

END OF SECTION 033300

SECTION 033543 - POLISHED CONCRETE FINISHING

PART 1 - GENERAL

1.1 SUMMARY

1. **Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.**

B. Section includes polished concrete finishing.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each type of product requiring color selection.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance Data: For polished concrete finishing to include in maintenance manuals. Also include the following

1. Manufacturer's instructions on maintenance renewal of applied treatments
2. Protocols and product specifications for joint filling, crack repair and/or surface repair.

1.4 QUALITY ASSURANCE

A. Field Sample Panels: After approval of samples, produce field sample panels to demonstrate the approved range of selections made under Sample submittals. Produce a minimum of three sets of full-scale panels, approximately 48 by 48 inches (1200 by 1200 mm) minimum, to demonstrate the expected range of finish, color, and appearance variations.

1. Locate panels as indicated or, if not indicated, as directed by Architect.
2. Maintain field sample panels during construction in an undisturbed condition as a standard for judging the completed Work.
3. Demolish and remove field sample panels when directed.

B. Manufacturers Qualifications:

1. Manufacturer has a minimum of 5 years' experience in manufacturing components similar to or exceeding requirements of project.
2. Manufacturer must be able to provide technically trained field representative during construction and approving application method

C. Installer Qualifications:

1. Installer experienced in performing work of this section who has specialized in installation work similar to that required for this project. The following are approved installers. Any installer that is not on this list will be required to submit qualifications and written manufacturers application approvals for review. Acceptance by manufacturer and architect will be required before bidding.

    a) CDC Restoration, 801-514-9218
    b) Floortex, 801-589-0899
    c) National Construction Specialties, 801-514-9218
    d) Russ Hall Flooring, 801-292-8355
    e) Stone Touch, 801-281-2299
    f) Western States, 801-550-5057

1. Installer trained and having current certification for Manufacture Concrete Polishing System must be able to provide technically trained field representative during construction and approving application method

1.5 REFERENCES

A. ASTM International (ASTM):
1. ASTM C309 – Standard Specification for Liquid Membrane Forming Compounds for Curing Concrete.
2. ASTM C171 – Standard Specification for Sheet Materials for Curing Concrete
3. ASTM C779 – Standard Test Method for Abrasion Resistance of Horizontal Concrete Surfaces
4. ASTM C805 – Standard Test Method for Rebound Number of Hardened Concrete
5. ASTM E 1155 – Standard Test Method for Determining Floor Flatness and Levelness Using the F number system

B. RILEM Test Method 11.4 Standard Measurement of Reduction of Moisture Penetration Through Horizontal Concrete Surfaces

1.6 PERFORMANCE REQUIREMENTS

A. Performance Requirements: Provide polished flooring that has been selected, manufactured and installed to achieve the following:

1. Abrasion Resistance: ASTM C779, Up to 400% increase in abrasion resistance Manufacturer must be able to provide technically trained field representative during construction and approving application method
2. Reflectivity: Increase of 35% as determined by gloss meter
3. Waterproof Properties: RILEM Test Method 11.4, 70% or greater reduction in absorption
4. Impact Strength: ASTM C805, Up to 21% increased impact strength
5. Must meet or exceed ADA/OSHA suggested 0.5 standard value for the Static Co-efficient of Friction

1.7 DELIVERY, STORAGE & HANDLING

A. Delivery: Deliver materials in manufacturer’s original packaging with identification labels and seals intact

B. Storage and Protection:

1. Store materials protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer
2. Protect Concrete Slab
   a. Protect from petroleum stains during construction
   b. Diaper all hydraulic lifts and power equipment
   c. No pipe cutting machinery will be used on interior floor slab
   d. Steel will not be placed on interior floor slab to avoid rust staining
   e. No acids or acidic detergents will come into contact with slab

PART 2 - PRODUCTS

2.1 LIQUID FLOOR TREATMENTS (Drawing Designation 'PCF-1')

A. Penetrating Liquid Floor Treatments for Polished Concrete Finish: Clear, waterborne solution of inorganic silicate or siliconate materials and proprietary components; odorless; that penetrates, hardens, and is suitable for polished concrete surfaces.

2.1 MANUFACTURERS

A. Subject to compliance with requirements, provide **ADVANCED FLOOR PRODUCTS, RETROPLATE SYSTEMS**.

B. MATERIALS: Ensure concrete finishing components and materials are from single source, from single manufacturer.

1. Hardener, Sealer, Densifier:
   a. Advanced Floor Products: RetroPlate 99 – penetrating, water based, odorless liquid, VOC compliant, environmentally safe chemical, will leave no film on surface
2. Joint Filler:
   a. Advanced Floor Products: CreteFill Pro 85, Semi-rigid, 2 component, self-leveling, 100%solids, rapid curing, polyurea control joint and crack filler with a 85 Shore-A hardness. Depending on project needs.
3. Repair Material:
   a. Advanced Floor Products: CreteFill Spall Repair, 2 component, 100% solids, rapid curing polyurea repair material.
4. Cleaning Solution:
   a. Advanced Floor Products: CreteClean Plus
5. Stain Protector:
   a. Advanced Floor Products: RetroGuard

PART 3 - EXECUTION

3.1 POLISHING

A. Polish: **Level 3: High sheen, 800 grit. Gloss Reading 50-60.**
   1. Remove existing coatings: For thick coatings, use a 16- or 20-grit diamond abrasive or more aggressive tool specifically for coating removal.

2. Seal cracks and joints with an epoxy filler.
3. Grind with a 30-grit metal-bonded diamond. **1 minimum passes.**
4. Grind with an 80-grit metal-bonded diamond. **1 minimum passes.**
5. Grind with a 150-grit metal-bonded diamond. **1 minimum passes.**
6. Apply a chemical hardener to densify the concrete.
7. Polish with a 100-grit resin-bond diamond. **1 minimum passes.**
8. Polish with a 400-grit resin-bond diamond. **1 minimum passes.**
9. Polish with an 800-grit resin-bond diamond. **6 minimum passes.**
10. Apply stain guard to help protect the polished surface and make it easier to maintain.

B. Aggregate Exposure: B, Fine aggregate exposure with little or no medium aggregate at random locations.

C. Apply polished concrete finish system to cured and prepared slabs.

1. Machine grind floor surfaces to receive polished finishes level and smooth.
2. Apply penetrating liquid floor treatment for polished concrete in polishing sequence and according to manufacturer's written instructions, allowing recommended drying time between successive coats.
3. Apply penetrating stain for polished concrete in polishing sequence and according to manufacturer's written instructions.
4. Continue polishing with progressively finer-grit diamond polishing pads to gloss level, to match approved mockup.
5. Control and dispose of waste products produced by grinding and polishing operations.
6. Neutralize and clean polished floor surfaces.

3.1 PROTECTING

A. Protect installed product (Polished floors) from damage during construction

END OF SECTION 033543

042200 CONCRETE UNIT MASONRY
042613 MASONRY VENEER

MASONRY

division 4

SAA

SANDERS ASSOCIATES ARCHITECTS

SECTION 042200 - CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Concrete masonry units.
2. Steel reinforcing bars.

1.2 DEFINITIONS

A. CMU(s): Concrete masonry unit(s).

B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.3 SUBMITTALS

A. Material Certificates: For each type and size of product. For masonry units, include material test reports substantiating compliance with requirements.

B. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91/C 91M for air content.
2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

C. Shop Drawings: For reinforcing steel. Detail bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315. Show elevations of reinforced walls.

1.4 FIELD CONDITIONS

A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

PART 2 - PRODUCTS

2.1 UNIT MASONRY, GENERAL

A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6, except as modified by requirements in the Contract Documents.

B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work.

2.2 CONCRETE MASONRY UNITS

A. CMUs: ASTM C 90.

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength as indicated on the Structural Drawings.
2. Density Classification: Medium weight, unless otherwise indicated.

2.3 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150/C 150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

B. Hydrated Lime: ASTM C 207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

D. Aggregate for Mortar: ASTM C 144.

1. White-Mortar Aggregates: Natural white sand or crushed white stone.

2. For joints less than 1/4 inch (6 mm) thick, use aggregate graded with 100 percent passing the No. 16 (1.18-mm) sieve.

E. Aggregate for Grout: ASTM C 404.

F. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. BASF Corporation; Construction Systems.
b. Euclid Chemical Company (The); an RPM company.
c. Grace Construction Products; W.R. Grace & Co. -- Conn.

G. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with

H. Water: Potable.

2.4 REINFORCEMENT

A. Uncoated-Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60 (Grade 420).

2.5 EMBEDDED FLASHING MATERIALS

A. Flexible Flashing: Use **one of** the following unless otherwise indicated:
1. EPDM Flashing: Sheet flashing product made from ethylene-propylene-diene terpolymer, complying with ASTM D 4637/D 4637M, 0.040 inch (1.0 mm) thick.

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) Carlisle Coatings & Waterproofing Inc.
2) Firestone Specialty Products.
3) Heckmann Building Products, Inc.
4) Hohmann & Barnard, Inc.

B. Solder and Sealants for Sheet Metal Flashings: As specified in Section 076200 "Sheet Metal Flashing and Trim."

C. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.6 MISCELLANEOUS MASONRY ACCESSORIES

A. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D 226/D 226M, Type I (No. 15 asphalt felt).

2.7 MASONRY-CELL FILL

A. Loose-Fill Insulation: Perlite complying with ASTM C 549, Type II (surface treated for water repellency and limited moisture absorption) or Type IV (surface treated for water repellency and to limit dust generation).

B. Lightweight-Aggregate Fill: ASTM C 331/C 331M.

2.8 MASONRY CLEANERS

A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

2.9 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.
2. Use portland cement-lime mortar unless otherwise indicated.
3. For exterior masonry, use portland cement-lime mortar.
4. For reinforced masonry, use portland cement-lime mortar.
5. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated or needed to provide required compressive strength of masonry.

1. For masonry below grade or in contact with earth, use Type M.
2. For reinforced masonry, use Type S.
3. For mortar parge coats, use Type S

D. Grout for Unit Masonry: Comply with ASTM C 476.

1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.
2. Proportion grout in accordance with ASTM C 476, Table 1 or paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 2000 psi (14 MPa).
3. Provide grout with a slump of **8 to 11 inches (200 to 280 mm)** as measured according to ASTM C 143/C 143M.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

3.2 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch (12 mm) or minus 1/4 inch (6 mm).
2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch (12 mm).

3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch (6 mm) in a story height or 1/2 inch (12 mm) total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2-inch (12-mm) maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2-inch (12-mm) maximum.
3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2-inch (12-mm) maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2-inch (12-mm) maximum.
5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2-inch (12-mm) maximum.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm).
2. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch (9 mm) or minus 1/4 inch (6 mm).
3. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm).

3.3 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less-than-nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.

C. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

D. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

E. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.

F. Fill cores in hollow CMUs with grout 24 inches (600 mm) under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

3.4 MORTAR BEDDING AND JOINTING

A. Lay hollow CMUs as follows:

1. Bed face shells in mortar and make head joints of depth equal to bed joints.
2. Bed webs in mortar in all courses of piers, columns, and pilasters.
3. Bed webs in mortar in grouted masonry, including starting course on footings.
4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.

B. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

C. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

3.5 FLASHING

A. General: Install embedded flashing at ledges and other obstructions to downward flow of water in wall where indicated.

B. Install flashing as follows unless otherwise indicated:

1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
2. At lintels, extend flashing a minimum of 6 inches (150 mm) into masonry at each end. At heads and sills, extend flashing 6 inches (150 mm) at ends and turn up not less than 2 inches (50 mm) to form end dams.
3. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall, and adhere flexible flashing to top of metal drip edge.
4. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall, and adhere flexible flashing to top of metal flashing termination.

C. Install single-wythe CMU flashing system in bed joints of CMU walls where indicated to comply with manufacturer's written instructions. Install CMU cell pans with upturned edges located below face shells and webs of CMUs above and with weep spouts aligned with face of wall. Install CMU web covers so that they cover upturned edges of CMU cell pans at CMU webs and extend from face shell to face shell.

3.6 REINFORCED UNIT MASONRY INSTALLATION

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.

1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and that of other loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

1. Comply with requirements in TMS 602/ACI 530.1/ASCE 6 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
2. Limit height of vertical grout pours to not more than **60 inches** (1520 mm)

3.7 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.

B. Inspections: Special inspections according to Level **B** in TMS 402/ACI 530/ASCE 5.

1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
3. Place grout only after inspectors have verified proportions of site-prepared grout.

C. Testing Prior to Construction: One set of tests.

D. Testing Frequency: One set of tests for each 5000 sq. ft. (464 sq. m) of wall area or portion thereof.

E. Clay Masonry Unit Test: For each type of unit provided, according to ASTM C 67 for compressive strength.

F. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.

G. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.

H. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for mortar air content and compressive strength.

I. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.

3.8 PARGING

A. Parge exterior faces of below-grade masonry walls, where indicated, in two uniform coats to a total thickness of 3/4 inch (19 mm). Dampen wall before applying first coat, and scarify first coat to ensure full bond to subsequent coat.

B. Use a steel-trowel finish to produce a smooth, flat, dense surface with a maximum surface variation of 1/8 inch per foot (3 mm per 300 mm). Form a wash at top of parging and a cove at bottom.

C. Damp-cure parging for at least 24 hours and protect parging until cured.

3.9 REPAIRING, POINTING, AND CLEANING

A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

B. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes.
2. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.

3.10 MASONRY WASTE DISPOSAL

A. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.

1. Do not dispose of masonry waste as fill within 18 inches (450 mm) of finished grade.

B. Masonry Waste Recycling: Return broken CMUs not used as fill to manufacturer for recycling.

C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 042200

SECTION 042613 - MASONRY VENEER

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Clay face brick (**Full Bed**).
2. Clay face brick (**Thin Brick**).

B. Products Installed but Not Furnished under This Section:

1. Steel lintels in masonry veneer.
2. Steel shelf angles for supporting masonry veneer.

C. Related Sections:

1. Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples for Verification: For each type and color of brick and colored mortar.

C. Material Certificates: For each type and size of product.

1.3 QUALITY ASSURANCE

A. Mock-up Panels: Build sample panels to verify selections made under Sample submittals and to demonstrate aesthetic effects. Comply with requirements in Section 014000 "Quality Requirements" for mockups.

1. Mock-up panels for each type of exposed new unit masonry construction typical exterior wall in size approximately **48 inches (1200 mm) long by 48 inches (1200 mm) wide** that indicates brick patterns. (Mock-up indicated on drawings).

1.4 FIELD CONDITIONS

A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.

B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

PART 2 - PRODUCTS

2.1 UNIT MASONRY, GENERAL

A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6, except as modified by requirements in the Contract Documents.

B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects will be exposed in the completed Work.

2.2 BRICK

A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching finish and color of exposed faces of adjacent units:

1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
2. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.

B. Clay Face Brick: Facing brick complying with ASTM C 216 (void areas between 25 and 40 percent of gross cross-sectional area).

1. Interstate Brick Company, 9780 S. 5200 W., West Jordan UT
2. Grade SW
3. Type FBX or better
4. Initial Rate of Absorption: Less than 30 g/30 sq. in. (30 g/194 sq. cm) per minute when tested according to ASTM C 67.
5. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
6. M-1 Full Bed Brick: Size (Actual Dimensions): **Emperor 3-5/8 inches wide by 2-1/4 inches high by 15-5/8 inches long.**
7. M-2 Thin Brick: Size (Actual Dimensions): **Emperor 7/8 inches wide by 2-1/4 inches high by 15-5/8 inches long.**
8. Color: **Ironstone**

2.3 COMPOSITE MORTAR BED PANEL SYSTEM.

A. Brick Lath.

1. Manufacturer: Subject to compliance with requirements, provide products by the following:

    a. Speedymason, 300 Sherry Lynn Lane, Sparta, WI.

2. Full Bed Masonry Support Panels
    a. Flat Panels: 10.67-squarefoot masonry support panels for flat areas 96”x16” nominal, shall have support spacing as follows:
        1. 2-5/8 for modular, 2-1/4” high units.

3. Accessories:
    a. Stainless fasteners (8” O.C.)
    b. Corner Brackets (8” O.C) As per Manufacturer.

2.4 MORTAR MATERIALS

A. Portland Cement: ASTM C 150/C 150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

B. Mortar Mix: shall conform to ASTM C 270 Type N
1. Proportion Specification:
    a. 1 part Portland cement (ASTM C 150 Types I, II, III) less than 6 months old 1 part hydrated lime (ASTM C-207), type S, 6 parts sand (ASTM C-144)
2. Property Specification:
    a. Portland cement - lime mortar Compressive strength 750 psi Water retention 75% minimum Air content 14% maximum Sand: 2 ¼ -3 ½ the sum of the separate volumes of cementitious materials sand (ASTM C-144)

C. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C 979/C 979M. Use only pigments with a record of satisfactory performance in masonry mortar.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. **Davis Colors**

    b. **Spec Mix**

    c. **True Tone**

D. Aggregate for Mortar: ASTM C 144.

1. White-Mortar Aggregates: Natural white sand or crushed white stone.
2. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.
3. Color: **SM100 Gray (Spec Mix).**

E. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. BASF Corporation; Construction Systems.
    b. Euclid Chemical Company (The); an RPM company.
    c. Grace Construction Products; W.R. Grace & Co. -- Conn.

F. Water: Potable.

2.5 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Provide metal flashing complying with Section 076200 "Sheet Metal Flashing and Trim" and as follows:

1. Fabricate metal drip edges from stainless steel or Flex-Flash drip edge, (Hohmann & Barnard, Inc.). Extend at least 3 inches (76 mm) into wall and 1/2 inch (13 mm) out from wall, with outer edge bent down 30 degrees and hemmed. Provide with pre-formed drip plate outside and inside corners.

B. Flexible Flashing: Use the following unless otherwise indicated:

1. Elastomeric Thermoplastic Flashing: Composite flashing product consisting of a polyester-reinforced ethylene interpolymer alloy. Install with sealed termination bars.

    a. Hohmann & Bardnard Inc., Flex-Flash Flashing

2. Accessories: Provide preformed corners and end dams produced by flashing manufacturer.

C. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.6 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene urethane or PVC.

2.7 MASONRY CLEANERS

A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Diedrich Technologies, Inc.; a division of Sandell Construction Solutions.

b. EaCo Chem, Inc.
c. PROSOCO, Inc.

2.8 MORTAR MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.
2. Use portland cement-lime mortar unless otherwise indicated.
3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Use Type N unless another type is indicated.

D. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products.

1. Pigments shall not exceed 10 percent of portland cement by weight.
2. Pigments shall not exceed 5 percent of mortar cement by weight.
3. Application: Use pigmented mortar for exposed mortar joints.

E. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color.

1. Mix to match Architect's sample.
2. Application: Use colored aggregate mortar for exposed mortar joints.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

B. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.

C. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. (30 g/194 sq. cm) per minute when tested according to ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

3.2 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch (12 mm) or minus 1/4 inch (6 mm).
2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch (12 mm).
3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch (6 mm) in a story height or 1/2 inch (12 mm) total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2 inch (12 mm) maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.
3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2 inch (12 mm) maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.
5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2 inch (12 mm) maximum.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm).
2. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm). Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch (3 mm).

3.3 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less-than-nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.

C. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

3.4 MORTAR BEDDING AND JOINTING

A. Lay masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

B. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

3.5 ANCHORED MASONRY VENEERS

A. Anchor masonry veneers to wall framing and concrete and masonry backup with seismic masonry-veneer anchors to comply with the following requirements:

1. Fasten screw-attached and seismic anchors through sheathing to wall framing and to concrete and masonry backup with metal fasteners of type indicated. Use two fasteners unless anchor design only uses one fastener.
2. Embed connector sections and continuous wire in masonry joints.
3. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
4. Space anchors as indicated in the Structural Drawings

B. Provide not less than 1 inch (25 mm) of airspace between back of masonry veneer and face of insulation.

3.6 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

A. Anchor masonry to structural steel and concrete, where masonry abuts or faces structural steel or concrete to comply with the following:

1. Anchor masonry with anchors embedded in masonry joints and attached to structure.
2. Space anchors as indicated in Structural Drawings.

3.7 FLASHING, WEEP HOLES, AND VENTS

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated. Install vents at shelf angles, ledges, and other obstructions to upward flow of air in cavities, and where indicated.

B. Install flashing as follows unless otherwise indicated:

1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
2. At lintels and shelf angles, extend flashing a minimum of 6 inches (150 mm) into masonry at each end. At heads and sills, extend flashing 6 inches (150 mm) at ends and turn up not less than 2 inches (50 mm) to form end dams.
3. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall, and adhere flexible flashing to top of metal drip edge.
4. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall, and adhere flexible flashing to top of metal flashing termination.

C. Install weep holes in veneers in head joints of first course of masonry immediately above embedded flashing and at top of walls.

1. Use specified weep/vent products to form weep holes.
2. Space weep holes 24 inches (600 mm) o.c. unless otherwise indicated.

D. Place cavity drainage material in airspace behind veneers to comply with configuration requirements for cavity drainage material in "Miscellaneous Masonry Accessories" Article.

E. Install vents in head joints in exterior wythes at spacing indicated. Use specified weep/vent products to form vents.

1. Close cavities off vertically and horizontally with blocking in manner indicated. Install through-wall flashing and weep holes above horizontal blocking.

3.8 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.

B. Clay Masonry Unit Test: For each type of unit provided, according to ASTM C 67 for compressive strength.

C. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.

3.9 REPAIRING, POINTING, AND CLEANING

A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

B. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes.
2. Protect adjacent stone and nonmasonry surfaces from contact with cleaner.
3. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
4. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.

3.10 MASONRY WASTE DISPOSAL

A. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.

1. Do not dispose of masonry waste as fill within 18 inches (450 mm) of finished grade.

B. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 042613

051200 STRUCTURAL STEEL FRAMING
053100 STEEL DECKING
054000 COLD FORMED METAL FRAMING
055000 METAL FABRICATIONS

METALS

division 5

SANDERS ASSOCIATES ARCHITECTS

SECTION 051200 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Structural steel.
2. Grout.

B. Related Sections:

1. Section 016001 “Buy American Preference Requirements” for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 DEFINITIONS

A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show fabrication of structural-steel components.

C. Qualification Data: For Installer\ and fabricator.

D. Welding certificates.

E. Mill test reports for structural steel, including chemical and physical properties.

F. Source quality-control reports.

G. Field quality-control and special inspection reports.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD.

B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category CSE.

C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

D. Comply with applicable provisions of the following specifications and documents:

1. AISC 303.
2. AISC 360.
3. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

A. W-Shapes: as indicated Structural Drawings.

B. Channels, Angles: as indicated in Structural Drawings.

C. Plate and Bar: as indicated in Structural Drawings.

D. Cold-Formed Hollow Structural Sections: as indicated in Structural Drawings.

E. Steel Pipe: as indicated in Structural Drawings.

F. Welding Electrodes: Comply with AWS requirements.

2.2 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: as indicated in Structural Drawings.

B. Direct-Tension Indicators: as indicated in Structural drawings.

C. Shear Connectors: as indicated in Structural Drawings.

D. Unheaded Anchor Rods: as indicated in Structural Drawings.

1. Configuration: Straight.
2. Finish: Plain, except at exterior locations use Hot-dip zinc coating, ASTM A 153/A 153M, Class C.

E. Headed Anchor Rods: as indicated in Structural Drawings, straight.

1. Finish: Plain, except at exterior locations use Hot-dip zinc coating, ASTM A 153/A 153M, Class C.

F. Threaded Rods: as indicated in Structural Drawings.

1. Finish: Plain, exept at exterior locations, use Hot-dip zinc coating, ASTM A 153/A 153M, Class C.

G. Clevises and Turnbuckles: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1035.

2.3 PRIMER

A. Primer: Comply with Section 099113 "Exterior Painting," Section 099123 "Interior Painting," and Section 099600 "High-Performance Coatings."

2.4 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and non-staining, mixed with water to consistency suitable for application and a 30-minute working time.

2.5 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," and to AISC 360.

B. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

2.6 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: as indicated in Structural Drawings.

B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

2.7 SHOP PRIMING

A. Shop prime steel surfaces except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of **2 inches (50 mm).**
2. Surfaces to be field welded.
3. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
4. Galvanized surfaces.
5. Surfaces enclosed in interior construction.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:

1. SSPC-SP 2, "Hand Tool Cleaning."

2. SSPC-SP 3, "Power Tool Cleaning."

C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

2.8 SOURCE QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform shop tests and inspections.

1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.

B. Bolted Connections: Inspect and test shop-bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

C. Welded Connections: Visually inspect shop-welded connections according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:

1. Liquid Penetrant Inspection: ASTM E 165.
2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
3. Ultrasonic Inspection: ASTM E 164.
4. Radiographic Inspection: ASTM E 94.

D. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

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

3.2 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.

B. Baseplates, Bearing Plates and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.

1. Set plates for structural members on wedges, shims, or setting nuts as required.
2. Weld plate washers to top of baseplate.

3. Snug-tighten, unless indicated to be pretensioned, anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

C. Maintain erection tolerances of structural steel within AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

3.3 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: as indicated in Structural Drawings

B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
2. Remove backing bars or runoff tabs where indicated, back gouge, and grind steel smooth.
3. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," for mill material.

3.4 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:

1. Verify structural-steel materials and inspect steel frame joint details.
2. Verify weld materials and inspect welds.
3. Verify connection materials and inspect high-strength bolted connections.

B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

C. Bolted Connections: Inspect and test bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

D. Welded Connections: Visually inspect field welds according to AWS D1.1/D1.1M.

1. In addition to visual inspection, test and inspect field welds according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:

a. Liquid Penetrant Inspection: ASTM E 165.
b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
c. Ultrasonic Inspection: ASTM E 164.

d. Radiographic Inspection: ASTM E 94.

END OF SECTION 051200

SECTION 053100 - STEEL DECKING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Roof deck.
2. Composite floor deck.
3. Noncomposite form deck.

B. Related Sections:

1. Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 SUBMITTALS

A. Product Data: For each type of deck, accessory, and product indicated.

B. Shop Drawings:

1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

C. Welding certificates.

D. Product Certificates: For each type of steel deck.

E. Evaluation reports.

F. Field quality-control reports.

1.3 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

2.2 ROOF DECK

A. Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following:

1. Galvanized and Shop-Primed Steel Sheet: ASTM A 653/653M, Structural Steel (SS), Grade 50 (340), G60 (Z180) zinc coating; cleaned, pretreated, and primed with manufacturer's standard gray baked on, rust-inhibitive primer.

    a. Location as indicated in Structural Drawings.

2. Deck Profile: As indicated in Structural Drawings.
3. Profile Depth: As indicated in Structural Drawings.
4. Design Uncoated-Steel Thickness: As indicated in Structural Drawings.

2.3 COMPOSITE FLOOR DECK

A. Composite Floor Deck: Fabricate panels, with integrally embossed or raised pattern ribs and interlocking side laps, to comply with "SDI Specifications and Commentary for Composite Steel Floor Deck," in SDI Publication No. 31, with the minimum section properties indicated, and with the following:

1. Prime-Painted Steel Sheet: ASTM A 1008/A 1008M, Structural Steel (SS), Grade 50 (340) minimum, with top surface phosphatized and unpainted and underside surface shop primed with manufacturers' standard gray baked-on, rust-inhibitive primer.

2. Galvanized and Shop-Primed Steel Sheet: ASTM A 653/653M, Structural Steel (SS), Grade 50 (340), G60 (Z180) zinc coating; with unpainted top surface and cleaned, pretreated bottom surface primed with manufacturer's standard gray baked on, rust-inhibitive primer.

    a. Color: Manufacturer's standard

    b. Location as indicated in Structural Drawings.

3. Profile Depth: As indicated in Structural Drawings.
4. Design Uncoated-Steel Thickness: As indicated in Structural Drawings.

2.4 NONCOMPOSITE FORM DECK

A. Noncomposite Form Deck: Fabricate ribbed-steel sheet noncomposite form-deck panels to comply with "SDI Specifications and Commentary for Noncomposite Steel Form Deck," in SDI Publication No. 31, with the minimum section properties indicated, and with the following:

1. Prime-Painted Steel Sheet: ASTM A 1008/A 1008M, Structural Steel (SS), with underside surface shop primed with manufacturer's standard baked-on, rust-inhibitive primer.

    a. Color**:** Gray.

2. Profile Depth: As indicated.

3. Design Uncoated-Steel Thickness: As indicated per deck profile.

2.5 ACCESSORIES

A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.

B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.

C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 (4.8-mm) minimum diameter.

D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.

E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi (230 MPa), not less than 0.0359-inch (0.91-mm) design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.

F. Flat Sump Plates: Single-piece steel sheet, 0.0747 inch (1.90 mm) thick, of same material and finish as deck. For drains, cut holes in the field.

G. Galvanizing Repair Paint: ASTM A 780/A 780M or SSPC-Paint 20 or MIL-P-21035B, with dry film containing a minimum of 94 percent zinc dust by weight.

H. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 31, manufacturer's written instructions, and requirements in this Section.

B. Place deck panels flat and square and fasten to supporting frame without warp or deflection.

C. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.

D. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.

E. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

F. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

G. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and weld or mechanically fasten flanges to top of deck. Space welds or mechanical fasteners not more than 12 inches (305 mm) apart with at least one weld or fastener at each corner.

1. Install reinforcing channels or zees in ribs to span between supports and weld.

H. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld or mechanically fasten to substrate to provide a complete deck installation.

1. Weld cover plates at changes in direction of roof-deck panels unless otherwise indicated.

I. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations unless otherwise indicated.

J. Floor-Deck Closures: Weld steel sheet column closures, cell closures, and Z-closures to deck, according to SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of deck.

3.2 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Field welds will be subject to inspection.

C. Prepare test and inspection reports.

3.3 PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780/A 780M and manufacturer's written instructions.

B. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on prime-painted deck immediately after installation, and apply repair paint.

END OF SECTION 053100

SECTION 054000 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Exterior non-load-bearing wall framing.
2. Interior non-load-bearing wall framing exceeding height limitations of standard, nonstructural metal framing.

B. Related Sections:

1. Section 016001 “Buy American Preference Requirements” for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 SUBMITTALS

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

B. Qualification data.

C. Welding certificates.

D. Product test reports.

E. Research/evaluation reports.

1.3 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

B. Product Tests: Mill certificates or data from a qualified independent testing agency.

C. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

D. Comply with AISI S230 "Standard for Cold-Formed Steel Framing - Prescriptive Method

PART 2 - PRODUCTS

2.1 MATERIALS

2.2 PERFORMANCE REQUIREMENTS

A. Cold-Formed Steel Framing Standards: Unless more stringent requirements are indicated, framing shall comply with AISI S100, AISI S200, and the following:

1. Wall Studs: AISI S211.
2. Headers: AISI S212.
3. Lateral Design: AISI S213.

B. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

2.3 COLD-FORMED STEEL FRAMING MATERIALS

A. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating designation as follows:

1. Grade: **As required by structural performance**.
2. Coating: G60 (Z180)

B. Steel Sheet for Vertical Deflection or Drift Clips: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:

1. Grade: **Class 1, As required by structural performance**.
2. Coating: G60 (Z180)

2.4 EXTERIOR NON-LOAD-BEARING WALL FRAMING

A. Steel Studs: Steel Stud Manufacturer's Association (SSMA) standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: As indicated in Structural Drawings.
2. Flange Width: As indicated in Structural Drawings.
3. Section Properties: As per SSMA minimum standard section properties for cold-formed metal framing designations shown on Structural Drawings.

B. Steel Track: SSMA standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and matching minimum base-metal thickness of steel studs.

C. Vertical Deflection Clips: Manufacturer's standard bypass and head clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.

D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure.

E. Double Deflection Tracks: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.

F. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure through positive mechanical attachment to stud web and structure.

2.5 INTERIOR NON-LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: as indicated in architectural drawings.
2. Flange Width: min. 1-5/8 inches (41 mm)
3. Section Properties: as indicated in architectural drawings.

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and matching minimum base-metal thickness of steel studs.

C. Vertical Deflection Clips: Manufacturer's standard clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.

D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure.

E. Double Deflection Tracks: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.

F. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure through positive mechanical attachment to stud web and structure.

2.6 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated steel sheet, of same grade and coating designation used for framing members.

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated.

2.7 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.

B. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel hex-headed bolts, carbon-steel nuts, and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C.

C. Post-Installed Anchors: Fastener systems with bolts of same basic metal as fastened metal, if visible, unless otherwise indicated; with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on approved ICC report as appropriate for the substrate.

1. Uses: Securing cold-formed steel framing to structure.
2. Type: Torque-controlled expansion anchor or adhesive anchor.
3. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, unless otherwise indicated.
4. Material for Exterior or Interior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 (A1) or Group 2 (A4) stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M).

D. Power-Actuated Anchors: Fastener systems with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

E. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.

1. Head Type: Low-profile head beneath sheathing; manufacturer's standard elsewhere.

2.8 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: SSPC-Paint 20 or ASTM A 780/A.

B. Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.

C. Shims: Load bearing, high-density multimonomer plastic, nonleaching.

D. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch (6.4 mm) thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

PART 3 - EXECUTION

3.1 PREPARATION

A. Install load bearing shims or grout between the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations to ensure a uniform bearing surface on supporting concrete or masonry construction.

B. Install sealer gaskets to isolate the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations.

3.2 INSTALLATION, GENERAL

A. Install cold-formed metal framing according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions" and to manufacturer's written instructions unless more stringent requirements are indicated.

B. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened.

C. Install framing members in one-piece lengths.

D. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

E. Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both sides of joints.

F. Install insulation, specified in Section 072100 "Thermal Insulation," in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.

G. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.

H. Erection Tolerances: Install cold-formed metal framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:

1. Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.3 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION

A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure.

B. Fasten both flanges of studs to **top and** bottom track unless otherwise indicated. Space studs as follows:

1. Stud Spacing: As indicated on Structural Drawings.

C. Set studs plumb, except as needed for diagonal bracing or required for non-plumb walls or warped surfaces and similar requirements.

D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.

1. Install single deep-leg deflection tracks and anchor to building structure.
2. Install double deep-leg deflection tracks and anchor outer track to building structure.
3. Connect vertical deflection clips to bypassing and infill studs and anchor to building structure as indicated.

4. Connect drift clips to cold-formed steel framing and anchor to building structure.

E. Install horizontal bridging in wall studs, spaced vertically in rows indicated but not more than 48 inches (1220 mm) apart. Fasten at each stud intersection.

1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
2. Strap Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
3. Bar Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

F. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches **(305 mm)** of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.

1. Install solid blocking at 96-inch (2440-mm) centers.

G. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.4 JOIST INSTALLATION

A. Install perimeter joist track sized to match joists. Align and securely anchor or fasten track to supporting structure at corners, ends, and spacings indicated on Shop Drawings.

B. Install joists bearing on supporting frame, level, straight, and plumb; adjust to final position, brace, and reinforce. Fasten joists to both flanges of joist track.

1. Install joists over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm).
2. Reinforce ends and bearing points of joists with web stiffeners, end clips, joist hangers, steel clip angles, or steel-stud sections as indicated on Shop Drawings.

C. Space joists not more than 2 inches (51 mm) from abutting walls, and as follows:

1. Joist Spacing: As shown on plans.

D. Frame openings with built-up joist headers consisting of joist and joist track, nesting joists, or another combination of connected joists if indicated.

E. Install joist reinforcement at interior supports with single, short length of joist section located directly over interior support, with lapped joists of equal length to joist reinforcement, or as indicated.

1. Install web stiffeners to transfer axial loads of walls above.

F. Install bridging at intervals indicated. Fasten bridging at each joist intersection as follows:

1. Bridging: Joist-track solid blocking of width and thickness indicated, secured to joist webs.

2. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and joist-track solid blocking of width and thickness indicated. Fasten flat straps to bottom flange of joists and secure solid blocking to joist webs.

G. Secure joists to load-bearing interior walls to prevent lateral movement of bottom flange.

H. Install miscellaneous joist framing and connections, including web stiffeners, closure pieces, clip angles, continuous angles, hold-down angles, anchors, and fasteners, to provide a complete and stable joist-framing assembly.

3.5 INTERIOR NON-LOAD-BEARING WALL INSTALLATION

A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure.

B. Fasten both flanges of studs to **top and** bottom track unless otherwise indicated. Space studs as follows:

1. Stud Spacing: **As indicated on Drawings**.

C. Set studs plumb, except as needed for diagonal bracing or required for non-plumb walls or warped surfaces and similar requirements.

D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.

1. Install single deep-leg deflection tracks and anchor to building structure.
2. Install double deep-leg deflection tracks and anchor outer track to building structure.
3. Connect vertical deflection clips to studs and anchor to building structure.
4. Connect drift clips to cold-formed steel metal framing and anchor to building structure.

E. Install horizontal bridging in wall studs, spaced vertically in rows indicated but not more than 48 inches (1220 mm) apart. Fasten at each stud intersection.

1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
2. Strap Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
3. Bar Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

F. Top Bridging for Single Deflection Track: Install row of horizontal bridging within **18 inches (450 mm)** of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.

1. Install solid blocking at 96-inch (2440-mm) centers

G. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.6 ERECTION TOLERANCES

A. Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:

1. Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.7 FIELD QUALITY CONTROL

A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Field and shop welds will be subject to testing and inspecting.

C. Testing agency will report test results promptly and in writing to Contractor and Architect.

D. Remove and replace work where test results indicate that it does not comply with specified requirements.

E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.8 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensure that cold-formed metal framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 054000

SECTION 055000 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Metal Ladders
   2. Metal bollards.

B. Related Sections:

   1. Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 ACTION SUBMITTALS

A. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

2.2 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 Pipe: ASTM A 53/A 53M, Standard Weight (Schedule 40) unless otherwise indicated.

2.3 FASTENERS

A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.

B. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.

   1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, unless otherwise indicated.
   2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M).

2.4 MISCELLANEOUS MATERIALS

A. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

B. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

C. Concrete: Comply with requirements in Section 033000 "Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 3000 psi (20 MPa).

2.5 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Use connections that maintain structural value of joined pieces.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges. Remove sharp or rough areas on exposed surfaces.

C. 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.

D. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Locate joints where least conspicuous.

E. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

2.6 METAL LADDERS

A. General:

1. Comply with ANSI A14.3

B. Steel Ladders:

1. Space siderails 18 inches (457 mm) apart unless otherwise indicated.
2. Siderails: Continuous, 1/2-by-2-1/2-inch (12.7-by-64-mm) steel flat bars, with eased edges.
3. Rungs: 3/4-inch- (19-mm-) diameter steel bars.
4. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.
5. Provide nonslip surfaces on top of each rung.
6. Prime ladders, including brackets and fasteners, with primer specified in Section 9

2.7 METAL BOLLARDS

A. Fabricate metal bollards from Schedule 40 steel pipe1/4-inch (6.4-mm) wall-thickness steel shapes, as indicated.

1. Cap bollards with 1/4-inch- (6.4-mm-) thick steel plate.

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.

C. Prime bollards with zinc-rich primer.

2.8 FINISHES, GENERAL

A. Finish metal fabrications after assembly.

2.9 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.

B. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

1. Shop prime with universal shop primer unless zinc-rich primer is indicated.

C. Preparation for Shop Priming: Prepare surfaces to comply with requirements indicated below:

1. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
2. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
3. Items Indicated to Receive Primers Specified in Section 099600 "High-Performance Coatings": SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
4. Other Items: SSPC-SP 3, "Power Tool Cleaning."

D. 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.

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.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

3.2 INSTALLING METAL BOLLARDS

A. Fill metal-capped bollards solidly with concrete and allow concrete to cure seven days before installing.

B. Anchor bollards to existing construction with expansion anchors. Provide four 3/4-inch (19-mm) bolts at each bollard unless otherwise indicated.

3.3 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780/A 780M.

END OF SECTION 055000

061000 ROUGH CARPENTRY
061050 MISCELLANEOUS CARPENTRY
061600 SHEATHING
061601 GYPSUM PANEL SHEATHING
062023 INTERIOR FINISH CARPENTRY
064023 INTERIOR ARCHITECTURAL WOODWORK

WOODS, PLASTICS, & COMPOSITES

division 6

SAA
SANDERS ASSOCIATES ARCHITECTS

SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Framing with dimension lumber.
2. Framing with engineered wood products.
3. Shear wall panels.
4. Rooftop equipment bases and support curbs.
5. Wood blocking, cants, and nailers.
6. Wood furring and grounds.
7. Wood sleepers.
8. Plywood backing panels.

B. Related Sections:

1. **Section 016001 “Buy American Preference Requirements” for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.**

2. Division 061600 “Panel Sheathing.”

1.2 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product.

B. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.

C. Evaluation Reports: For the following, from ICC-ES:

1. Wood-preservative-treated wood.
2. Fire-retardant-treated wood.
3. Engineered wood products.
4. Shear panels.
5. Power-driven fasteners.
6. Post-installed anchors.
7. Metal framing anchors.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: 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. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency.
3. Dress lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content of Lumber: 19 percent unless otherwise indicated.

C. Engineered Wood Products: Acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.

1. Allowable design stresses, as published by manufacturer, shall meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.

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 cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
4. Wood framing members that are less than 18 inches (460 mm) above the ground in crawlspaces or unexcavated areas.
5. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 FIRE-RETARDANT-TREATED MATERIALS

A. General: Where fire-retardant-treated materials are indicated, materials shall 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 according to ASTM E 84, 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. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
2. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 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.

D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.

E. Application: Treat items indicated on Drawings, and the following:

1. Plywood backing panels.

2.4 DIMENSION LUMBER FRAMING

A. Non-Load-Bearing Interior Partitions: Construction or No. 2 grade.

1. Application: Interior partitions not indicated as load bearing.
2. Species:

    a. Hem-fir (north); NLGA
    b. Spruce pine fir; NLFA
    c. Hem-fir; WCLIB, or WWPA.
    d. Spruce pine fir (south); NeLMA, WCLIB, or WWPA
    e. Northern species; NLGA.
    f. Western woods; WCLIB or WWPA.

B. Framing Other Than Non-Load-Bearing Partitions: No. 2 grade.

1. Application: Framing other than interior partitions not indicated as load bearing.
2. Species:

    a. Hem-fir (north); NLGA.
    b. Douglas fir-larch; WCLIB or WWPA.
    c. Douglas fir-south; WWPA.
    d. Hem-fir; WCLIB or WWPA.
    e. Douglas fir-larch (north); NLGA.

C. Exposed Framing: Hand-select material for uniformity of appearance and freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot-holes, shake, splits, torn grain, and wane.

1. Species and Grade: As indicated above for load-bearing construction of same type.

2.5 ENGINEERED WOOD PRODUCTS

A. Laminated-Veneer Lumber: Structural composite lumber made from wood veneers with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D 5456 and manufactured with an exterior-type adhesive complying with ASTM D 2559.

1. Extreme Fiber Stress in Bending, Edgewise: 2600 psi (17.9 MPa) for 12-inch nominal-(286-mm actual-) depth members.
2. Modulus of Elasticity, Edgewise: 2,000,000 psi (13 700 MPa).

2.6 SHEAR WALL PANELS

A. Wood-Framed Shear Wall Panels: Prefabricated assembly consisting of wood perimeter framing, tie downs, and Exposure I, Structural I plywood or OSB sheathing.

B. Steel-Framed Shear Wall Panels: Prefabricated assembly consisting of cold-formed galvanized-steel panel, steel top and bottom plates, and wood studs.

C. Allowable design loads, as published by manufacturer, shall meet or exceed those of basis-of-design products. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.7 MISCELLANEOUS LUMBER

A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

1. Blocking.
2. Nailers.
3. Rooftop equipment bases and support curbs.
4. Cants.
5. Furring.
6. Grounds.

B. Dimension Lumber Items: Construction or No. 2 grade lumber of any species.

C. Concealed Boards: 15 percent maximum moisture content and any of the following species and grades:

1. Mixed southern pine or southern pine; No.2 grade; SPIB.
2. Eastern softwoods; No. 2 Common grade; NeLMA.
3. Northern species; No. 2 Common grade; NLGA.
4. Western woods; Construction or No. 2 Common grade; WCLIB or WWPA.

2.8 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.

2.9 FASTENERS

A. General: Fasteners shall be of size and type indicated and shall 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 with hot-dip zinc coating complying with ASTM A 153/A 153M] [of Type 304 stainless steel.

B. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

C. 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.

2.10 METAL FRAMING ANCHORS

A. Allowable design loads, as published by manufacturer, shall meet or exceed those of basis-of-design products. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency. Framing anchors shall be punched for fasteners adequate to withstand same loads as framing anchors.

B. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 (Z180) coating designation.

1. Use for interior locations unless otherwise indicated.

C. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A 653/A 653M; structural steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 (Z550) coating designation; and not less than 0.036 inch (0.9 mm) thick.

1. Use for wood-preservative-treated lumber and where indicated.

2.11 MISCELLANEOUS MATERIALS

A. Sill-Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch (6.4 mm) thick, selected from manufacturer's standard widths to suit width of sill members indicated.

B. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch (0.6 mm).

C. Adhesives for Gluing Furring and Sleepers to Concrete or Masonry: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.

1. Adhesives shall have a VOC content of 70 g/L or less when calculated according tp 40CFR 59, Subpar D (EPA Method 24).

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

B. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.

C. Set rough carpentry 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 Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.

D. Install shear wall panels to comply with manufacturer's written instructions.

E. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

F. Do not splice structural members between supports unless otherwise indicated.

G. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

H. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

I. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code (IBC).
2. ICC-ES evaluation report for fastener.

3.2 PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes [wet] wet enough that moisture content exceeds that specified, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061000

SECTION 061050 - MISCELLANEOUS CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Wood furring, grounds, nailers, and blocking.
2. F.R. Plywood panels for mounting IT equipment.
3. Provide solid wood blocking at the following locations including, but not limited to:
   a. Parapet caps.
   b. Other wall mounted fixtures.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Section 016001 “Buy American Preference Requirements” for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

2. Division 9 Section "Non-Load Bearing Steel Framing” for metal strap blocking.

1.2 DELIVERY, STORAGE, AND HANDLING

A. Keep materials under cover and dry. Protect from weather and contact with damp or wet surfaces. Stack lumber, plywood, and other panels. Provide for air circulation around stacks and under temporary coverings.

1. For lumber and plywood pressure treated with waterborne chemicals, place spacers between each bundle to provide air circulation.

PART 2 - PRODUCTS

2.1 LUMBER, GENERAL

A. Lumber Standards: Comply with DOC PS 20, “American Softwood Lumber Standard,” and with applicable grading rules of inspection agencies certified by American Lumber Standards Committee’s (ALSC) Board of Review.

B. Inspection Agencies: Inspection agencies, and the abbreviations used to reference them, include the following:

1. NELMA- Northeastern Lumber Manufacturers Association.
2. RIS- Redwood Inspection Service.
3. SPIB- Southern Pine Inspection Bureau.
4. WCLIB- West Coast Lumber Inspection Bureau.
5. WWPA- Western Wood Products Association.

C. Grade Stamps: Provide lumber with each piece factory marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.

1. For exposed lumber, furnish pieces with grade stamps applied to ends or back of each piece.

D. Nominal Sizes: 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 lumber.

1. Provide dressed lumber, S4S, unless otherwise indicated.
2. Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal (38-mm actual) thickness or less, unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

A. General: Where lumber or plywood is indicated as preservative treated or is specified to be treated, comply with applicable requirements of AWPA C2 (lumber) and AWPA C9 (plywood). Mark each treated item with the Quality Mark Requirements of an inspection agency approved by ALSC's Board of Review.

1. Do not use chemicals containing chromium or arsenic.
2. For exposed items indicated to receive a stained finish, use chemical formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.

B. Pressure treat aboveground items with waterbourne preservatives to a minimum retention of 0.25 lb/cu. ft. (4.0 kg/cu. m.). After treatment, kiln-dry lumber and plywood to a maximum moisture content of 19 and 15 percent, respectively. Treat indicated items and the following:

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.

C. Pressure treat wood members in contact with ground or freshwater with waterbourne preservatives to a minimum retention of 0.40 lb/cu. ft. (6.4 kg/cu. m).

2.3 FIRE-RETARDANT TREATMENT BY PRESSURE PROCESS

A. General: Where fire-retardant-treated wood is indicated, pressure impregnate lumber and plywood with fire-retardant chemicals to comply with AWPA C20 and C27, respectively, for treatment type indicated; identify "fire-retardant-treated wood" with appropriate classification marking of Underwriters Laboratories, Inc., U.S. Testing, Timber Products Inspection, Inc. or other testing and inspecting agency acceptable to authorities having jurisdiction.

1. Current Evaluation/Research Reports: Provide fire-retardant-treated wood for which a current model code evaluation/research report exists that is acceptable to authorities having jurisdiction and that evidences compliance of fire-retardant-treated wood for application indicated.

B. Interior Type A: For interior locations use fire-retardant chemical formulation that produces treated lumber and plywood with the following properties under conditions present after installation:

1. No reduction takes place in bending strength, stiffness, and fastener holding capacities below values published by manufacturer of chemical formulation that are based on tests by a qualified independent testing laboratory of treated wood products identical to those indicated for the Project under elevated temperature and humidity conditions simulating installed conditions.
2. No other form of degradation occurs due to acid hydrolysis or other causes related to manufacture and treatment.
3. No corrosion of metal fasteners results from their contact with treated wood.

C. Exterior Type: Use for exterior locations and where indicated.

D. Inspection: Inspect each piece of treated lumber or plywood after drying and discard damaged or defective pieces.

E. Products: Subject to compliance with requirements, provide one of the following:

1. Interior Type A Fire-Retardant-Treated Wood:
   a. "Dricon" Hickson Corporation.
   b. "Pyro-Guard" Hoover Treated Wood Products.
   c. "FlameProof LHC-HTT" Osmose Wood Preserving Co, Inc.
2. Exterior Type Fire-Retardant-Treated Wood:
   "Exterior Fire-X" Hoover Treated Wood Products.

2.4 DIMENSION LUMBER

A. General: Provide dimension lumber of grades indicated according to the ALSC National Grading Rule (NGR) provisions of the inspection agency indicated.

1. Grade: Standard, Stud or No. 3.
2. Species: Hem-fir; WCLIB or WWPA.

2.5 MISCELLANEOUS LUMBER

A. General: Provide lumber for support or attachment of other construction, including the rooftop equipment curbs and support bases, cant strips, bucks, nailers, blocking, furring, grounds, stripping, and similar members.

B. Fabricate miscellaneous lumber from dimension lumber of sizes indicated and into shapes shown.

C. Moisture Content: 19 percent maximum for lumber items are not specified to receive wood preservative treatment.

D. Grade: For dimension lumber sizes, provide No. 3 or Standard grade lumber per ALSC's NGRs of any species. For board-size lumber, provide No. 3 Common grade per NELMA, NLGA, or WWPA; No. 2 grade per SPIB; or Standard grade per NLGA, WCLIB or WWPA of any species.

2.6 PLYWOOD BACKING PANELS

A. For mounting electrical or telephone equipment, provide fire-retardant-treated plywood panels with grade, C-D Plugged Exposure 1, in thickness indicated or, if not otherwise indicated, not less than 15/32 inch (11.9 mm) thick.

2.7 MISCELLANEOUS INTERIOR TRIM

A. Hardwood Lumber Trim:

1. Species and Grade: Rift Cut White Oak
2. Maximum Moisture Content: 9 percent.
3. Finger Jointing: Not allowed.

2.8 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.

1. Where miscellaneous carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with hot-dip zinc coating per ASTM A 153 or of Type 304 stainless steel.

B. Nails, Wire, Brads, and Staples: FS FF-N-105.

C. Power-Driven Fasteners: CABO NER-272.

D. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.

2.9 METAL FRAMING ANCHORS

A. General: Provide galvanized steel framing anchors of structural capacity, type, and size indicated and as follows:

1. Research or Evaluation Reports: Provide products for which model code research or evaluation reports exist that are acceptable to authorities having jurisdiction and that evidence compliance of metal framing anchors for application indicated with building code in effect for Project.
2. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis, and demonstrated by comprehensive testing performed by a qualified independent tasting agency.

B. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653, G60 (ASTM A 653M, Z180) coating designation; structural, commercial, or lock-forming quality, as standard with manufacturer for type of anchor indicated.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Discard units of material with defects that impair quality of carpentry and that are too small to use with minimum number of joints or optimum joint arrangement.

B. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted.

C. Fit carpentry to other construction; scribe and cope as needed for accurate fit. Correlate location of furring, nailers, blocking, grounds**,** and similar supports to allow attachment of other construction.

D. Apply field treatment complying with AWPA M4 to cut surfaces of preservative-treated lumber and plywood.

E. Securely attach carpentry work as indicated and according to applicable codes and recognized standards.

F. Countersink nail heads on exposed carpentry work and fill holes with wood filler.

G. Use fasteners of appropriate type and length. Predrill members when necessary to avoid splitting wood.

3.2 WOOD GROUNDS, NAILERS, BLOCKING AND SLEEPERS

A. Install where shown and where required for scredding or attaching other work. Cut and shape to required size. Coordinate locations with other work involved.

B. Attach to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated.

3.3 WOOD FURRING INSTALLATION

A. Install plumb and level with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.

3.4 INSTALLATION OF STRUCTURAL-USE PANELS

A. General: Comply with applicable recommendations contained in APA Form No. E30, “APA Design/Construction Guide: Residential & Commercial,” for types of structural-use panels and applications indicated.

1. Comply with “Code Plus” provisions of above-referenced guide.

END OF SECTION 061053

SECTION 061600 - SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wall sheathing.
2. Roof sheathing.
3. Parapet sheathing.

B. Related Sections:

1. **Section 016001 “Buy American Preference Requirements” for special product requirements. All equipment and materials must comply with 49 U.S.C. Section**
2. Section 061000 “Rough Carpentry,” for fire rated plywood backer panels.
3. Section 061601 “Gypsum Panel Sheathing” for glass-mat gypsum sheathing for wall applications.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product.

PART 2 - PRODUCTS

2.1 WALL SHEATHING

A. Plywood Sheathing: Either DOC PS 1 or DOC PS 2, Exterior, Structural I sheathing.

B. Oriented-Strand-Board Sheathing: DOC PS 2, Exposure 1, Structural I sheathing.

2.2 ROOF SHEATHING

A. Plywood Sheathing: Either DOC PS 1 or DOC PS 2, Exterior, Structural I sheathing.

B. Oriented-Strand-Board Sheathing: DOC PS 2, Exposure 1, Structural I sheathing.

2.3 PARAPET SHEATHING

A. Plywood Sheathing: Either DOC PS 1 or DOC PS 2, Exterior, Structural I sheathing.

B. Oriented-Strand-Board Sheathing: DOC PS 2, Exposure 1, Structural I sheathing.

2.4 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
   1. For roof, parapet and wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

2.5 MISCELLANEOUS MATERIALS

A. Adhesives for Field Gluing Panels to Wood Framing: Formulation complying with ASTM D 3498 that is approved for use with type of construction panel indicated by manufacturers of both adhesives and panels.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.

C. Securely attach to substrate by fastening as indicated, complying with the following:
   1. Table 2304.9.1, "Fastening Schedule," in the ICC's International Building Code.
   2. ICC-ES evaluation report for fastener.

D. Coordinate wall, parapet and roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

3.2 WOOD STRUCTURAL PANEL INSTALLATION

A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.

B. Fastening Methods: Fasten panels as indicated below:

   1. Wall and Roof Sheathing:
      a. Nail to wood framing. Apply a continuous bead of glue to framing members at edges of wall sheathing panels.
      b. Screw to cold-formed metal framing.
      c. Space panels 1/8 inch (3 mm) apart at edges and ends.

END OF SECTION 061600

SECTION 061601 – GYPSUM PANEL SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Glass-mat gypsum sheathing board for wall applications.

B. Related Sections include the following:

1. Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

2. Division 6 Section "Rough Carpentry" for blocking.
3. Division 7 Section for Air Barrier applied to face of sheathing.
4. Division 7 Section "Sheet Metal Flashing and Trim for flashing installed with gypsum sheathing.
5. Division 7 Section "Joint Sealants for sealants applied with gypsum sheathing.
6. Division 9 Section "Gypsum Board Assemblies" for steel framing, interior gypsum, exterior soffits and panels incorporated into assemblies with gypsum sheathing on the exterior.

1.2 DEFINITIONS

A. Gypsum Board Construction Terminology Standard: Refer to ASTM C 11 for definitions of terms for gypsum sheathing board construction not defined in this Section or in other referenced standards.

1.3 SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product.

1.4 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: For assembles with fire-resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

1. Fire-Resistance Ratings: Indicated by design designations from **UL's "Fire Resistance** Directory."

B. Sheathing Performance: Must allow for installation of Air Barrier without adversely affecting warranty.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store materials protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, or other causes. Stack sheathing flat on leveled supports off the ground, under cover, and fully protected from weather.

1.6 COORDINATION

A. Glass-Mat Gypsum Sheathing Board:

1. Do not leave exposed to weather for more than 180 days.

PART 2 - PRODUCTS

2.1 GYPSUM SHEATHING

A. Glass-Mat Gypsum Sheathing Board: ASTM C 1177/C 1177M.

1. Product: Subject to compliance with requirements, provide one of the following:

a. "Dens-Glass Gold" by G-P Gypsum Corporation.
b. “GlasRoc” Gypsum Sheathing by Certainteed

2. Type and Thickness: Type X, 5/8 inch (15.9 mm) thick.
3. Size: 48 by 96 inches (1219 by 2438 mm) for vertical installation.

2.2 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

A. Silicone Emulsion Sealant: ASTM C 834, compatible with sheathing tape and sheathing, recommended by tape and sheathing manufacturers for use with glass-fiber sheathing tape and for covering exposed fasteners.

1. Glass-Fiber Sheathing Tape: Self-adhering glass-fiber tape, minimum 2 inches (50 mm) wide, 10 by 10 or 10 by 20 threads/inch (390 by 390 or 390 by 780 threads/m), of type recommended by sheathing and tape manufacturers for use with silicone emulsion sealant in sealing joints in glass-mat gypsum sheathing board and with a history of successful in-service use.

2.3 MISCELLANEOUS MATERIALS

A. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, rubberized- asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than **0.025 inch (0.6 mm)**.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

a. Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.

b. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Vycor V40 Weather Barrier Strips.
c. MFM Building Products Corp.; Window Wrap.
d. Polyguard Products, Inc.; Polyguard 300.
e. Protecto Wrap Company; BT-20 XL.

B. Primer for Flexible Flashing: Product recommended by manufacturer of flexible flashing for substrate.

C. Fasteners: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing board to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.

D. For steel framing from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick, attach sheathing with drill screws complying with ASTM C 954.

PART 3 - EXECUTION

3.1 GYPSUM SHEATHING INSTALLATION

A. Comply with GA-253 and manufacturer's written instructions.

B. Cut boards at penetrations, edges, and other obstructions of work; fit tightly against abutting construction, unless otherwise indicated.

1. Install boards with a 3/8-inch (9-mm) setback where non-load-bearing construction abuts structural elements.
2. Install boards with a 1/4-inch (6.4-mm) setback where they abut masonry or similar materials that might retain moisture, to prevent wicking.

C. Coordinate sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed exterior wall assembly.

D. Apply fasteners so screw heads bear tightly against face of sheathing boards but do not cut into facing.

E. Do not bridge building expansion joints with sheathing; cut and space edges to match spacing of structural support elements.

F. Horizontal Installation: Install sheathing with V-grooved edge down and tongue edge up. Interlock tongue with groove to bring long edges in contact with edges of adjacent boards without forcing. Abut ends of boards over centers of stud flanges, and stagger end joints of adjacent boards not less than one stud spacing. Screw-attach boards at perimeter and within field of board to each steel stud.

1. Space fasteners approximately 8 inches (200 mm) o.c. and set back a minimum of 3/8 inch (9 mm) from edges and ends of boards.

3.2 SHEATHING JOINT-AND-PENETRATION TREATMENT

A. Seal sheathing joints according to sheathing manufacturer's written instructions.

1. Apply elastomeric sealant to joints and fasteners and trowel flat. Apply sufficient amount of sealant to completely cover joints and fasteners after troweling. Seal other penetrations and openings.

END OF SECTION 061600

SECTION 062023 - INTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

1. **Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.**

B. Section Includes:

1. Interior Wood Panel.

PART 2 - PRODUCTS

2.1 INTERIOR WOOD PANEL

A. Interior Wood Panel #1:

1. Manufacturer: **Terramai**
   a. Contact Information:
      1) 8400 Agate Rd, White City OR 97503; (541)-326-4971; terramai.com
2. Product: **3D Stick Modular Panel**
   a. 21" x 96" Modular Panel
   b. 1 ¼" Panel Thickness
3. Species: **Doug Fir**
4. Finish: **Faux Sugi Ban**
5. Total Panel Weight: 40 pounds.
6. Installation Method: Adhesive with nailing per manufacturer's written instructions.
7. Outside Corners: Mitered by manufacturer

B. Interior Wood Panel #2:

1. Manufacturer: **Terramai**
   a. Contact Information:
      1) 8400 Agate Rd, White City OR 97503; (541)-326-4971; terramai.com
2. Product: **Plank Modular Panel**
   a. 20" to 22.8" x 8' Modular Panel
   b. ¾" to 1-1/8" Panel Thickness
3. Species: **MC White Oak 5" VG**
4. Finish: **Zero-VOC Clear Oil**
5. Installation Method: Adhesive with nailing per manufacturer's written instructions.
6. Outside Corners: Mitered by manufacturer

2.2 MISCELLANEOUS MATERIALS

A. Low-Emitting Materials: Adhesives shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

B. Glue: A one-part Silyl Modified Polymer glue recommended by manufacturer for Terramai panel installation.
   1. Manufacturer: **Bostik**
   2. Product: **Climb**
   3. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
   4. Adhesives shall have a VOC content of 30 g/L or less.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installing interior finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours.

3.2 INSTALLATION, GENERAL

A. Install interior finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.

   1. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
   2. Where face fastening is unavoidable, countersink fasteners, fill surface flush, and sand unless otherwise indicated.
   3. Install to tolerance of 1/8 inch in 96 inches (3 mm in 2438 mm) for level and plumb. Install adjoining interior finish carpentry with 1/32-inch (0.8-mm) maximum offset for flush installation and 1/16-inch (1.5-mm) maximum offset for reveal installation.
   4. Install panels according to manufacturer’s written instructions.

END OF SECTION 062023

SECTION 064023 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Plastic-laminate cabinets.
2. Quartz countertops.
3. Solid Surface window sills.

B. Related Sections:

1. Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

C. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips unless concealed within other construction before woodwork installation.

1.2 SUBMITTALS

A. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

B. Samples:

1. Plastic-laminates, Wood veneer, Quartz, Upholstery, and Solid Surface, for each type, color, pattern, and surface finish.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed architectural woodwork similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Fabricator Qualifications: A firm experienced in producing architectural woodwork similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Source Limitations: Engage a qualified woodworking firm to assume undivided responsibility for production and installation of interior architectural woodwork

D. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork, construction, finishes, and other requirements.

1. Provide AWI Quality Certification Program certificate indicating that woodwork complies with requirements of grades specified.

E. Fire-Test-Response Characteristics: Where fire-retardant materials or products are indicated, provide materials and products with specified fire-test-response characteristics as determined by testing identical products per test method indicated by UL, ITS, or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify with appropriate markings of applicable testing and inspecting agency in the form of separable paper label or, where required by authorities having jurisdiction, imprint on surfaces of materials that will be concealed from view after installation.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver woodwork until painting and similar operations that could damage woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
   1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed and indicate measurements on Shop Drawings.
   2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.6 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide materials that comply with requirements of the AWI quality standard for each type of woodwork and quality grade indicated.

B. Wood Products: Comply with the following:
   1. Hardboard: AHA A135.4.
   2. Medium-Density Fiberboard: ANSI A208.2, Grade MD-Exterior Glue.
   3. Particleboard: ANSI A208.1, Grade M-2-Exterior Glue.
   4. Softwood Plywood: DOC PS 1, Medium Density Overlay – required for all countertops

5. Hardwood Plywood and Face Veneers: HPVA HP-1.

C. Thermoset Decorative Overlay: Particleboard complying with ANSI A208.1, Grade M-2, or medium-density fiberboard complying with ANSI A208.2, Grade MD, with surface of thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1.

D. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated, or if not indicated, as required by woodwork quality standard.
1. See finish schedule for Laminates.

E. MDF: ANSI A208.2, Grade **130, made with binder containing no urea-formaldehyde resin**

F. Particleboard: ANSI A208.1, Grade **M-2 made with binder containing no urea-formaldehyde resin**.

G. Adhesive for Bonding Plastic Laminate: contact cement.

H. Association Standard: The National Building Granite Quarries Association's (NBGQA) "Specifications for Architectural Granite."

G. **Quartz Surface Countertops & Tabletops:** Homogeneous solid sheets of quartz aggregate and resin complying with ISSFA-2.
1. **See finish schedule for manufacturers.**

I. Solid Surface Window sill:
1. ASTM E84 Fire Test Results Flamespread Index: (20) Class A R
2. **See finish schedule for manufacturer.**

2.2 FIRE-RETADANT-TREATED MATERIALS

A. Lumber: Comply with performance requirements in AWPA C20, I**nterior Type A**. Kiln dry after treatment to a maximum moisture content of 19 percent.

B. Plywood: Comply with performance requirements in AWPA C27, **Interior Type A**. Kiln dry after treatment to a maximum moisture content of 15 percent.

C. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not contain colorants and provide materials that do not have marks from spacer sticks on the exposed face.

D. Do not use material that does not comply with requirements for untreated material or is warped or discolored.

E. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.
1. For exposed lumber indicated to receive a stained or natural finish, **mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency**.
2. For exposed plywood indicated to receive a stained or natural finish, mark back of each piece.

F. Application **All interior electrical room plywood.**

2.3 INSTALLATION MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content.

B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

2.4 FABRICATION, GENERAL

A. Interior Woodwork Grade: Provide Premium grade interior woodwork complying with the referenced quality standard.

B. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.

C. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:
1. Corners of Cabinets and Edges of Solid-Wood (Lumber) Members 3/4 Inch (19 mm) Thick or Less: 1/16 inch (1.5 mm).
2. Edges of Rails and Similar Members More Than 3/4 Inch (19 mm) Thick: 1/8 inch (3 mm).
3. Corners of Cabinets and Edges of Solid-Wood (Lumber) Members and Rails: 1/16 inch (1.5 mm).

D. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible, before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
1. Notify Architect seven days in advance of the dates and times woodwork fabrication will be complete.
2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements indicated on Shop Drawings before disassembling for shipment.

E. Shop cut openings, to maximum extent possible, to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
1. Seal edges of openings in countertops with a coat of varnish.

2.5 PLASTIC-LAMINATE CABINETS

A. Quality Standard: Comply with AWS Section 10 requirements for laminate cabinets.

B. AWI Type of Cabinet Construction: Flush overlay, unless otherwise shown.

C. Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate complying with the following requirements:

1. Horizontal Surfaces Other Than Tops: HGS.
2. Post-formed Surfaces: HGP.
3. Vertical Surfaces: HGS.
4. Edges: HGS

D. Materials for Semi-exposed Surfaces: Provide surface materials indicated below:
1. Surfaces Other Than Drawer Bodies: Thermoset decorative overlay.
2. Drawer Sides and Backs: Thermoset decorative overlay.
3. Drawer Bottoms: Thermoset decorative overlay.

E. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
1. See finish schedule.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas. Examine shop-fabricated work for completion and complete work as required, including removal of packing and back-priming.

B. Install woodwork level, plumb, true, and straight to a tolerance of 1/8 inch in 96 inches. Shim as required with concealed shims.

C. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

D. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation.

E. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop. Calk space between backsplash and wall with sealant specified in Division 07 Section "Joint Sealants."

3.2 ADJUSTING AND CLEANING

A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

B. Clean, lubricate, and adjust hardware. Clean woodwork on exposed and semi-exposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

C. Door Operation: Rehang or replace doors that do not swing or operate freely.

3.3 HARDWARE SCHEDULE

1. **Hinges**: Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 170 degrees of opening.

2. **Drawer Slides**: Side-mounted, full extension, zinc plated steel drawer slides with steel ball bearings, BHMA A156.9, B05091, and rated for the following:
    a. **File drawer slides: 150 lbf (670N)**

3. **Pulls:**
    a. Product: Subject to compliance with requirements, Liberty Hardware, **Stratford Bar Pull, model number: P28921C-SS-C -** height 5.7", width .63 inches, height 1.38"

4. **Door Locks:** BHMA A156.11, E07121

5. **Catches:** Magnetic catches, BHMA A156.9, B03141

6. **Grommets:** 2-1/2", molded-plastic grommets and matching plastic caps with slot for wire passage.

    a. Product: Subject to compliance with requirements, provide **EDP3 "OG series"** by Doug Mockett and Co., Inc.

7. **Adjustable Shelf Standards & Supports**: BHMA A156.9, B04071; with shelf rests.

    a. Product: Subject to compliance with requirements, provide **KV 83/183 heavy-duty series. Load capacity up to 460 lb. per pair single slot.**

8. **Screw**: Reed and Prince square drive screws. Standard wood screws and sheet metal screws are not acceptable.

END OF SECTION 064023

THERMAL & MOISTURE PROTECTION

division 7

072100 BUILDING INSULATION
072413 POLYMER-BASED EXTERIOR INSULATION AND FINISH SYSTEM
072726 FLUID-APPLIED MEMBRANE AIR BARRIERS
074213 COMPOSITE METAL WALL SYSTEMS
075423 POLYVINYL-CHLORIDE (PVC) ROOFING
076200 SHEET METAL FLASHING AND TRIM
077100 ROOF SPECIALTIES
078400 THROUGH-PENETRATION FIRESTOP SYSTEMS
079100 PREFORMED JOINT SEALS
079200 JOINT SEALANTS
079513.13 INTERIOR EXPANSION JOINT COVER ASSEMBLIES

SAA
SANDERS ASSOCIATES ARCHITECTS

SECTION 072100 - BUILDING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Concealed building insulation (batt form).
2. Continuous insulation for exterior walls.
3. Foundation wall insulation.
4. Spray-applied polyurethane foam insulation.
5. Vapor Retarders.

B. Related Sections: The following sections contain requirements that relate to this section:

1. Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

2. Division 7 Section "firestopping" for safing insulation as part of firestopping systems.
3. Division 7 Section for "Fluid-Applied Air Barriers" over gypsum sheathing.
4. Division 7 roofing section for roof insulation specified as part of roofing construction.
5. Division 9 Section for "Gypsum Board Assemblies" for sound attenuation insulation installed as part of metal-framed wall partition assemblies.

1.2 SUBMITTALS

A. Product Data: For each type of product.

B. Product test reports.

1.3 QUALITY ASSURANCE

A. Fire Performance Characteristics: Provide insulation materials identical to those whose indicated fire performance characteristics have been determined per the ASTM test method indicated below, by UL or other testing and inspecting organizations acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing and inspecting organization.

1. Surface Burning Characteristic: ASTM E 84.
2. Fire Resistance Ratings: ASTM E 119.
3. Combustion Characteristics: ASTM E 136.

B. Single-Source Responsibility for Insulation Products: Obtain each type of building insulation from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's recommendations for handling, storage, and protection during installation.

B. Protect plastic insulation as follows:
1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
2. Protect against ignition at all times. Do not deliver plastic insulating materials to project site ahead of installation time.
3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide insulation products of one of the following:
1. Extruded Polystyrene Board Insulation:
   a. Amoco Foam Products Company.
   b. Dow Chem Co.
   c. UC Industries Inc.; Owens-Corning Co.

2. Glass-Fiber Insulation:
   a. CertainTeed Corp.
   b. Knauf Fiber Glass GmbH.
   c. Manville: Building Insulations Div., Manville Sales Corp.
   d. Owens/Corning Fiberglas Corp.

3. Spray-applied Polyurethane Insulation:
   a. BASF Corporation.
   b. Bay Systems North America, LLC.
   c. Dow Chemical Company.
   d. ER Systems, Inc.
   e. Gaco Western Inc.
   f. Henry Company.
   g. NCFI; Division of Barnhardt Mfg. Co.
   h. SWD Urethane Company.
   i. Volatile Free, Inc.

2.2 INSULATING MATERIALS

A. General: Provide insulating materials that comply with requirements and with referenced standards.

B. **Mineral Fiber Blanket/Batt Insulation:** ASTM C 665, type indicated below; consisting of fibers manufactured from glass.

1. Type II (blankets with nonreflective membrane covering), Category 1 (membrane is a vapor retarder), Class A (membrane-faced surface with a flame-spread index of 25 or less).
2. Vapor-Retarder Facing: ASTM C 1136, with permeance not greater than 0.02 perm (1.15 ng/Pa x s x sq. m) when tested according to ASTM E 96, Desiccant Method.
3. Composition: White polypropylene film facing and fiberglass-polyester blend fabric backing.
4. Retainer Strips: 0.019-inch- (0.5-mm-) thick, formed, galvanized steel or PVC retainer clips colored to match insulation facing.

C. **Extruded Polystyrene Board Insulation:** Extruded Polystyrene Board Insulation (Perimeter insulation below grade): Rigid, cellular polystyrene thermal insulation formed from polystyrene base resin by an extrusion process using hydrochlorofluorocarbons as blowing agent to comply with ASTM C 578 for type and with other requirements indicated below:
1. Type IV, 1.60-lb/cu. ft. (26-kg/cu. m) minimum density, unless otherwise indicated.
2. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indices of 75 and 450, respectively.
3. Recycled Content: Not less than 50 percent blend of post-consumer and recovered polystyrene resins.
4. Thickness: 2 inches minimum.

D. **Spray polyurethane foam insulation:** For infill applications where voids have limited access, provide **Closed-Cell Polyurethane Foam Insulation:** ASTM C 1029, Type II, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84

2.3 AUXILIARY INSULATING MATERIALS

A. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation or mechanical anchors securely to substrates indicated without damaging or corroding either insulation, anchors, or substrates.

2.4 INSULATION FASTNERS

A. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of thickness indicated securely in position indicated with self-locking washer in place; and complying with the following requirements:
1. Available Products:
   a. AGM Industries, Inc.; Series T TACTOO Insul-Hangers.
   b. Eckel Industries of Canada; Stic-Klip Type N Fasteners.
   c. Gemco; Spindle Type.
2. Plate: Perforated galvanized carbon-steel sheet, 0.030 inch (0.762 mm) thick by 2 inches (50 mm) square.
3. Spindle: Copper-coated, low carbon steel; fully annealed; 0.105 inch (2.67 mm) in diameter; length to suit depth of insulation indicated.

B. Insulation-Retaining Washer: Self-locking washers formed from 0.016-inch- (0.41-mm-) thick galvanized steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 1-1/2 inches (38 mm) square or in diameter.
1. Available Products:
   a. AGM Industires, Inc.; RC 150.
   b. Gemco; Dome-Cap.

2. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permant retention of cap.

2.5 VAPOR RETARDERS

A. Foil-Polyester-Film: 2 layers of 0.5-mil (0.013-mm-) thick polyester film laminated to an inner layer of 1-mil- (0.025-mm-) thick aluminum foil, with maximum water-vapor transmission rate in flat condition of 0.0 g/h x sq. m and with maximum flame-spread and smoke- developed indexes of 5.
   1. Product: Subject to compliance with requirements, provide “Zero Perm” by Alumiseal Corporation.

B. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.

C. Vapor-Retarder Fasteners: Pancake-head, self-tapping seal drill screws; with fender washers.

D. Single-Component Nonsag Urethane Sealant: ASTM C 920, Type I, Grade NS, Class 25, Use NT related to exposure, and Use O related to vapor-barrier-related substrates.

E. Adhesive for Vapor Retarders: Product recommended by vapor-retarder manufacturer and with demonstrated capability to bond vapor retarders securely to substrates indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions with Installer present, for compliance with requirements of the Sections in which substrates and related work are specified and to determine if other conditions affecting performance of insulation are satisfactory. Do not proceed with installation of insulation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of substances harmful to insulations or vapor retarders, including removal of projections that might puncture vapor retarders.

3.3 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and applications. If printed instructions are not available or do not apply to protect conditions, consult manufacturer’s technical representative for specific recommendations before proceeding with installation of insulation.

B. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

C. Apply single layer of insulation of required thickness, unless otherwise shown or required to make up total thickness.

3.4 INSTALLATION OF GENERAL BUILDING INSULATION

A. Apply insulation units to substrate by method indicated, complying with manufacturer's recommendations. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

B. Set Vapor Retarder faced units with vapor retarder to warm side of construction, except as otherwise indicated. Do not obstruct ventilation spaces, except for firestopping.

1. Tape joints and ruptures in vapor tarder, and seal each continuous area of insulation to surrounding construction to ensure airtight installation.

3.5 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

B. Glass-Fiber or Mineral-Wool Blanket Insulation: Install in cavities formed by framing members according to the following requirements:

1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
3. Maintain 3-inch (76-mm) clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
4. Install eave ventilation troughs between roof framing members in insulated attic spaces at vented eaves.
5. For metal-framed wall cavities where cavity heights exceed 96 inches (2438 mm), support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.

6. Vapor-Retarder-Faced Blankets: Tape joints and ruptures in vapor-retarder facings, and seal each continuous area of insulation to ensure airtight installation.

    a. Exterior Walls: Set units with facing placed toward **interior of construction**.
    b. Interior Walls: Set units with facing placed **toward areas of high humidity**.

C. Loose Fill Insulation: Apply according to ASTM C 1015 and manufacturer's written instructions. Level horizontal applications to uniform thickness as indicated, lightly settle to uniform density, but do not compact excessively.

D. Spray-Applied Insulation: Apply spray-applied insulation according to manufacturer's written instructions. Do not apply insulation until installation of pipes, ducts, conduits, wiring, and electrical outlets in walls is completed and windows, electrical boxes, and other items not indicated to receive insulation are masked. After insulation is applied, make flush with face of studs by using method recommended by insulation manufacturer.

E. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:

1. Loose Fill Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft. (40 kg/cu. m).
2. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

3.6 INSTALLATION OF PERIMETER AND UNDERSLAB INSULATION

A. On vertical Surfaces, set units in adhesive applied in accordance with manufacturer's instructions. Use type of adhesive recommended by manufacturer of insulation.

B. On Horizontal Surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

C. Protect top surface of horizontal insulation from damage during concrete work by applying protection course with joints butted.

3.7 INSTALLATION OF SHEATHING INSULATION

A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions.

3.8 PROTECTION

A. General: Protect installed insulation and vapor retarders from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation will be subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

3.9 INSTALLATION OF VAPOR RETARDERS

A. General: Extend vapor retarder to extremities of areas to be protected from vapor transmission. Secure in place with adhesives or other anchorage system as indicated. Extend vapor retarder to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.

B. Seal vertical joints in vapor retarders over framing by lapping not less than two wall studs. Fasten vapor retarders to wood framing at top, end, and bottom edges; at perimeter of wall openings; and at lap joints. Space fasteners 16 inches (400 mm) o.c.

C. Before installing vapor retarder, apply urethane sealant to flanges of metal framing including runner tracks, metal studs, and framing around door and window openings, Seal overlapping joints in vapor retarders with vapor-retarder tape according to vapor-retarder manufacturer’s written instructions. Seal butt joints with vapor-retarder tape. Locate all joints over framing members or other solid substrates.

D. Seal joints caused by pipes, conduits, electrical boxes, and similar itiems penetrating vapor retarders with vapor-retarder tape to creat and airtight seal between penetrating objects and vapor retarder.

1. Repair tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarder.

END OF SECTION 072100

SECTION 072413 - POLYMER-BASED EXTERIOR INSULATION AND FINISH SYSTEM (EIFS)

PART 1 - GENERAL

A. Related Requirements:

1. Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 SUMMARY

A. Section Includes:

1. EIFS-clad barrier-wall assemblies that are field applied over substrate.

1.3 ACTION SUBMITTALS

A. Product Data: For each EIFS component, trim, and accessory.

B. Samples: **For each exposed product and for each color and texture specified.**

1.4 INFORMATIONAL SUBMITTALS

A. Manufacturer certificates.

B. Product certificates.

C. Product test reports.

D. Evaluation Reports: For EIFS, including insulation fasteners, flexible membrane flashing, from ICC-ES.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An installer certified in writing by EIFS manufacturer as qualified to install manufacturer's system using trained workers.

B. **Mockups**: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, to set quality standards for materials and execution, and to set quality standards for fabrication and installation.

1. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Dryvit Systems, Inc. (Outsulation System, Class PB, Data DS447, Application DS204, Installation Details DS107)

B. Source Limitations: Obtain EIFS from single source from single EIFS manufacturer and from sources approved by EIFS manufacturer as tested and compatible with EIFS components.

2.2 PERFORMANCE REQUIREMENTS

A. EIFS Performance: Comply with ASTM E 2568 and ICC-ES AC219 and with the following:

1. Weathertightness: Resistant to water penetration from exterior.
2. Impact Performance: ASTM E 2568, Standard impact resistance unless otherwise noted.
3. Bond Integrity: Free from bond failure within EIFS components or between EIFS and substrates, resulting from exposure to fire, wind loads, weather, or other in-service conditions.

2.3 EIFS MATERIALS

A. Primer/Sealer (E2): EIFS manufacturer's standard substrate conditioner designed to protect substrates from moisture penetration and to improve the bond between substrate and insulation adhesive with VOC content of 250 g/L or less.

B. Flexible-Membrane Flashing: Cold-applied, self-adhering, self-healing, rubberized-asphalt and polyethylene-film composite sheet or tape and primer; EIFS manufacturer's standard or product recommended in writing by EIFS manufacturer.

C. Insulation Adhesive: EIFS manufacturer's standard formulation designed for indicated use; compatible with substrate with VOC content of 50 g/L or less.

D. Molded, (Expanded) Rigid Cellular Polystyrene Board Insulation (EPS): Comply with ASTM C 578, Type I.

E. Reinforcing Mesh: Balanced, alkali-resistant, open-weave, glass-fiber mesh treated for compatibility with other EIFS materials, made from continuous multiend strands with retained mesh tensile strength of not less than 120 lbf/in. (21 dN/cm) according to ASTM E 2098.

F. Base-Coat Materials: EIFS manufacturer's standard mixture.

G. Air/Water-Resistive Barrier: **See specification section 072726 for applied water & air barrier**

H. Waterproof Adhesive/Base-Coat Materials: EIFS manufacturer's standard waterproof formulation with VOC content of 50 g/L or less.

I. Primer: EIFS manufacturer's standard factory-mixed, elastomeric-polymer primer for preparing base-coat surface for application of finish coat.

J. Finish-Coat Materials: EIFS manufacturer's standard acrylic-based coating.

1. Color:
   a. Match Sherwin Williams Ellie Gray 7650 (verify color matches existing building)
2. Finish:
   a. Finish #1 (E2): Sandblast

K. Trim Accessories: Type as designated or required to suit conditions indicated and to comply with EIFS manufacturer's written instructions; manufactured from UV-stabilized PVC; and complying with ASTM D 1784 and ASTM C 1063.

PART 3 - EXECUTION

3.1 EIFS INSTALLATION

A. Comply with ASTM C 1397, ASTM E 2511, and EIFS manufacturer's written instructions for installation of EIFS as applicable to each type of substrate.

B. Primer/Sealer: Apply over gypsum & plywood sheathing substrates and where required by EIFS manufacturer for improving adhesion of insulation to substrate.

C. Flexible-Membrane Flashing: Apply and lap to shed water; seal at openings, penetrations, terminations, and where required by EIFS manufacturer. Prime substrates if required and install flashing to comply with EIFS manufacturer's written instructions and details.

D. Trim: Apply trim accessories at perimeter of EIFS, at expansion joints, and elsewhere as indicated. Coordinate with installation of insulation.

E. Board Insulation: Adhesively attach insulation to substrate.

1. Coordinate installation of flashing and insulation to produce wall assembly that does not allow water to penetrate behind flashing and EIFS lamina.

F. Expansion Joints: Install at locations indicated and where required by EIFS manufacturer.

G. Waterproof Adhesive/Base Coat: To exposed surfaces of insulation, apply in minimum thickness recommended in writing by EIFS manufacturer.

H. Base Coat: Apply to exposed surfaces of insulation in minimum thickness recommended in writing by EIFS manufacturer, but not less than [1/16-inch (1.6-mm)] dry-coat thickness.

I. Reinforcing Mesh: Embed reinforcing mesh in wet base coat to produce wrinkle-free installation with mesh continuous at corners, overlapped not less than 2-1/2 inches (64 mm) or otherwise treated at joints to comply with ASTM C 1397 and EIFS manufacturer's written instructions. Do not lap reinforcing mesh within 8 inches (200 mm) of corners. Completely embed mesh, applying additional base-coat material if necessary, so reinforcing-mesh color and pattern are invisible.

J. Double-Layer Reinforcing-Mesh Application: Where indicated or required, apply second base coat and second layer of reinforcing mesh, overlapped not less than 2-1/2 inches (64 mm) or otherwise treated at joints to comply with ASTM C 1397 and EIFS manufacturer's written instructions in same manner as first application. Do not apply until first base coat has cured.

K. Additional Reinforcing Mesh: Apply strip reinforcing mesh around openings, extending 4 inches (100 mm) beyond perimeter. Apply additional 9-by-12-inch (230-by-300-mm) strip reinforcing mesh diagonally at corners of openings (re-entrant corners). Apply 8-inch- (200-mm-) wide, strip reinforcing mesh at both inside and outside corners unless base layer of mesh is lapped not less than 4 inches (100 mm) on each side of corners.

L. Foam Build-Outs: Fully embed reinforcing mesh in base coat.

M. Double Base-Coat Application: Where indicated, apply second base coat in same manner and thickness as first application, except without reinforcing mesh. Do not apply until first base coat has cured.

N. Finish Coat: Apply over dry primed base coat, maintaining a wet edge at all times for uniform appearance, in thickness required by EIFS manufacturer to produce a uniform finish of color and texture matching approved sample and free of cold joints, shadow lines, and texture variations.

END OF SECTION 072413

SECTION 072726 - FLUID-APPLIED MEMBRANE AIR BARRIERS

PART 1 GENERAL

A. Related Requirements:

1. Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.01 SECTION INCLUDES

A. A 40 mil thickness fluid-applied vapor-permeable membrane of synthetic polymer, fire retardant composition for use as an air and water resistive barrier in exterior walls.

B. Monolithic, fully-adhered membrane and accessory products installed as a continuous air and water resistive barrier assembly over substrates of the Project's opaque walls as indicated on Drawings

C. Air and water resistive barrier assembly providing air and water tight coverage over these conditions
1. Joints between building materials such as sheathing joints, mortar joints and dissimilar materials.
2. Joints around windows, curtain walls, louvers, door frames and other service openings
3. Junctions between walls and floors, between walls at building corners and between walls, roofs and ceilings.
4. Mechanical and electrical penetrations
5. Structural penetrations for canopies, decks, walkways and similar horizontal projections or junctions to the exterior walls
6. Fastener and hardware penetrations used to attach insulation, cladding, trim or other overburden
7. Termination at footing, roof deck and existing construction
8. Junction to air & water barrier in roof, below grade or other adjacent systems

D. Air and water resistive barrier assembly providing air and water tight coverage while accommodating designed movement at expansion and control joints.

E. Air and water resistive barrier assembly performing as a liquid water drainage plane flashed to discharge to the exterior any incidental condensation or water penetration

1.02 RELATED SECTIONS

A. Section 3 - Cast-In-Place Concrete

B. Section 4 - Unit Masonry

C. Section 7 - Thermal Insulation

D. Section 7 - Sheet Metal Flashing and Trim: Metal through-wall flashings

E. Section 7 - Joint Protection: Joint sealant materials and installation.

F. Section 8 - Metal Door Frames

G. Section 8 - Storefronts

H. Section 9 - Gypsum Sheathing: Gypsum sheathing over metal studs.

1.03 REFERENCES

A. American Association of Textile Chemists and Colorists (AATCC) Test Method 127. “Water Resistance – Hydrostatic Pressure Test”

B. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Standard 90.1-2010 “Energy Standard for Buildings Except Low-Rise Residential Buildings”

C. ASTM C 920 Standard Specification for Elastomeric Joint Sealants

D. ASTM C 1305 Standard Test Method for Crack Bridging Ability of Liquid-Applied Waterproofing Membrane

E. ASTM C 1522 Standard Test Method for Extensibility after Heat Aging of Cold, Liquid-Applied Elastomeric Waterproofing Membrane

F. ASTM D 1970 Standard Specification for Self-Adhering Polymer Modifed Bituminous Sheet Materials Used as Steep slope roofing Underlayment for Ice Dam Protection.

G. ASTM D 4541 Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers

H. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials

I. ASTM E 96 Standard Test Methods for Water Vapor Transmission of Materials.

J. ASTM E 783 Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors

K. ASTM E 1105 Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform or Cyclic Static Air Pressure Difference

L. ASTM E 1354 Standard Test Method for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter

M. ASTM E 2178 Standard Test Method for Air Permeance of Building Materials

N. ASTM E 2357 Standard Test Method for Determining Air Leakage of Air Barrier Assemblies

O. Canadian General Standards Board (CGSB) 71-GP-24M Standard for: Adhesive, Flexible, for Bonding Cellular Polystyrene Insulation

P. International Code Council Evaluation Services (ICC-ES) Acceptance Criteria for Water Resistive Coatings used as Water Resistive Barriers over Exterior Sheathing AC-212, Approved February 2015

Q. National Fire Protection Association (NFPA) 285 Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components

1.04 PERFORMANCE REQUIREMENTS

A. Installed product and accessories shall exhibit an air leakage rate, infiltration and exfiltration modes, measured after pressure cycling, not to exceed 0.2 L/s*m^2 at 75 Pa [0.040 CFM/ft^2 at 1.57 PSF] according to ASTM E 2357.

B. Product shall meet the water vapor transmission requirement water resistive coatings used as water resistive barriers: minimum 35 g/m^2/24h (5 Perms), tested to ASTM E 96 water method (B), ICC-ES AC-212, Section 4.4

C. For Type I, II, III and IV construction: Installed product and accessories shall be tested to NFPA 285 and pass in wall assemblies of the Project or shall pass by engineering judgement.

D. Installed product and accessories shall be recommended by manufacturer for at least 180 days of outdoor exposure.

E. Installed product and accessories shall have an upper service temperature limit of 180°F or higher.

F. Manufacturer shall provide product and accessories which have a minimum installation temperature of 25°F or lower.

G. Product shall be of fire-retardant, non-asphalt synthetic polymer composition.

H. Product shall be minimum 0.040 inch (40 mils) dry thickness membrane. Dry membrane thickness shall be calculated based on field-measured wet mil thickness using a comb gauge and volume % solids of the product. [Example 66% solids membrane applied at minimum 60 wet mils yields a minimum 40 mil thickness membrane].

I. Product shall meet the following requirements:

REQUIREMENT	RESULT	TEST METHOD
Air Permeance – on Porous Substrate	Not more than 0.02 L/s*m^2 at 75 Pa (0.004 CFM/ft^2 at 1.57 PSF)	ASTM E-2178, mod sprayed on CMU
Air Permeance – Free Film	Not more than 0.02 L/s*m^2 at 75 Pa (0.004 CFM/ft^2 at 1.57 PSF)	ASTM E-2178
Low Temperature Flexibility	No cracking at minus 20 degrees F, 180 degree bend over 1 inch mandrel	ASTM D 1970
Low-Temperature Crack Bridging	No cracking after 10 cycles at minus 15 deg F	ASTM C 1305, mod 40 mil membrane thickness
Long-Term Aging/ Flexibility	No cracking or tearing after aging	ASTM C 1522, mod 40 mil membrane thickness OR CGSB 71-GP-24M
Fastener Sealability	No water leaking through nail penetration after 24 h.	ASTM D 1970
Water Resistance	Product spray-applied to CMU and gypsum sheathing with joint shall resist a 55 cm (22 inch) column of water for 5 hours, no leaking or wet through.	AATCC-127 - mod, static head generated with 5”diameter PVC pipe sealed to specimen
Pull Adhesion	Not less than 16 lb_f per square inch (or report value at substrate failure) on glass-faced gypsum sheathing and concrete masonry unit (CMU)	ASTM D 4541, modified 4 inch wood puck
Water Vapor Permeance	Not less than 5 Perms	ASTM E-96, Water Method (B)
Surface Burning Characteristics.	Flame Spread Index: Not more than 25 Smoke Generation Index: Not more than 450	ASTM E 84, sample tested at full coverage, 40 mil dry film, cement board substrate
Measurement of Heat Release Rate by Cone Calorimeter	Effective Heat of Combustion: Not more than 12.3 MJ/kg Total Heat Released: not more than 14.7 MJ/m^2 Peak Heat Release: Not more than 167 kW/m^2	ASTM E 1354, horizontal orientation, 50 kW/m^2 heat flux

1.05 SUBMITTALS

A. Provide submittals in accordance with Section 013300

B. Shop drawings showing locations and extent of air barrier and details of all typical conditions.

C. Vertical and lateral fire propagation evaluation of the Project's exterior wall assemblies containing the product, submit documentation of one of the following:
   1. NFPA 285 test and pass
   2. NFPA 285 pass through engineering judgement
   3. Exemption from the NFPA 285 requirement.

D. Manufacturer's technical data sheets and safety data sheets for product and accessories.

E. Manufacturer's installation instructions.

F. Certification of compatibility by manufacturer, listing all materials on the project with which the product and accessories may come into contact.

G. Free film sample of product at representative cured thickness, minimum 2 inch by 3 inch size.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: Shall be experienced in applying the same or similar materials and shall be specifically approved in writing by Manufacturer.

B. Single-Source Responsibility: Obtain product and accessories from single manufacturer.

C. Product and Accessories shall comply with all state and local regulations controlling use of volatile organic compounds (VOCs).

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to Project site in original packages with seals unbroken, labeled with manufacturer's name, product, lot number and directions for storage.

B. Store materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by manufacturer.

C. During cold weather, protect product in containers and spray equipment from freezing. Maintain product temperature within acceptable range for spray application, as required by air barrier manufacturer.

1.08 WASTE MANAGEMENT AND DISPOSAL

A. Place materials defined as hazardous or toxic waste in designated containers.

B. Ensure emptied containers are stored safely for disposal away from children.

1.09 PROJECT CONDITIONS

A. Do not apply product or accessories during rain or accumulating snowfall.

B. Apply product and accessories within approved ambient and substrate temperature range stated in manufacturer's literature.

C. Do not apply product or accessories over incompatible materials.

D. Observe safety and environmental measures indicated in manufacturer's SDS, and mandated by federal, state and local regulations.

1.10 WARRANTIES: Provide the manufacturer's minimum five year material warranty.

PART 2 PRODUCTS

2.01 PRODUCTS AND MANUFACTURERS :

A. Carlisle Coatings & Waterproofing, Incorporated. 900 Hensley Lane, Wylie, TX 75098. Phone 1-800-527-7092. Website http://www.carlisleccw.com
1. Fire Resist Barritech VP, for installation at 40 degrees F and above
2. Fire Resist Barritech VP LT, for installation at 15 degrees F and above
3. Air Shield LMP, W.R. Meadows, Inc.

2.02 ACCESSORIES: Provide from same manufacturer as air barrier membrane.

A. Sheet Detail Flashing: Foil composite faced rubberized asphalt flashing, minimum 0.040 inch (40 mils) thickness.
1. Fire-Resist 705 FR-A or Fire-Resist 705 FR-A LT low temperature application formula by Carlisle Coatings & Waterproofing, Incorporated
2. Others as approved by air barrier membrane manufacturer

B. Contact Adhesive:
1. Carlisle Coatings & Waterproofing, Incorporated: CCW-702 Solvent-Based, CCW-702 LV VOC Compliant Solvent-Based, CCW-702 WB Water-Based, CAV-GRIP™ Aerosol Spray or Travel-Tack portable aerosol spray cans
2. Others as approved by air barrier membrane manufacturer

C. Liquid Detail Flashing. Silane-terminated polyether, minimum 90% solids. ASTM C 920 Type S, Grade NS, Class 25, Use NT. 0.040 inch (40 mil) thickness application
1. Barribond
2. Others as approved by air barrier membrane manufacture

D. Detail Sealant:
1. Barribond by Carlisle Coatings & Waterproofing, Incorporated
2. Others as approved by air barrier membrane manufacturer

E. Transition Membrane:
1. CCW SURE-SEAL Pressure-Sensitive Elastoform by Carlisle Coatings & Waterproofing, Incorporated
2. Others as approved by air barrier membrane manufacturer

F. Transition Membrane Primer:
1. Carlisle Coatings & Waterproofing, Incorporated: SURE-SEAL HP-250 Primer, SURE-SEAL EP-95 Splicing Cement or SURE-SEAL Low VOC EPDM Primer
2. Others as approved by air barrier membrane manufacturer

G. Reinforcing Fabric: Woven, synthetic polymer fabric
   1. DCH Reinforcing Fabric by Carlisle Coatings & Waterproofing, Incorporated
   2. Others as approved by air barrier membrane manufacturer

H. Glass Mat: Randomly-oriented glass strands held in binder soluble in wet air barrier membrane. Offered in rolls of various widths
   1. LiquiFiber
   2. Others as approved by air barrier membrane manufacturer

I. Fill Compound: 2-part, non-sag polyurethane sealant
   1. Carlisle Coatings & Waterproofing, Incorporated: CCW-703 V or CCW-201
   2. Others as approved by air barrier membrane manufacturer

2.03 RELATED MATERIALS BY OTHERS

A. Silicone Sealant, select any:
   1. Dow 758, 790, 791, 795
   2. Pecora AVB Silicone, 890, 891, 895
   3. GE Silpruf, Silpruf LM
   4. Other product approved by air barrier membrane manufacturer

B. Polyurethane Foam Sealant, select any:
   1. TVM Fireblock Foam
   2. Fomo Handifoam Fireblock
   3. Great Stuff PRO or Froth Pack by Dow Chemical Company
   4. Other product approved by air barrier membrane manufacturer

C. Insulation Adhesive, select any
   1. Barribond
   2. LM 800 XL
   3. QB-300 Multi-Purpose Construction Adhesive by OSI

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions affecting installation of the air & vapor barrier and accessory products for compliance with requirements. Verify that surfaces and conditions are suitable prior to commencing Work of this section. Do not proceed with installation until unsatisfactory conditions have been corrected.

B. Verify that wall assemblies are dried in, such that water intrusion will not occur from above, behind or around the air barrier installation.

C. Concrete shall be cured for a minimum of seven days. It shall be smooth, with sharp protrusions such as form joints or fins removed and ground flush. Honeycomb and holes/cracks shall be filled with grout or mortar.

D. Surfaces shall be sound, dry and free of oil, grease, dirt, excess mortar or other contaminants.

E. Surfaces shall be supported and flush at joints without large voids or sharp protrusions.

F. Mortar joints shall be struck flush and shall be free of voids. Mortar droppings shall be removed from brick ties and all other surfaces accepting air barrier.

G. Sheathing boards shall be flush at joints, with gaps between boards according to building code and sheathing manufacturer's requirements. Sheathing boards shall also be securely fastened to the structure with proper fastener type, technique and spacing according to building code and sheathing manufacturer's requirements. Sheathing boards shall be repaired or replaced if inspection reveals moisture damage, mechanical damage or if sheathing boards have exceeded the exposure duration or exposure conditions as required by the sheathing manufacturer.

3.02 SURFACE PREPARATION

A. Fill cracks, gaps and joints with fill compound, detail sealant or other material approved by air barrier manufacturer.

B. Fill rough gaps around pipe, conduit and similar penetrations with mortar, non-shrink grout, fill compound or polyurethane foam sealant shaved flush.

C. Apply a ¾ inch cant of fill compound or detail sealant at the intersection of the base of the wall and the footing.

3.03 DETAILING

A. Additional materials and installation are required at joints, transitions, openings, terminations, penetrations and similar surface irregularities. Perform detailing before or after product installation.

B. Install product and accessories in details as directed in manufacturer's literature.

C. Sheathing joints, use one of the following methods:
1. 4 inch reinforcing fabric imbedded in product and centered over joint.
2. 2" width liquid flashing centered over joint.

D. Sheathing inside and outside corners. Flashing or reinforcement shall bear 3 inches minimum onto either side of angle change. Use any of the following methods:
1. Sheet detail flashing
2. Liquid detail flashing centered over angle change
3. Reinforcing fabric centered over angle change and imbedded in product
4. Glass mat centered over angle change and imbedded in product

E. Window openings. Flashing or reinforcement shall bear onto wall 3 inches minimum and shall return into window opening according to Project drawings. Use any of the following materials:
1. Sheet detail flashing
2. Liquid detail flashing
3. Glass mat imbedded in product

F. Pipe or duct penetrations. Flashing or reinforcement shall bear onto wall 3 inches minimum and shall bear onto pipe or duct 3 inches, or according to Project drawings. Select any:
1. Sheet detail flashing
2. Liquid detail flashing
3. Glass mat imbedded in product

G. Expansion or deflection joints. Flashing shall bear 3 inches minimum onto either side of joint. Select any:
1. Sheet detail flashing bellows or expansion bulb
2. Transition membrane expansion bulb

H. Interface of dissimilar substrates: Flashing or reinforcement shall bear 3 inches minimum onto either side of joint. Select any:
1. Sheet detail flashing
2. Liquid detail flashing
3. Reinforcing fabric imbedded in product
4. Glass mat imbedded in product

I. Seal all terminations of sheet detail flashing with a 1 inch width X 0.040 inch (40 mils) thick ribbon of detail sealant, centered over termination.

3.04 INSTALLATION

A. Apply product and accessories over opaque wall surfaces as indicated in Project drawings.

B. Use the manufacturer's standard or low temperature formula product as required by the project conditions.

C. Apply product by spray, roller, brush or other method as recommended by air barrier manufacturer. Apply product at specified wet mil thickness in accordance with air barrier manufacturer's requirements.

D. Verify compliance with air barrier manufacturer's minimum required thickness by documenting product use per area. Perform and document wet mil thickness measurements every 100 square feet, or more frequently if required, to establish uniform and adequate coverage.

E. Installation shall produce complete coverage of opaque substrates as indicated in Drawings.

F. Product and accessories shall be fully-adhered to substrates. Defects such as holes, fishmouths, blistering, de-lamination, bridging or thin spots shall be repaired according to air barrier manufacturer's instructions.

3.05 SCHEDULE

A. Wall substrates and roof or temporary roof shall be in place, effectively enclosing interior space, before proceeding with air barrier installation.

B. Seal penetrations made through installed product according to manufacturer's instructions and drawings.

C. Seal fenestration to product with detail membrane, transition membrane, detail sealant, silicone sealant or polyurethane foam sealant according to Project drawings

D. Through-wall flashing may be installed before or after product. Seal termination of through-wall flashing to product according product manufacturer's instructions.

E. Exterior cladding shall be installed after product.

F. Semi-rigid insulation installed over product shall be attached with mechanical fastening, insulation adhesive or a combination of these techniques, according to insulation manufacturer and air barrier manufacturer's instructions.

G. Sequence Work to enable air barrier continuity at wall-to-foundation, shelf angle, wall-to-roof, fenestration, different wall assemblies and other conditions as indicated in Project drawings.

3.06 REPAIR AND PROTECTION

A. Protect from damage during application and remainder of construction period.

B. Inspect and make necessary repairs before covering. Repair or replace damaged material according to manufacturer's literature.

C. Product and accessories are not designed for permanent exposure. Cover with insulation or exterior cladding as soon as schedule allows.

D. Outdoor exposure of installed product and accessories shall not exceed 180 days.

END OF SECTION

SECTION 074213 - COMPOSITE METAL WALL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes aluminum composite material fabricated from materials with recycled content into panels and related trim.
   1. Wet system
   2. Flashings and accessories.
   3. Coping caps incorporated into system
   4. Radius column covers.

B. Related Sections:

   1. Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

   2. Division 7 Section "Sheet Metal Flashing and Trim" for flashings and copings.
   3. Division 7 Section "Joint Sealants" for field-applied sealants.

1.3 SYSTEM PERFORMANCE REQUIREMENTS

A. General: Provide wall system that complies with air infiltration and water penetration performance requirements indicated without the reliance of a secondary backup membrane.

B. Bond Integrity: Provide wall system with no loss of bond strength or delamination when tested in accordance with the following:
   1. Bond Strength: 861 psi (5941 kPa) minimum in accordance with ASTM C 297-88.
   2. Peel Strength: 22.5 lb/in. (0.4 kg/cm) minimum in accordance with ASTM D 1781-76, or 20lb/in. (0.35 kg/cm) minimum in accordance with ASTM D 903.
   3. In addition, the panels should remain intact with no decrease in bond strength after 8 hours in 212 deg F. (100 deg. C) water, and 21 consecutive days immersed in 70 deg. F. (20 deg. C) water.

C. Structural Performance of Wall System: Provide wall system capable of withstanding the effects of all loads integral to itself and elements attached to it or supported by it, including all gravity loads in combination with the following horizontal loads. Member design and connections shall be based on the worst combination of gravity and any single horizontal load.
   1. Structural Performance Testing: Wall system shall be tested in accordance with ASTM E 330-84 at design pressure. Deflection of horizontal perimeter framing members normal to the plane of the wall between supports shall not exceed L/240 of the span length or 1/2-inch, whichever is less. After initial test, test at 150 percent of design pressure. No permanent deformation exceeding L/1000 or failure to structural members allowed.

2. Wind Loads: As required by IBC for Wind Design, but not less than that indicated by the General Structural Notes, applied perpendicular to the face of the wall panel, acting inward or outward.
3. Seismic Loads: Loads required by IBC, (both perpendicular to and parallel with the plane of the wall, but not simultaneously).

D. Thermal Movements: Provide wall system that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing displacement of panels, opening of joints, overstressing of components, failure of joint sealants and connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime sky heat loss.
1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

E. Vertical Building Movement (Floor and/or Roof Live Load deflection): Design and detail system(s) to allow for live load deflections of at least L/360 for typical spandrel beam locations.

F. Building Attachments: Design all connection materials, fasteners, welds, anchors and embedded items as required to attach the wall system to the building as required by IBC and structural calculations.

G. Design wall system and connection to building structure to withstand loads and movements without exceeding allowable stresses established by the following:
1. For Structural Steel: AISC S335, "Specification for Structural Steel Buildings Allowable Stress Design and Plastic Design with Commentary."
2. For Cold-Formed Steel: AISI SG-673, Part I, "Specification for the Design of Cold-Formed Steel Structural Members."
3. For Aluminum: AA ADM-1, "The Aluminum Design Manual."
4. Coordination: Wall systems shall be designed and detailed with due consideration for, and fully coordinated with, all interfacing materials, elements, and systems and their respective attachments and movements.

1.4 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data including manufacturer's product specifications, system details meeting project design requirements, certified product test reports showing compliance with performance requirements, installation instructions, and general recommendations, as applicable to materials and finishes for each component and for total panel system.

C. Samples for verification purposes of wall panels. Provide sample panels 12 x 12 inches in the color indicated.

D. Shop Drawings showing layouts of panels, details of edge conditions, joints, corners, panel profiles, supports, anchorages, trim, flashings, closures, and special details. Distinguish between factory and field assembly work.

E. Calculations prepared by a Utah Licensed Professional Engineer responsible for or having direct supervision over the production of calculations, and any other item or issue pertinent to the wall panel system design.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer who has completed wall system projects similar in material, design, and extent to that indicated for this Project and with a 10-year record of successful in-service performance.

B. Fabricator Qualifications: A firm experienced in producing wall systems similar to those indicated for this Project and with a 10-year record of successful in-service performance, as well as sufficient production capacity to produce required panels.

C. Single-Source Responsibility for Fabrication and Installation: Engage a qualified fabrication / installation firm to assume undivided responsibility for fabricating and installing wall systems specified in this Section.

D. Product Options: Drawings are diagrammatic only and intended to indicate scope, profiles, system arrangements, and dimensional requirements of the wall system required and are based on the specific system specified. Responsibility for watertight performance and engineering is that of the Contractor, fabricator and manufacturer.
   1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval and only to the extent needed to comply with performance and design requirements. Where modifications are proposed, submit comprehensive explanatory data to Architect for review.

E. Fire-Test-Response Characteristics: Provide materials and construction identical to those of assemblies tested for fire resistance per tests indicated by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
   1. Flame Spread: 25 maximum per ASTM E84, and no flame spread along interior face of penetration through the wall assembly per IBC standards.
   2. Smoke Developed: 450 or less per ASTM E84.
   3. Flaming: No surface flaming per ASTM E 162.
   4. Ignition Temperature: Greater than 650 deg. F, in accordance with ASTM D 1929.

F. ICBO Research Report: Aluminum composite material manufacturer shall have a current ICBO research report allowing its use on non-combustible construction, and shall have established a Certification Program acceptable to authorities having jurisdiction.

1.6 DELIVERY, STORAGE & HANDLING

A. Deliver panels and other components so they will not be damaged or deformed. Package wall panels for protection against transportation damage.

B. Handling: Exercise care in unloading, storing, and erecting wall panels to prevent bending, warping, twisting, and surface damage.
   1. Remove and replace damaged items as directed.

C. Store materials at protected location at building site under cover away from other construction activities to avoid damage. Stack materials on platforms or pallets, covered with tarpaulins or other suitable weathertight ventilated covering. Store metal wall panels so that they will not accumulate water. Do not store panels in contact with other materials that might cause staining, denting, or other surface damage.

1.7 PROJECT CONDITIONS

A. Established Dimensions: Establish and coordinate wall construction to ensure actual locations of structural members and to ensure opening dimensions correspond to established dimensions.

1.8 WARRANTY

A. General Warranty: Special warranties specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

B. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal composite material panel systems that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures including rupturing, cracking, or puncturing.
      b. Deterioration of metals and other materials beyond normal weathering.
      c. Distortion in metal panel surface.
   2. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 ALUMINUM COMPOSITE MATERIAL

A. Composite Aluminum Material: Aluminum alloy face sheets applied under tension to both sides of an extruded, fire rated, thermoplastic core in a continuous process with no glues or adhesives between the materials.
   1. Total composite Thickness: 4mm (0.157 inch) minimum.
   2. Aluminum Face Sheets: 0.0197-inch (0.50mm) thick aluminum type 3003 or 3105-H25 alloy for coil coated sheet.

B. Manufacturer: Subject to compliance with requirements, provide aluminum composite material by one of the following:
   1. Aluminum Composite Material:
      a. Alucobond 21; Alusuisse Composites, Inc.
      b. Alpolic; Mitsubishi Chemical America, Inc.
      c. Reynobond, Alcoa.

2.2 WALL SYSTEM MOUNTING MATERIALS AND ACCESSORIES

A. Aluminum: Alloy and temper recommended by wall system fabricator and finisher for type of use and finish indicated and with not less than the strength and durability of alloy and temper designated below:
   1. Aluminum Sheet Pre-painted with Coil Coating: Aluminum sheet complying with ASTM B 209 (ASTM B 209M) for alclad alloy 3003, 3004, or 3105-H25 with temper as required to suit forming operations, prepainted by the coil-coating process
   2. Extruded Aluminum: ASTM B 221 (ASTM B 221M), alloy 6063-T52, with a minimum thickness of 0.080 inch (2.0 mm) for primary legs of extrusions.

a. Finish: Mill finish where not exposed to view in completed Work, black finish where exposed to view in joints.

B. Flashing: 0.060 inch (1.5 mm) thick aluminum, finished to match wall system.

C. Fasteners: Aluminum or stainless steel, self-tapping hexhead type screws designed to withstand design loads.
1. Provide exposed fasteners with heads matching color of wall system by means of factory applied coating.

D. Elastomeric Sealant: Medium-modulus neutral-curing silicone sealant complying with requirements for joint sealants as specified in Division 7 Section "Joint Sealants." For concealed applications only.

E. Accessories: Unless otherwise specified, provide components required for a complete wall system assembly including weatherstripping, internal guttered weep system, mounting accessories, reveals, trim, clips, stiffeners, copings, corners, flashings, and similar items. Match materials and finishes of panels.

F. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil (0.4-mm) dry film thickness per coat, unless otherwise indicated. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.3 FINISH GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

2.4 ALUMINUM FINISH

A. High-Performance Organic Coating Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturer's written instructions.
1. Fluoropolymer 2 or 3-Coat Coating System: Coil coated Kynar 500 or Hylar 5000, thermocured system composed of specially formulated inhibitive primer, fluoropolymer color coat, and clear fluorocarbon topcoat, with both color coat and clear topcoat containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight; complying with AAMA 605.2-92 and the following:
a. Humidity Resistance: No formation of blisters when subjected to condensing water fog at 100 percent relative humidity and 100 deg. F. For 3000 hours in accordance with ASTM D 2247.
b. Salt Spray Resistance: Complying with the following when tested in accordance with ASTM B 117 exposing coating system to 3000 hours, using a 5 percent NaC1 solution:
1) Corrosion creepage from scribe line: 1/16inch (1.6 mm) maximum.
2) Minimum blister rating of 8 within the test specimen field.

c. Outdoor Weather Exposure: Comply with the following after 5year exposure at 45degree angle facing south Florida exposure:

1) Maximum color change of 5 Delta E units as calculated in accordance with ASTM D 2244.
2) Maximum chalk rating of 8 in accordance with ASTM D 659.
3) No checking, crazing, adhesion loss

d. Color: Panels will be finished in painted color to match Architect's Basis of Design samples as follows: Architect's approval for color selection of panel colors from other manufacturers is required. Colors not matching Basis of Design colors will not be accepted.
1) DON GREY, Alpolic.

2.5 PANEL WALL SYSTEM FABRICATION

A. General: Fabricate rout and return rainscreen dry-joint aluminum composite material wall system with all components and accessories as required to fulfill design intent and indicated performance requirements. Fabricate wall system and accessories at the shop to greatest extent possible.

B. Wall System: 1 .5 to 2-inch nominal thickness system composed of a aluminum composite material surface mounted on aluminum extrusion shapes.
1. Form aluminum composite material with routed and returned edges forming a pan-type panel assembly anchored sealants into custom mounting extrusions forming rout and return joint with edges of composite panels and aluminum plate protected within the continuous joint pocket.
2. Fabricate wall system joints with nominal 3/8-inch wide reveals.
3. Provide continuous extruded aluminum mounting and indexing extrusions mechanically fastened to the aluminum composite material panel.

C. Fabricate wall system components to allow for field adjustment and thermal movement.

D. Square and trim edges of sheet with no displacement of aluminum sheets or protrusion of core material.

E. Form panel lines, breaks, and angles to be sharp and true, with surfaces that are free from warp or buckle.

F. Fabricate Panel surface with grain pattern of finish running in same direction throughout wall system.

G. Where required for structural performance, shop apply extruded aluminum stiffeners with structural silicone adhesive to the back of the composite panels and aluminum plate panels to maintain flatness of the panel. Attach stiffeners in a manner that will not interfere with or restrain free differential thermal movement of the panel.

H. Fabricate curved panels in factory with extrusions rolled to match curve of panel.

I. Miscellaneous Shapes: Where composite panels cannot be formed to the required shape or configuration indicated, provide extruded or sheet aluminum shapes formed to the required shape or configuration and finished to match the composite panel. Fasten miscellaneous shapes to mounting extrusions by same method as panels to conform with performance requirements.

J. Where welding is required to provide configurations indicated, weld joints and seams continuously at back of panels. Provide smooth, flush, exposed surfaces in which joints are not visible after finishing is completed.
   1. Use welding procedures that will blend with and not cause discoloration of metal being joined.

K. Apply bituminous coating or other permanent separation materials on concealed panel surfaces where panels would otherwise be in direct contact with substrate materials that are non-compatible or could result in corrosion or deterioration of either material or finishes.

L. Fabrication Tolerances: Fabricate wall system to comply with the following:
   1. Panel Bow: 0.8 percent maximum of panel overall dimension in width and length.
   2. Panel lines, breaks, and curves shall be sharp, smooth, and free of warps and buckles.
   3. Surface Flatness: Fabricate panels with a flatness deviation not to exceed 0.030 inch in 18 feet (0.14 mm per meter) in any direction when measured with a metal straight edge.
   4. Dimensional Variation: As follows:
      a. Panel Width: Plus or minus 1/32 inch (0.8 mm) maximum.
      b. Panel Length: Plus 0inch (0 mm), minus 1/8inch (3.0 mm) maximum.
      c. Panel Thickness: Plus or minus 1/32 inch (0.8 mm) maximum.

2.6 SECONDARY FRAMING

A. Panel Supports and Anchorage: Provide structural studs, girts, furring channels, angles, plates, bracing, and other secondary framing members to receive and support panels where required to connect nominal 2-inch panels to building structure.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements indicated for conditions affecting performance of manufactured wall panels.
   1. Do not proceed with wall panel installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Coordinate metal wall panels with flashing, trim; and construction of soffits, roofing, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

B. Secondary Structural Supports: Install structural studs, girts, angles, and other secondary structural panel support members and anchorages where required to reach and connect to building structural frame members provided for wall system support.

3.3 METAL-FACED COMPOSITE WALL PANEL INSTALLATION

A. Attachment Assembly, General: Install attachment assembly required to support metal composite material wall panels and to provide a complete weathertight wall system, including sub-girts, perimeter extrusions, tracks, drainage channels, panel clips, and anchor channels.

1. Include attachment to supports, panel-to-panel joinery, panel-to-dissimilar-material joinery, and panel-system joint seals.

B. Installation: Attach metal composite material wall panels to supports at locations, spacings, and with fasteners recommended by manufacturer to achieve performance requirements specified.

1. Wet Seal Systems: Seal horizontal and vertical joints between adjacent metal composite material wall panels with sealant backing and sealant. Install sealant backing and sealant according to requirements specified in Section 079200 "Joint Sealants."

C. Accessories: Install components and accessories required for a complete wall system assembly including mounting accessories, reveals, trims, flashings, formed aluminum shapes, and similar items.

D. Joint Sealers: Provide joint sealants within wall system and between wall system and adjacent surfaces as required for a complete, weathertight assembly. Do not substitute sealants for drygasketed type joints within wall system.
1. Install sealants and backer rod in accordance with manufacturers instructions, including requirements for joint width to depth ratios and substrate priming as applicable.

E. Separate dissimilar metals by painting each metal surface in area of contact with a bituminous coating or by other permanent separation as recommended by manufacturers of dissimilar metals.

F. Promptly remove protective film from exposed surfaces of wall system after completion of wall system. Strip with care to avoid damage to finish.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified independent testing agency to perform testing indicated.

B. Water Penetration: Test areas of installed system for compliance with system performance requirements according to ASTM E 1105 at minimum differential pressure of 20 percent of inwardacting, wind-load design pressure as defined by SEI/ASCE 7, but not less than 6.24 lbf/sq. ft. (300 Pa).

C. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust completed metal-faced composite wall panel installation, including accessories.

D. Metal-faced composite wall panels will be considered defective if they do not pass tests and inspections.

E. Additional tests and inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

F. Prepare test and inspection reports.

3.5 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align metal-faced composite wall panel units within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m), nonaccumulative, on level, plumb, and location

lines as indicated and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

3.6 CLEANING AND PROTECTION

A. Clean integral gutters and weep system to assure functioning weep system at time of Substantial Completion.

B. Provide final protection and maintain conditions in a manner acceptable to fabricator and installer that ensure wall system is without damage or deterioration at the time of Substantial Completion.

END OF SECTION 074213

SECTION 075419 - POLYVINYL-CHLORIDE ROOFING

PART 1 GENERAL

A. Related Requirements:

1. **Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.**

1.01 DESCRIPTION

A. **Basis of Design** - The project consists of installing Versico's VersiFlex PVC membrane adhered with Versico Low VOC PVC Adhesive.
   1. Remove all existing roofing materials, including membrane, insulation, flashings and metal.
   2. Clean wood decks.
   3. Repair any damaged wood. Install new in wet or damaged areas.
   4. **Basis of Design** - Adhere the new Versico VersiFlex PVC Membrane fully-dhered roofing system.
      a. Install R-8.6 Polyisocyanurate, in 1 layers of 1.5" thickness, adhered to wood with Versico Flexible Dash adhesive.
      b. Install Versico VersiFlex PVC fully-adhered membrane.

1.03 SUBMITTALS

A. Prior to starting work, the roofing contractor must submit the following:

1. Shop drawings showing layout, details of construction and identification of materials.

2. A sample of the manufacturer's Membrane System Warranty.

3. Submit a letter of certification from the manufacturer which certifies the roofing contractor is authorized to install the manufacturer's roofing system and lists foremen who have received training from the manufacturer along with the dates training was received.

4. Certification from the membrane manufacturer indicating the membrane thickness over the reinforcing scrim (top ply membrane thickness) is nominal 25 mils above scrim.

5. Certification of the manufacturer's warranty reserve.

B. Upon completion of the installed work, submit copies of the manufacturer's final inspection to the specifier prior to the issuance of the manufacturer's warranty.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver materials to the job site in the manufacturer's original, unopened containers or wrappings with the manufacturer's name, brand name and installation instructions intact and legible. Deliver in sufficient quantity to permit work to continue without interruption.

B. Comply with the manufacturer's written instructions for proper material storage.

1. Store PVC membrane in a dry, cool, shaded area in the original undisturbed plastic. VersiFlex membrane that has been exposed to the elements for approximately 7 days must be prepared by scrubbing the splice area with a scouring pad and Versico PVC and KEE HP Membrane Cleaner prior to hot air welding.

2. Store curable materials (adhesives and sealants) between 60°F and 80°F in dry areas protected from water and direct sunlight. If exposed to lower temperature, restore to 60°F minimum temperature before using.

3. Store materials containing solvents in dry, well ventilated spaces with proper fire and safety precautions. Keep lids on tight. Use before expiration of their shelf life.

C. Insulation must be on pallets, off the ground and tightly covered with waterproof materials.

D. Any materials which are found to be damaged shall be removed and replaced at the applicator's expense.

1.05 WORK SEQUENCE

A. Schedule and execute work to prevent leaks and excessive traffic on completed roof sections. Care should be exercised to provide protection for the interior of the building and to ensure water does not flow beneath or wick into any completed sections of the membrane system.

B. Do not disrupt activities in occupied spaces.

1.07 EXISTING CONDITIONS

If discrepancies are discovered between the existing conditions and those noted on the drawings, immediately notify the owner's representative by phone and solicit the manufacturer's approval prior to commencing with the work. Necessary steps shall be taken to make the building watertight until the discrepancies are resolved.

1.10 JOB SITE PROTECTION

A. The roofing contractor shall adequately protect building, paved areas, service drives, lawn, shrubs, trees, etc. from damage while performing the required work. Provide canvas, boards and sheet metal (properly secured) as necessary for protection and remove protection material at completion. The contractor shall repair or be responsible for costs to repair all property damaged during the roofing application.

B. During the roofing contractor's performance of the work, the building owner will continue to occupy the existing building and site. The contractor shall take precautions to prevent the spread of dust and debris, particularly where such material may sift into the building or cause conflict with aircraft on tarmac. The roofing contractor shall provide labor and materials to construct, maintain and remove necessary, temporary enclosures to prevent dust or debris in the construction area(s) from entering the remainder of the building or blowing onto tarmac.

C. Do not overload any portion of the building, by either use of or placement of equipment, storage of debris, or storage of materials.

D. Protect against fire and flame spread. Maintain proper and adequate fire extinguishers.

E. Store moisture susceptible materials above ground and protect with waterproof coverings.

F. Remove all traces of piled bulk material and return the job site to its original condition upon completion of the work.

1.12 WORKMANSHIP

A. Applicators installing new roof, flashing and related work shall be factory trained and approved by the manufacturer they are representing.

B. All work shall be of highest quality and in strict accordance with the manufacturer's published specifications and to the building owner's satisfaction.

C. There shall be a supervisor on the job site at all times while work is in progress.

1.13 QUALITY ASSURANCE

A. **Basis of Design** - The VersiFlex PVC Membrane Roofing System must achieve a UL Class A fire rating.

B. The specified roofing assembly must have been successfully tested by a qualified testing agency to resist the design uplift pressures calculated according to American Society of Civil Engineers (Asce 7-16):

1. Field -23.1
2. Perimeter -30.5
3. Corners -41.6

C. The membrane must be manufactured by the material supplier. Manufacturer's supplying membrane made by others are not acceptable.

D. Unless otherwise noted in this specification, the roofing contractor must strictly comply with the manufacturer's current specifications and details.

E. The roofing system must be installed by an applicator authorized and trained by the manufacturer in compliance with shop drawings as approved by the manufacturer. The roofing applicator shall be thoroughly experienced and upon request be able to provide evidence of having at least five (5) years successful experience installing single-ply roofing systems and having installed at least 10 roofing application or several similar systems of equal or greater size within one year.

F. Provide adequate number of experienced workmen regularly engaged in this type of work who are skilled in the application techniques of the materials specified. Provide at least one thoroughly trained and an experienced superintendent on the job at all times roofing work is in progress.

G. There shall be no deviations made from this specification or the approved shop drawings without the prior written approval of the specifier. Any deviation from the manufacturer's installation procedures must be supported by written certification on manufacturer's letterhead and presented for the specifier's consideration.

H. Basis of Design - The VersiFlex PVC White membrane meets the ENERGY STAR requirement for reflectance and emittance. When tested in accordance with ASTM C1549, the material has an initial reflectance of 111 and a 3-year aged reflectance of 72. The material has also been tested for emittance in accordance with ASTM C1371. An initial emittance of 0.95 and a 3-year aged emittance of 0.86 were achieved.

I. Upon completion of the installation, the applicator shall arrange for an inspection to be made by a

non-sales technical representative of the membrane manufacturer in order to determine whether or not corrective work will be required before the warranty will be issued. Notify the building owner seventy-two (72) hours prior to the manufacturer's final inspection.

1.14 JOB CONDITIONS, CAUTIONS AND WARNINGS

Basis of Design - Refer to Versico's VersiFleece Adhered Roofing System specification for General Job Site Considerations.

A. Safety Data Sheets (SDS) must be on location at all times during the transportation, storage and application of materials.

B. **Do not apply Flexible DASH Adhesive** when surface and/or ambient temperatures are **below 25°F**.

C. When using Flexible DASH Adhesive in non-heated spray equipment, surface and/or ambient temperatures must be 60° F (16° C) or warmer.

D. The addition of **Flexible DASH Adhesive Catalyst (to Part B side) is recommended** to speed up reaction time **when temperatures are below 50°F.**

E. The contractor must exercise caution during adhesive spraying to avoid overspray.

Use a non-atomizing spray tip such as the Graco Spatter Tip and reduce spray pressure to 500 – 800 psi to increase adhesive droplet size and reduce airborn mist. Maintain hand held wind screens on-site for use as necessary.

Extruding DASH Adhesive is also recommended for the elimination of overspray concerns.

F. When loading materials onto the roof, the Versico Authorized Roofing Applicator must comply with the requirements of the building owner to prevent overloading and possible disturbance to the building structure.

G. When positioning membrane sheets, exercise care to locate all field splices away from low spots and out of drain sumps. All field splices should be shingled to prevent bucking of water.

H. Proceed with roofing work only when weather conditions are in compliance with the manufacturer's recommended limitations, and when conditions will permit the work to proceed in accordance with the manufacturer's requirements and recommendations.

I. Proceed with work so new roofing materials are not subject to construction traffic. When necessary, new roof sections shall be protected and inspected upon completion for possible damage. Provide protection, such as 3/4 inch thick plywood, for all roof areas exposed to traffic during construction. Plywood must be smooth and free of fasteners and splinters.

J. The surface on which the insulation or roofing membrane is to be applied shall be clean, smooth, dry, and free of projections or contaminants that would prevent proper application of or be incompatible with the new installation, such as fins, sharp edges, foreign materials, oil and grease.

J. New roofing shall be complete and weather tight at the end of the work day. Care must be taken to avoid wicking water though the fleece by properly sealing exposed edges of the membrane

K. Contaminants such as grease, fats and oils shall not be allowed to come in direct contact with the roofing membrane.

1.15 WARRANTY

A. Provide manufacturer's **30 Year System Warranty** covering both labor and material with no dollar limitation. The maximum wind speed coverage shall be peak gusts of **55 mph measured at 10 meters above ground level**. Certification is required with bid submittal indicating the manufacturer has reviewed and agreed to such wind coverage.

B. **Pro-rated System Warranties shall not be accepted**.

C. Evidence of the manufacturer's warranty reserve shall be included as part of the project submittals for the specifier's approval.

PART 2 PRODUCTS

2.01 GENERAL

A. Unless otherwise approved by the specifier and accepted by the membrane manufacturer, all products (including adhesives, insulation, fasteners, fastening plates and edgings) must be **manufactured and supplied** by the roofing system manufacturer and covered by the warranty.

2.02 MEMBRANE

A. **Basis of Design** - Furnish Versico **80 mil thick** White VersiFlex PVC (polyvinyl chloride) membrane as needed to complete the roofing system. Membrane thickness over the reinforcing scrim (top-ply thickness) shall be nominal 25 mil or thicker. Sheets are packaged in 120” or 60” x 100’ rolls.

OR
1) Sarnafil G410
2) JM PVC FB

B. Membrane with white color shall have an SRI (solar reflectance index) not less than 111 in accordance with ASTM D4434 type IV.

C. Membrane Weathering Performance: The PVC membrane shall be formulated with a minimum of 30% Elvaloy polymer to withstand:

1. ASTM D 3045: 56 days exposure @ 176° F and 670 hrs @ 240°

2. ASTM G 155 (xenon arc): a min. of 17,640 kj/m² resistance @ 63° C without cracking or showing signs of material failure.

2.03 INSULATION/UNDERLAYMENT

A. When applicable, insulation shall be installed in multiple layers and mechanically fastened or secured with Versico DASH Adhesive to the substrate in accordance with manufacturer's published specifications.

B. Insulation shall be Versico VersiCore MP-H Polyisocyanurate as supplied by Versico Incorporated. Minimum R-value required is R-30. OR APPAROVED EQUAL.

1. **Versico Versicore MP-H Polyiso** – A foam core insulation board covered on both sides with a medium weight fiber-reinforced felt facer meeting ASTM C 1289-06, Type II, Class 1, Grade 2 (20 psi) or Grade 3 (25 psi). The product is available in 4' x 8' standard size with a thickness from 1 to 4 inches. 4' x 4' tapered panels are also available.

2.04 FASTENING COMPONENTS

To be used for mechanical attachment of insulation and to provide additional membrane securement:

A. **Fasteners, Plates and Bars**

1. **InsulTite Fasteners:** A threaded #12 fastener with #3 phillips drive used for insulation attachment into steel or wood decks.

2. **HPVX Plates**: A 2-3/8" diameter metal barbed fastening plate used with Versico HP-X or HP-14-10 Fasteners for membrane securement. This plate can be used for insulation securement.

3. **HPV-XL Plates:** A 2-3/8" diameter metal barbed fastening plate with an oversized hole for use with Carlise HP-Xtra Fasteners for membrane securement.

4. **Insulation Fastening Plates**: a nominal 3 inch diameter plastic or metal plate used for insulation attachment.

B. **Insulation Adhesive:**

1. **Flexible DASH Adhesive:** A two component insulating urethane adhesive used to attach insulation and VersiFleece membrane. Packaging formats include 50 and 15 gallon drums as well as Dual Tanks, Dual Cartridges and 5 gallon Jug formats. OR APPAROVED EQUAL.

2.05 ADHESIVES, CLEANERS, AND SEALANTS

All products shall be furnished by Versico and specifically formulated for the intended purpose OR APPROVED EQUAL.

A. **Flexible DASH Adhesive:** A two component insulating urethane adhesive used to attach insulation and VersiFleece membrane. Packaging formats include 50 and 15 gallon drums as well as Dual Cartridges and 5 gallon Bag in a Box formats.

B. **Low VOC PVC Bonding Adhesive:** A high strength solvent-based contact adhesive that allows bonding of PVC membrane to various porous and non-porous substrates. It is specially formulated using a blend of VOC exempt and nonexempt solvent to be in compliance with the state of California Clean Air Act of 1988 (updated in 1997) and as further requlated by California's Air Quality Control Districts listing VOC grams per liter limitations. This product also meets the <250 gpl VOC content requirements of the OTC Model Rule for Singel Ply Roofing Adhesives.

C. **VersiFlex PVC Cut-Edge Sealant:** A clear-colored sealant used to seal cut edges of reinforced VersiFlex membrane. A coverage rate of approximately 225 - 275 linear feet per squeeze bottle can be achieved when a 1/8" diameter bead is applied.

D. **Water Cut-Off Mastic:** Used as mastic to prevent moisture migration at drains, compression

terminations and beneath conventional metal edging (at a coverage rate of approximately 10' per tube or 100' per gallon).

E. **Universal Single-Ply Sealant:** A 100% solids, solvent free, one-part, polyether sealant that provides a weather tight seal to a variety of building substrates. Can be used as a termination bar sealant or for use in counterflashing, coping, and scupper details.

F. **PVC One-Part Pourable Sealer:** A one-part, moisture curing, elastomeric polyether sealant used to fill Molded Sealant Pockets. Packaged in four 1/2 gallon pouches per plastic bucket. One pouch will fill one Molded Sealant Pocket.

G. **PVC and KEE HP Membrane Cleaner:** Used to prepare membrane that has been exposed to the elements for approximately 7 days prior to heat welding or to remove general construction dirt at an approximate coverage rate of 400 square feet per gallon (one surface).

PART 3 EXECUTION

3.01 GENERAL

A. Comply with the manufacturer's published instructions for the installation of the membrane roofing system including proper substrate preparation, job site considerations and weather restrictions.

B. Position sheets to accommodate contours of the roof deck and shingle splices to avoid bucking water.

3.02 VAPOR RETARDERS

A. In the generally temperate climate of the United States, during the winter months, water vapor flows upward from a heated, more humid interior toward a colder, drier exterior. Vapor retarders are more commonly required in northern climates than in southern regions, where downward vapor pressure may be expected and the roofing membrane itself becomes the vapor retarder.

B. Consult the latest publications by ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.) and NRCA (National Roofing Contractors Association) for specific information.

C. If insulation is to be adhered to the vapor retarder with DASH or Flexible DASH Adhesive, the 725 TR vapor retarder must be compatible and shall be fully adhered to the substrate. Available products include Versico supplied “peel and stick” rubberized asphalt membrane with compatible film coating (Versico VapAir Seal 725TR Air and Vapor Barrier), and spray or roller applied butyl coatings. Installation requirements for Versico’s 725 Air and Vapor Barrier are identified in Versico published specification.

3.03 INSULATION PLACEMENT

A. Install insulation or membrane underlayment over the substrate with boards butted together. Fill joints or gaps greater than 1/4 inch with DASH Adhesive. Stagger joints both horizontally and vertically if multiple layers are provided.

B. Secure insulation to the substrate with Flexible DASH Adhesive or mechanical fasteners, see plans for proper locations, in accordance with the manufacturer's specifications.

3.04 MEMBRANE PLACEMENT AND BONDING

A. Position and unroll successive sheets and align to provide a minimum 2 inch overlap (use pre-marked overlap line) along the selvage edge. At end laps (along the width of the sheet), membrane shall be butted together which will be overlaid with 8 inch wide VersiFlex Reinforced Membrane and hot air welded on all edges.

B. Position adjoining sheets to allow a minimum overlap of 2 inches to provide a minimum 1-1/2" hot air weld.

C. Continue to install adjoining membrane sheets in the same manner, overlapping edges a minimum of 2 inches and complete the bonding procedures as stated previously.

3.05 MEMBRANE SPLICING – HOT AIR WELDING

A. **General**

The VersiFleece membrane has a selvage edge (the fleece-backing is discontinued) along the length of the sheet for membrane splicing. Selvage edges are not provided along the width of the membrane; adjoining membrane sheets must be butted together and overlaid with 8 inch wide VersiFlex Reinforced membrane heat welded on all sides.

B. **Hot Air Welding Procedures**

1. Hot air weld the VersiFlex PVC membrane using an Automatic Hot Air Welding Machine or Hot Air Hand Welder in accordance with the manufacturer's specifications. At all splice intersections, roll the seam with a silicone roller to ensure a continuous hot air welded seam.

2. Probe all seams once the hot air welds have thoroughly cooled (approximately 30 minutes).

3. Repair all seam deficiencies the same day they are discovered.

4. Apply Cut Edge Sealant on all cut edges of reinforced membrane (where the scrim reinforcement is exposed) after seam probing is complete. Cut Edge Sealant is **not required** on horizontal or vertical splices.

3.06 FLASHING

A. Flashing of parapets, curbs, expansion joints and other parts of the roof must be performed using VersiFlex VersiFleece membrane or VersiFlex reinforced membrane. VersiFlex non-reinforced membrane can be used for flashing pipe penetrations, Sealant Pockets, and scuppers, as well as inside and outside corners, when the use of pre-molded accessories is not feasible.

B. Follow manufacturer's typical flashing procedures for all wall, curb, and penetration flashing including metal edging/coping and roof drain applications.

3.07 DAILY SEAL

A. On phased roofing, when the completion of flashings and terminations is not achieved by the end of the work day, a daily seal must be performed to temporarily close the membrane to prevent water infiltration.

B. Use DASH Adhesive or other similar material in accordance with the manufacturer's requirements.

3.08 CLEAN UP

A. Perform daily clean up to collect all wrappings, empty containers, paper, and other debris from the project site. Upon completion, all debris must be disposed of in a legally acceptable manner.

B. Prior to the manufacturer's inspection for warranty, the applicator must perform a pre-inspection to review all work and to verify all flashing has been completed as well as the application of all caulking.

END OF SPECIFICATION

SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exposed trim & fascia.
2. Metal flashing and trim.
3. Reglets

B. Related Sections:

1. **Section 016001 “Buy American Preference Requirements” for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.**

2. Division 6 "Miscellaneous Rough Carpentry" for wood nailers, curbs, and blocking.
3. Division 7 “Joint Sealants” for elastomeric sealants.

1.2 PERFORMANCE REQUIREMENTS

A. General: Sheet metal flashing and trim assemblies as indicated shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

B. Wind Loading: Fabricate and install roof edge flashing and copings capable of resisting the following forces according to recommendations in FMG Loss Prevention Data Sheet 1-49:

1. **Wind Zone 2:** For velocity pressures of 31 to 45 lbf/sq. ft. (1.48 to 2.15 kPa): 90-lbf/sq. ft. (4.31-kPa) perimeter uplift force, 120-lbf/sq. ft. (5.74-kPa) corner uplift force, and 45-lbf/sq. ft. (2.15-kPa) outward force.

C. Thermal Movements: Provide sheet metal flashing and trim that allows for thermal movements from ambient and surface temperature changes.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C) material surfaces.

D. Water Infiltration: Provide sheet metal flashing and trim that do not allow water infiltration to building interior.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.

B. Samples for Selection: For each type of sheet metal flashing, trim, and accessory indicated with factory-applied color finishes involving color selection.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experience Installer who has completed sheet metal flashing and trim work similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

1.5 PROJECT CONDITIONS

A. Coordinate Work of this Section with interfacing and adjoining Work for proper sequencing of each installation. Ensure best possible weather resistance, durability of Work, and protection of materials and finishes.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.

B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to the extent necessary for the period of sheet metal flashing and trim installation.

PART 2 - PRODUCTS

2.1 SHEET METALS

A. Finishes for sheet metals are specified with materials in this article rather than in a separate "Finishes" Article. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy and temper recommended by manufacturer for use and finish indicated, finished as follows:
1. Surface: Smooth, flat finish.
2. High-Performance Organic Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
   a. Fluoropolymer 2-Coat System: Manufacturer's standard 2-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2605.

B. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), alloy and temper recommended by manufacturer for type of use and finish indicated, finished as follows:
1. High-Performance Organic Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to

exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

a. Fluoropolymer 2-Coat System: Manufacturer's standard 2-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight;

2.2 REGLETS

A. General: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces and compatible with flashing indicated.

B. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.

C. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.
1. Material: Galvanized Steel .0396 (20 gauge) inch thick.

D. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of the counterflashing lower edge.
1. Material: Galvanized steel, 0.0217 inch (0.55 mm) thick.

E. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
1. Fry Reglet Corporation.
2. Hickman: W.P. Hickman Co.
3. Keystone Flashing Company.

2.3 MISCELLANEOUS MATERIALS

A. Solder: ASTM B 32, Grade Sn50, used with rosin flux.

B. Fasteners: Same metal as sheet metal flashing or other noncorrosive metal as recommended by sheet metal manufacturer. Match finish of exposed heads with material being fastened.

C. Asphalt Mastic: SSPC-Paint 12, solvent-type asphalt mastic, nominally free of sulfur and containing no asbestos fibers, compounded for 15-mil (0.4-mm) dry film thickness per coat.

D. Mastic Sealant: Polyisobutylene; nonhardening, nonskinning, nondrying, nonmigrating sealant.

E. Self-Adhering Sheet Underlayment: Granular surfaced; ASTM D 1970; self-adhering, polymer-modified, bituminous sheet underlayment; 40 mils (1 mm) thick. Provide primer when recommended by underlayment manufacturer.

a. Available Granular-Surfaced Manufacturers
1) Carlisle Coatings & Waterproofing, Inc.
2) CertainTeed Corporation.
3) Johns Manville.
4) Protecto Wrap Company.

F. Elastomeric Sealant: Generic type recommended by sheet metal manufacturer and fabricator of components being sealed and complying with requirements for joint sealants as specified in Division 7 Section "Joint Sealants."

G. Metal Accessories: Provide sheet metal clips, straps, anchoring devices, and similar accessory units as required for installation of Work, matching or compatible with material being installed; noncorrosive; size and thickness required for performance.

H. Roofing Cement: ASTM D 4586, Type I, asbestos free, asphalt based.

2.4 FABRICATION, GENERAL

A. Sheet Metal Fabrication Standard: Fabricate sheet metal flashing and trim to comply with recommendations of SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of the item indicated.

B. Comply with details shown to fabricate sheet metal flashing and trim that fit substrates and result in waterproof and weather-resistant performance once installed. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

C. Form exposed sheet metal Work that is without oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems.

D. Seams: Fabricate nonmoving seams in sheet metal with flat-lock seams except where standing seam is shown. Tin edges to be seamed, form seams, and solder.

E. Expansion Provisions: Space movement joints at maximum of 10 feet (3 m) with no joints allowed within 24 inches (610 mm) of corner or intersection. Where lapped or bayonet-type expansion provisions in Work cannot be used or would not be sufficiently weatherproof and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with mastic sealant (concealed within joints).

F. Sealed Joints: Form non-expansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.

G. Separate metal from non-compatible metal or corrosive substrates by coating concealed surfaces at locations of contact with asphalt mastic or other permanent separation as recommended by manufacturer.

H. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of sheet metal exposed to public view.

I. Fabricate cleats and attachment devices from same material as sheet metal component being anchored or from compatible, noncorrosive metal recommended by sheet metal manufacturer.
   1. Size: As recommended by SMACNA manual or sheet metal manufacturer for application but never less than thickness of metal being secured or 16 gage, whichever is heavier.

J. Fabricate counterflashing in two parts to accommodate re-roofing.

2.5 SHEET METAL FLASHING

A. General: Fabricate sheet metal items in thickness or weight needed to comply with performance requirements but not less than that listed below for each application and metal.

B. Base Flashing: Fabricate from the following material:
   1. Galvanized Steel: 0.0276 inch (0.7 mm) thick.

C. Counterflashing: Fabricate from the following material:
   1. Galvanized Steel: 0.0217 inch (0.55 mm) thick.

D. Flashing Receivers: Fabricate from the following material:
   1. Galvanized Steel: 0.0217 inch (0.55 mm) thick.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of the Work.

   1. Verify compliance with requirements for installation tolerances of substrates.
   2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

3.2 INSTALLATION

A. General: Unless otherwise indicated, install sheet metal flashing and trim to comply with performance requirements, manufacturer's installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Anchor units of Work securely in place by methods indicated, providing for thermal expansion of metal units; conceal fasteners where possible, and set units true to line and level as indicated. Install Work with laps, joints, and seams that will be permanently water- tight and weatherproof.

B. Install exposed sheet metal Work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather resistant performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

C. Roof-Edge Flashings: Secure metal flashings at roof edges according to FM Loss Prevention Data Sheet 1-49 for specified wind zone.

D. Expansion Provisions: Provide for thermal expansion of exposed sheet metal Work. Space movement joints at maximum of 10 feet (3 m) with no joints allowed within 24 inches (610 mm) of corner or intersection. Where lapped or bayonet-type expansion provisions in Work cannot be used or would not be sufficiently weatherproof and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with mastic sealant (concealed within joints).

E. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pretin edges of sheets to be soldered to a width of 1-1/2 inches (38 mm), except where pretinned surface would show in finished Work.
   1. Do not solder the following:
      a. Coil-coated galvanized steel sheet fascia and exposed components.
   2. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.

F. Sealed Joints: Form non-expansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards. Fill joint with sealant and form metal to completely conceal sealant.
1. Use joint adhesive for nonmoving joints specified not to be soldered.

G. Seams: Fabricate nonmoving seams in sheet metal with flat-lock or standing seams as shown. Tin edges to be seamed, form seams, and solder on non-pre-finished materials only.

H. Separations: Separate metal from non-compatible metal or corrosive substrates by coating concealed surfaces, at locations of contact, with asphalt mastic or other permanent separation as recommended by manufacturer.
1. Bed flanges of Work in a thick coat of roofing cement where required for waterproof performance.

I. Underlay all flashing with adhesive underlayment, overlapping and extending upward from roofing terminations fully covering substrate beneath copings and similar items.

J. Install reglets to receive counterflashing according to the following requirements:
1. Where reglets are shown in masonry, furnish reglets for installation under Division 4 Section "Unit Masonry."

K. Counterflashings: Coordinate installation of counterflashings with installation of assemblies to be protected by counterflashing. Install counterflashings in reglets or receivers. Secure in a waterproof manner by means of snap-in installation and sealant, lead wedges and sealant, interlocking folded seam, or blind rivets and sealant. Lap counterflashing joints a minimum of 2 inches (50 mm) and bed with sealant.

3.3 CLEANING AND PROTECTION

A. Clean exposed metal surfaces, removing substances that might cause corrosion of metal or deterioration of finishes. Provide final protection and maintain conditions that ensure sheet metal flashing and trim Work during construction is without damage or deterioration other than natural weathering at the time of Substantial Completion.

END OF SECTION 076200

SECTION 077100 - ROOF SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Copings.
2. Roof-edge specialties.
3. Roof-edge drainage systems.
4. Reglets and counterflashings.

B. Preinstallation Conference: Conduct conference at Project site.

C. Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For roof specialties.

1. Include plans, elevations, expansion-joint locations, keyed details, and attachments to other work. Distinguish between plant- and field-assembled work.

C. Samples: For each type of roof specialty and for each color and texture specified.

1.3 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For tests performed by a qualified testing agency.

B. Sample warranty.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing specialties to include in maintenance manuals.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer offering products meeting requirements that are FM Approvals listed for specified class and SPRI ES-1 tested to specified design pressure.

1.6 WARRANTY

A. Roofing-System Warranty: Roof specialties are included in warranty provisions in Section 075423 "Thermoplastic Polyolefin (TPO) Roofing".

B. Special Warranty on Painted Finishes: Manufacturer agrees to repair finish or replace roof specialties that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. FM Approvals' Listing: Manufacture and install copings roof-edge specialties that are listed in FM Approvals' "RoofNav" and approved for windstorm classification, Class 1-90 Identify materials with FM Approvals' markings.

B. SPRI Wind Design Standard: Manufacture and install copings roof-edge specialties tested according to SPRI ES-1 and capable of resisting the following design pressures:

1. Design Pressure: 30 psf outward, 49 psf upward.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of thermal movements. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C) material surfaces.

2.2 COPINGS

A. Metal Copings: Manufactured coping system consisting of metal coping cap in section lengths not exceeding 12 feet (3.6 m) concealed anchorage; with corner units, end cap units, and concealed splice plates with finish matching coping caps.

1. Basis-of-Design Product: Subject to compliance with requirements, provide **Metal-Era, Inc**.; or a comparable product by one of the following:

a. Architectural Products Company.
b. ATAS International, Inc.

2. Formed Aluminum Sheet Coping Caps: Aluminum sheet, 0.040 inch (1.02 mm) thick or thickness as required to meet performance requirements.

    a. Surface: Smooth, flat finish.
    b. Finish: Three-coat fluoropolymer.
    c. Color: As selected by Architect from manufacturer's full range.

3. Corners: Factory mitered and mechanically clinched and sealed watertight.
4. Coping-Cap Attachment Method: Face leg hooked to continuous cleat with back leg fastener exposed, fabricated from coping-cap material.

    a. Face-Leg Cleats: Concealed, continuous galvanized-steel sheet.

2.3 ROOF-EDGE SPECIALTIES

A. Roof-Edge Fascia: Manufactured, two-piece, roof-edge fascia consisting of snap-on metal fascia cover in section lengths not exceeding 12 feet (3.6 m) and a continuous metal receiver with integral drip-edge cleat to engage fascia cover and secure single-ply roof membrane. Provide matching corner units.

1. Basis-of-Design Product: Subject to compliance with requirements, provide **Metal-Era, Inc.**; or a comparable product by one of the following:

    a. Hickman Company, W. P.
    b. Metal-Fab Manufacturing, LLC.

2. Formed Aluminum Sheet Fascia Covers: Aluminum sheet, 0.040 inch (1.02 mm) thick thickness as required to meet performance requirements.

    a. Surface: Smooth, flat finish.
    b. Finish: Three-coat fluoropolymer.
    c. Color: As selected by Architect from manufacturer's full range.

3. Corners: Factory mitered and soldered, continuously welded, or mechanically clinched and sealed watertight.
4. Splice Plates: Concealed, of same material, finish, and shape as fascia cover.
5. Receiver: Manufacturer's standard material and thickness.
6. Fascia Accessories: Fascia extenders with continuous hold-down cleats and Soffit trim.

2.4 ROOF-EDGE DRAINAGE SYSTEMS

A. Basis-of-Design Product: Subject to compliance with requirements, provide **Metal-Era, Inc.; Seal-Tite Gutter System** or a comparable product by one of the following:

1. ATAS International, Inc.
2. Hickman Company, W. P.

B. Gutters: Manufactured in uniform section lengths not exceeding **12 feet (3.6 m)**, with matching corner units, ends, outlet tubes, and other accessories. 6 inch x 6 inch section size. Elevate back edge at least 1 inch (25 mm) above front edge. Furnish flat-stock gutter straps, gutter brackets, expansion joints, and expansion-joint covers fabricated from same metal as gutters.

1. Aluminum Sheet: 0.050 inch (1.27 mm) thick.
2. Gutter Profile: Style A according to SMACNA's "Architectural Sheet Metal Manual."
3. Corners: Factory mitered and soldered, continuously welded, mechanically clinched and sealed watertight Factory fabricated.
4. Gutter Supports: Gutter brackets, Straps, Manufacturer's standard supports as selected by Architect with finish matching the gutters.

C. Downspouts: Plain rectangular and Open-face rectangular complete with mitered elbows, manufactured from the following exposed metal. Furnish with metal hangers, from same material as downspouts, and anchors. 4 inch x 4 inch size. Provide with square-to-round transition units at grade for storm drain connection.

1. Formed Aluminum: 0.050 inch (1.27 mm) thick.

D. Aluminum Finish: Three-coat fluoropolymer.

1. Color: As selected by Architect from manufacturer's full range.

2.5 REGLETS AND COUNTERFLASHINGS

A. Reglets: Manufactured units formed to provide secure interlocking of separate reglet and counterflashing pieces, from the following exposed metal:

1. Zinc-Coated Steel: Nominal [0.022-inch (0.56-mm)] [0.028-inch (0.71-mm)] thickness.
2. Formed Aluminum: [0.024 inch (0.61 mm)] [0.050 inch (1.27 mm)] thick.
3. Corners: Factory mitered and [soldered] [continuously welded] [mechanically clinched and sealed watertight.
4. Surface-Mounted Type: Provide reglets with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
5. Stucco Type, Embedded: Provide reglets with upturned fastening flange and extension leg of length to match thickness of applied finish materials.
6. Concrete Type, Embedded: Provide temporary closure tape to keep reglet free of concrete materials, special fasteners for attaching reglet to concrete forms, and guides to ensure alignment of reglet section ends.
7. Masonry Type, Embedded: Provide reglets with offset top flange for embedment in masonry mortar joint.
8. Multiuse Type, Embedded: For multiuse embedment in masonry mortar joints.

B. Counterflashings: Manufactured units of heights to overlap top edges of base flashings by 4 inches (100 mm) and in lengths not exceeding 12 feet (3.6 m) designed to snap into reglets or through-wall-flashing receiver and compress against base flashings with joints lapped, from the following exposed metal:

1. Zinc-Coated Steel: Nominal [0.022-inch (0.56-mm)] [0.028-inch (0.71-mm) thickness.
2. Formed Aluminum: [0.024 inch (0.61 mm)] [0.032 inch (0.81 mm)] thick.

C. Accessories:

1. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where reglet is provided separate from metal counterflashing.

2. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.

D. Zinc-Coated Steel Finish: Two-coat fluoropolymer.

1. Color: As selected by Architect from manufacturer's full range.

E. Aluminum Finish: Two-coat fluoropolymer.

1. Color: As selected by Architect from manufacturer's full range.

2.6 MATERIALS

A. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating designation.

B. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy as standard with manufacturer for finish required, with temper to suit forming operations and performance required.

2.7 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils (0.76 to 1.0 mm) thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.

1. Thermal Stability: ASTM D 1970/D 1970M; stable after testing at 240 deg F (116 deg C).
2. Low-Temperature Flexibility: ASTM D 1970/D 1970M; passes after testing at minus 20 deg F (29 deg C).

B. Felt: ASTM D 226/D 226M, Type II (No. 30), asphalt-saturated organic felt, nonperforated.

C. Slip Sheet: Rosin-sized building paper, 3-lb/100 sq. ft. (0.16-kg/sq. m) minimum.

2.8 MISCELLANEOUS MATERIALS

A. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to meet performance requirements. Furnish the following unless otherwise indicated:

1. Exposed Penetrating Fasteners: Gasketed screws with hex washer heads matching color of sheet metal.
2. Fasteners for Aluminum: Aluminum or Series 300 stainless steel.
3. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A 153/A 153M or ASTM F 2329.

B. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane, silicone polymer sealant of type, grade, class, and use classifications required by roofing-specialty manufacturer for each application.

C. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type joints with limited movement.

D. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

E. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.9 FINISHES

A. Coil-Coated Aluminum Sheet Finishes:

1. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

    a. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat.
    b. Three-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat.

PART 3 - EXECUTION

3.1 UNDERLAYMENT INSTALLATION

A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches (152 mm) staggered 24 inches (610 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). Roll laps with roller. Cover underlayment within 14 days.

1. Apply continuously under copings roof-edge specialties and reglets and counterflashings.
2. Coordinate application of self-adhering sheet underlayment under roof specialties with requirements for continuity with adjacent air barrier materials.

B. Felt Underlayment: Install with adhesive for temporary anchorage to minimize use of mechanical fasteners under roof specialties. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches (50 mm).

C. Slip Sheet: Install with tape or adhesive for temporary anchorage to minimize use of mechanical fasteners under roof specialties. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches (50 mm).

3.2 INSTALLATION, GENERAL

A. General: Install roof specialties according to manufacturer's written instructions. Anchor roof specialties securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, underlayments, sealants, and other miscellaneous items as required to complete roof-specialty systems.

1. Install roof specialties level, plumb, true to line and elevation; with limited oil-canning and without warping, jogs in alignment, buckling, or tool marks.
2. Provide uniform, neat seams with minimum exposure of solder and sealant.
3. Install roof specialties to fit substrates and to result in weathertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.

4. Torch cutting of roof specialties is not permitted.
5. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

1. Coat concealed side of uncoated aluminum and stainless-steel roof specialties with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
2. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof specialties for waterproof performance.

C. Expansion Provisions: Allow for thermal expansion of exposed roof specialties.

1. Space movement joints at a maximum of 12 feet (3.6 m) with no joints within 18 inches (450 mm) of corners or intersections unless otherwise indicated on Drawings.
2. When ambient temperature at time of installation is between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures.

D. Fastener Sizes: Use fasteners of sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

E. Seal concealed joints with butyl sealant as required by roofing-specialty manufacturer.

F. Seal joints as required for weathertight construction. Place sealant to be completely concealed in joint. Do not install sealants at temperatures below 40 deg F (4 deg C).

3.3 COPING INSTALLATION

A. Install cleats, anchor plates, and other anchoring and attachment accessories and devices with concealed fasteners.

B. Anchor copings with manufacturer's required devices, fasteners, and fastener spacing to meet performance requirements.

1. Interlock face-leg drip edge into continuous cleat anchored to substrate at manufacturer's required spacing that meets performance requirements. Anchor back leg of coping with screw fasteners and elastomeric washers at manufacturer's required spacing that meets performance requirements.

3.4 ROOF-EDGE SPECIALITIES INSTALLATION

A. Install cleats, cants, and other anchoring and attachment accessories and devices with concealed fasteners.

B. Anchor roof edgings with manufacturer's required devices, fasteners, and fastener spacing to meet performance requirements.

3.5 ROOF-EDGE DRAINAGE-SYSTEM INSTALLATION

A. General: Install components to produce a complete roof-edge drainage system according to manufacturer's written instructions. Coordinate installation of roof perimeter flashing with installation of roof-edge drainage system.

B. Gutters: Join and seal gutter lengths. Allow for thermal expansion. Attach gutters to firmly anchored gutter supports spaced not more than 24 inches (610 mm) apart or as required by design. Attach ends with rivets and seal with sealant to make watertight. Slope to downspouts.

1. Install gutter with expansion joints at locations indicated but not exceeding 50 feet (15.2 m) apart. Install expansion-joint caps.

C. Downspouts: Join sections with manufacturer's standard telescoping joints. Provide hangers with fasteners designed to hold downspouts securely to walls and 1 inch (25 mm) away from walls; locate fasteners at top and bottom and at approximately 60 inches (1500 mm) o.c.

1. Connect downspouts to underground drainage system indicated.

D. Parapet Scuppers: Install scuppers through parapet where indicated. Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.

3.6 REGLET AND COUNTERFLASHING INSTALLATION

A. Embedded Reglets: See Section 042000 "Unit Masonry" for installation of reglets.

B. Surface-Mounted Reglets: Install reglets to receive flashings where flashing without embedded reglets is indicated on Drawings. Install at height so that inserted counterflashings overlap 4 inches (100 mm) over top edge of base flashings.

C. Counterflashings: Insert counterflashings into reglets or other indicated receivers; ensure that counterflashings overlap 4 inches (100 mm) over top edge of base flashings. Lap counterflashing joints a minimum of 4 inches (100 mm) and bed with butyl sealant. Fit counterflashings tightly to base flashings.

3.7 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder and sealants.

C. Remove temporary protective coverings and strippable films as roof specialties are installed.

END OF SECTION 077100

SECTION 078400 – THROUGH-PENETRATION FIRESTOP SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes through-penetration firestop systems for penetrations through the following fire-resistance-rated constructions, including both empty openings and openings containing penetrating items.

1. Floors.
2. Roofs.
3. Walls and partitions.
4. Smoke barriers.
5. The work of this section shall include, but not limited to:
   a. All clips and other restraining devices necessary for holding fire protection material in place.
   b. Other items necessary for a complete and integral installation thru out the entire perimeter and other penetrations.

B. Related Sections include the following:

1. Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

2. Division 7 Section "Fire Resistive Joint Systems."
3. Divisions 21 thru 23 Sections specifying duct and piping penetrations.
4. Divisions 26 thru 28 Sections specifying cable and conduit penetrations.

1.2 PERFORMANCE REQUIREMENTS

A. General: For penetrations through the following fire-resistance-rated constructions, including both empty openings and openings containing penetrating items, provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated.

1. Fire-resistance-rated walls including fire walls, fire partitions, fire barriers, and smoke barriers.
2. Fire-resistance-rated horizontal assemblies including floor/ceiling assemblies and ceiling membranes of roof/ceiling assemblies.

B. Rated Systems: Provide through-penetration firestop systems with the following ratings determined per ASTM E 814 or UL 1479:

1. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, but not less than that equaling or exceeding fire-resistance rating of constructions peretrated.

2. T-Rated Systems: For the following conditions, provide through-penetration firestop systems with T-ratings indicated, as well as F-ratings, where systems protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas:
   a. Penetrations located outside wall cavities.
   b. Penetrations located outside fire-resistance-rated shaft enclosures.

C. For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that, after curing, do not deteriorate when exposed to these conditions both during and after construction.

1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
2. For floor penetrations with annular spaces exceeding 4 inches (100 mm) in width and exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved, either by installing floor plates or by other means.
3. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.

D. For through-penetration firestop systems exposed to view, provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

1.3 SUBMITTALS

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

B. Shop Drawings: For each through-penetration firestop system, show each type of construction condition penetrated, relationships to adjoining construction, and type of penetrating item. Include firestop design designation of qualified testing and inspecting agency that evidences compliance with requirements for each condition indicated.
1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each through-penetration firestop system configuration for construction and penetrating items.

C. Through-Penetration Firestop System Schedule: Indicate locations of each through-penetration firestop system, along with the following information:
1. Types of penetrating items.
2. Types of constructions penetrated, including fire-resistance ratings and, where applicable, thicknesses of construction penetrated.
3. Through-penetration firestop systems for each location identified by firestop design designation of qualified testing and inspection agency.

D. Qualification Data: For installer.

E. Product Test Reports: From a qualified testing agency indicating through-penetration firestop system complies with requirements, based on comprehensive testing of current products.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is qualified by having the necessary experience, staff, and training to install manufacturer's products per specified requirements. A

manufacturer's willingness to sell its through-penetration firestop system products to Contractor or to an installer engaged by Contractor does not in itself confer qualification on buyer.

B. Source Limitations: Obtain through-penetration firestop systems, for each kind of penetration and construction condition indicated, through one source from a single manufacturer.

C. Fire-Test-Response Characteristics: Provide through-penetration firestop systems that comply with the following requirements:

1. Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is **UL**, **ITS**, or another agency performing testing and follow-up inspection services for firestop systems acceptable to authorities having jurisdiction.
2. Through-penetration firestop systems provide rated systems complying with the following requirements:

    a. Through-penetration firestop system products bear classification marking of qualified testing and inspecting agency.
    b. Through-penetration firestop systems correspond to those indicated by reference to through-penetration firestop system designations listed by the following:

        1) UL in its "Fire Resistance Directory."

        2) ITS in “Directory of Listed Products”.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver through-penetration firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturers’ labels identifying product and manufacturer, date of manufacture, lot number, shelf life if applicable, qualified testing and inspecting agency’s classification marking applicable to Project, curing time, and mixing instructions for multicomponent materials.

B. Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not install through-penetration firestop systems when ambient or substrate temperatures are outside the limits permitted by through-penetration firestop system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.

C. Notify Owner's inspecting agency at least seven days in advance of through-penetration firestop installations; confirm dates and times on days preceding each series of installations.

D. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until each installations has been examined by Owner’s inspecting agency and building inspector, if required by authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, through-penetration firestop systems that may be incorporated into the Work include the following manufacturers:
1. Hilti Construction Chemicals, Inc.
2. International Protective Coatings Corp.
3. Isolatek International.
4. Nelson Firestop Products.
5. Specified Technologies Inc.
6. 3M Fire Protection Products.
7. Tremco.
8. United States Gypsum Company.

2.2 FIRESTOPPING, GENERAL

A. Compatibility: Provide through-penetration firestop systems that are compatible with one another; with the substrates forming openings; and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer and approved by qualified testing and inspecting agency for firestop systems indicated.

B. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with Part 1 “Performance Requirements” Article. Use only components specified by through-penetration firestop system manufacturer and approved by qualified testing and inspecting agency for firestop systems indicated.

C. Accessories include, but are not limited to the following items:

1. Permanent forming/damming/backing materials, including the following:
   a. Slag-/Rock-wool-fiber insulation.
   b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
   c. Fire-rated form board.
   d. Fillers for sealants.
2. Temporary forming materials.
3. Substrate primers
4. Collars.

2.3 MIXING

A. For those products requiring mixing before application, comply with through-penetration firestop system manufacturer’s written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, 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: Clean out openings immediately before installing through-penetration firestop systems to comply with manufacturer's written instructions and with the following requirements:

1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of through-penetration firestop systems.
2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with through-penetration firestop systems. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Priming: Prime substrates where recommended in writing by through-penetration firestop system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Masking Tape: Use masking tape to prevent through-penetration firestop systems from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestop system materials. Remove tape as soon as possible without disturbing firestop system's seal with substrates.

3.3 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

A. General: Install through-penetration firestop systems to comply with "Performance Requirements" Article and with firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
1. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.

C. Install fill materials for firestop systems by proven techniques to produce the following results:
1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.

3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 FIELD QUALITY CONTROL

A. Inspecting Agency: Owner will engage a qualified, independent inspecting agency to inspect through-penetration firestops.
   1. Inspecting agency will state in each report whether inspected through-penetration fire stop systems comply with or deviate from requirements.

B. Proceed with enclosing through-penetration firestop systems with other construction only after inspection reports are issued and firestop installations comply with requirements.

C. Where deficiencies are found, repair, or replace through-penetration firestop systems so they comply with requirements.

3.5 IDENTIFICATION

A. Identify through-penetration firestop systems with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of edge of the firestop systems so that the labels will be visible to anyone seeking to remove penetrating items or firestop systems. Use mechanical fasteners for metal labels. For plastic labels, use self-adhering type with adhesives capable of permanently bonding labels to surfaces on which labels are placed and, in combination with label material, will result in partial destruction of label if removal is attempted. Include the following information on labels:

   1. The words "Warning – Through-Penetration Firestop System - Do Not Disturb. Notify Building Management of Any Damage."
   2. Contractor's name, address, and phone number.
   3. Through-penetration firestop system designation of applicable testing and inspecting agency.
   4. Date of installation.
   5. Through-penetration firestop system manufacturer's name.
   6. Installer's name.

B. In areas exposed to view, label locations shall be determined with care to minimize exposure.

3.6 CLEANING AND PROTECTION

A. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by through-penetration firestop system manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure that through-penetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce systems complying with specified requirements.

THROUGH-PENETRATION FIRESTOP SYSTEM SCHEDULE
FIRESTOP SYSTEMS ARE LISTED USING THE ALPHA-ALPHA-NUMERIC IDENTIFICATION SYSTEM PUBLISHED IN UL'S *FIRE RESISTANCE DIRECTORY*, VOL. 2

TYPE OF PENETRANT	CONSTRUCTION					
	FLOOR PENETRATION SYSTEMS (FIRST ALPHA COMPONENT = C OR F)			WALL PENETRATION SYSTEMS (FIRST ALPHA COMPONENT = C OR W)		
	CONCRETE FLOORS WITH A MINIMUM THICKNESS LESS THAN OR EQUAL TO 5 INCHES	CONCRETE FLOORS WITH A MINIMUM THICKNESS GREATER THAN 5 INCHES	FRAMED FLOORS	CONCRETE OR MASONRY WALLS WITH A MINIMUM THICKNESS LESS THAN OR EQUAL TO 8 INCHES	CONCRETE OR MASONRY WALLS WITH A MINIMUM THICKNESS GREATER THAN 8 INCHES	FRAMED WALLS
NO PENETRATING ITEMS	C-AJ-0001-0999 or F-A-0001-0999	C-BJ-0001-0999		C-AJ-0001-0999, C-BJ-0001-0999, or W-J-0001-0999		W-L-000-1-0999
METALLIC PIPE, CONDUIT, OR TUBING	C-AJ-1001-1999 or F-A-1001-1999	C-BJ-1001-1999, C-BK-1001-1999, or F-B-1001-1999	F-C-1001-1999	C-AJ-1001-1999, C-BJ-1001-1999, or W-J-1001-1999	C-BK-1001-1999 or W-K-1001-1999	W-L-1001-1999
NONMETALLIC PIPE, CONDUIT, OR TUBING	C-AJ-2001-2999 or F-A-2001-2999	C-BJ-2001-2999 or F-B-2001-2999	F-C-2001-2999	C-AJ-2001-2999, C-BJ-2001-2999, or W-J-2001-2999		W-L-2001-2999
ELECTRICAL CABLES	C-AJ-3001-3999 or F-A-3001-3999	C-BJ-3001-3999 or F-B-3001-3999	F-C-3001-3999	C-AJ-3001-3999, C-BJ-3001-3999, or W-J-3001-3999		W-L-3001-3999
CABLE TRAYS WITH ELECTRICAL CABLES	C-AJ-4001-4999 or F-A-4001-4999	C-BJ-4001-4999		C-AJ-4001-4999, C-BJ-4001-4999, or W-J-4001-4999	W-K-4001-4999	W-L-4001-4999
INSULATED PIPES	C-AJ-5001-5999 or F-A-5001-5999	C-BJ-5001-5999	F-C-5001-5999	C-AJ-5001-5999 or W-J-5001-5999		W-L-5001-5999
MISCELLANEOUS ELECTRICAL PENETRANTS	C-AJ-6001-6999 or F-A-6001-6999			C-AJ-6001-6999		W-L-6001-6999
MISCELLANEOUS MECHANICAL PENETRANTS	C-AJ-7001-7999		F-C-7001-7999	C-AJ-7001-7999 or W-J-7001-7999		W-L-7001-7999
GROUPINGS OF PENETRATIONS	C-AJ-8001-8999 or F-A-8001-8999	C-BJ-8001-8999	F-C-8001-8999	C-AJ-8001-8999, C-BJ-8001-8999, or W-J-8001-8999		W-L-8001-8999

For each location where a fire-resistance-rated floor or wall assembly is penetrated, provide a UL-listed through-penetration firestop system selected from the applicable UL number range listed above that complies with Section 078413 - Penetration Firestopping and is suitable for the penetration conditions indicated for the Project.

END OF SECTION 078400

SECTION 079100 - PREFORMED JOINT SEALS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes preformed, foam joint seals.

B. Related Sections:

1. Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 ACTION SUBMITTALS

A. Product Data: For each preformed joint seal product.

B. Samples for Verification: For each type and color of preformed joint seal required.

C. Preformed joint seal schedule.

1.3 INFORMATIONAL SUBMITTALS

A. Product test reports.

B. Sample warranties.

1.4 WARRANTY

A. Special Warranty: Installer agrees to repair or replace preformed joint seals that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer agrees to furnish preformed joint seals to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PREFORMED, FOAM JOINT SEALS

A. Preformed, Foam Joint Seals <Insert drawing designation>: Manufacturer's standard joint seal manufactured from urethane or EVA (ethylene vinyl acetate) foam with minimum density of 10 lb/cu. ft. (160 kg/cu. m) and impregnated with a nondrying, water-repellent agent. Factory produce in precompressed sizes in roll or stick form to fit joint widths based on design criteria indicated, with factory- or field-applied adhesive for bonding to substrates.

1. EMSEAL, Colorseal / Seismic Colorseal
2. Design Criteria:

    a. Nominal Joint Width: As indicated on Drawings.
    b. Movement Capability: -50 percent/+50 percent.

3. Joint Seal Color: As selected by Architect from full range of industry colors.

2.2 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by preformed-joint-seal manufacturer for joint substrates indicated.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to preformed joint seal manufacturer, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces, and formulated to promote best adhesion to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with preformed joint seals and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing preformed joint seals to comply with preformed joint seal manufacturer's written instructions and the following requirements:

1. Remove laitance and form-release agents from concrete.
2. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion.

B. Joint Priming: Prime joint substrates where recommended by preformed joint seal manufacturer or as indicated by tests or prior experience.

C. Masking Tape: Use masking tape where required to prevent contact of adhesive or primer with adjoining surfaces.

3.2 INSTALLATION

A. General: Comply with preformed joint seal manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.

B. Installation of Preformed, Foam Joint Seals:

1. Install each length of seal immediately after removing protective wrapping.
2. Firmly secure compressed joint seals to joint gap side to obtain full bond using exposed pressure-sensitive adhesive or field-applied adhesive as recommended by manufacturer.
3. Do not pull or stretch material. Produce seal continuity at splices, ends, turns, and intersections of joints.
4. For applications at low ambient temperatures, heat foam joint seal material in compliance with manufacturer's written instructions.

END OF SECTION 079100

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes sealants for the following applications, including those specified by reference to this Section:

1. Exterior joints in the following vertical surfaces and non-traffic horizontal surfaces:

    a. Control and expansion joints in cast-in-place concrete.
    b. Joints in metal panel systems.
    c. Joints between different materials listed above
    d. Perimeter joints between materials listed above and frames of doors and windows.
    e. Control and expansion joints in soffit and overhead surfaces.
    f. Other joints, as indicated.

2. Exterior joints in the following horizontal traffic surfaces:

    a. Control, expansion, and isolation joints in cast-in-place concrete slabs.
    b. Tile control and expansion joints.
    c. Joints between different materials listed above.

3. Interior joints in the following vertical surfaces and horizontal nontraffic surfaces:

    a. Control and expansion joints on exposed interior surfaces of exterior walls.
    b. Perimeter joints of exterior openings where indicated.
    c. Control and expansion joints in ceiling and overhead surfaces.
    d. Tile control and expansion joints.
    e. Vertical control joints on exposed surfaces of interior unit masonry and concrete walls and partitions.
    f. Perimeter joints between interior wall surfaces and frames of interior doors, windows, and elevator entrances.
    g. Joints between interior partitions and concrete floors.
    h. Other joints indicated.

4. Interior Joints in the following horizontal traffic surfaces:

    a. Control and expansion joints in cast-in-place concrete slabs.
    b. Control and expansion joints in tile flooring.
    c. Other joints indicated.

5. All joints between dissimilar materials.

B. Related Sections:

1. Section 016001 “Buy American Preference Requirements” for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

2. Division 7 Section "Firestopping" for fire-resistant building joint-sealant systems.
3. Division 9 Section "Gypsum Board" for sealing perimeter joints of gypsum board partitions to reduce sound transmission.

1.2 PERFORMANCE REQUIREMENTS

A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.

1.3 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples for 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. Product Certificates: Signed by manufacturers of joint sealants certifying that products furnished comply with requirements and are suitable for the use indicated.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has specialized in installing joint sealants similar in material, design, and extent to those indicated for this Project and whose work has resulted in joint-sealant installations with a record of successful in-service performance.

B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.

C. Preconstruction Compatibility and Adhesion Testing: Submit to joint sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.

1. Use manufacturers standard test methods to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.

    a. Perform tests under environmental conditions replicating those that will exist during installation.

2. Submit not fewer than nine pieces of each type of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
4. For materials failing tests, obtain joint sealant manufacturers written instructions for corrective measures, including the use of specially formulated primers.
5. Testing will not be required if joint sealant manufacturers submit joint preparation data that are based on previous testing of current sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in original unopened containers or bundles with labels indicated manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multicomponent materials.

B. Store and handle materials in compliance with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: 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.
2. When joint substrates are wet.

B. Joint-Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.

C. Joint-Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

1.7 WARRANTY

A. Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

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

B. Special Manufacturer's Warranty: Manufacturer's standard form in which joint-sealant manufacturer agrees to furnish joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Ten years from date of Substantial Completion.

C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:

1. Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.
2. Disintegration of joint substrates from natural causes exceeding design specifications.
3. Mechanical damage caused by individuals, tools, or other outside agents.
4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 MATERIALS, 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. Colors of Exposed Joint Sealants: Custom as selected by Architect.

2.2 ELASTOMERIC JOINT SEALANTS

A. Elastomeric Sealant Standard: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curring sealant in the Elastomeric Joint-Sealant Schedule at the end of Part 3, including those referencing ASTM C 920 classifications for type, grade, class and uses.

B. Additional Movement Capability: Where additional movement capability is specified in the Elastomeric Joint-Sealant Schedule, provide products with the capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719, to withstand the specified percentage change in the joint width existing at the time of installation and remain in compliance with other requirements of ASTM C 920 for uses indicated.

C. Suitability for Contact with Food: Where elastomeric sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

2.3 SOLVENT-RELEASE JOINT SEALANTS

A. Acrylic-Based Solvent-Release Joint-Sealant Standard: Comply with ASTM C 1311 for each product of this description indicated in the Solvent-Release Joint-Sealant Schedule at the end of Part 3.

B. Butyl-Rubber-Based Solvent-Release Joint-Sealant Standard: Comply with ASTM C 1085 for each product of this description indicated in the Solvent-Release Joint-Sealant Schedule at the end of Part3.

2.4 LATEX JOINT SEALANTS

A. Latex Sealant Standard: Comply with ASTM C 834 for each product of this description indicated in the Latex Joint-Sealant Schedule at the end of Part 3.

2.5 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 filers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, of type indicated below and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

C. Type C: Closed-cell material with a surface skin

D. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26 deg F (minus 32 deg C). Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and otherwise contribute to an optimum sealant performance.

E. 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.

2.6 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. All joints of dissimilar materials to receive joint sealant.

B. Examine joints to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

C. 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. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate

capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following concrete, masonry, or unglazed surfaces of ceramic tile.

3. Remove laitance and form-release agents from concrete.
4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants to metal, glass, porcelain enamel or glazed surfaces of ceramic tile

B. Joint Priming: Prime joint substrates where recommended in writing by joint sealant manufacturer, based on 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 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 C 1193 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.
4. Seal abutting joint at all dissimilar materials.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint profile per Figure 5A in ASTM C 1193, unless otherwise indicated.
4. Provide flush joint profile where indicated per Figure 5B in ASTM C 1193, where indicated.
5. Provide recessed joint configuration, per Figure 5C in ASTM C 1193, of recess depth and at locations indicated.

    a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

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 and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.6 ELASTOMERIC JOINT-SEALANT SCHEDULE

A. Medium-Modulus Neutral-Curing Silicone Sealant: Where joint sealants of this type are indicated, provide products complying with the following:

1. Products:

    a. 791; Dow Corning.
    b. PSI-631; Polymeric Systems, Inc.
    c. Sonolastic 150, Sonneborn.
    d. Spectrem 2; Tremco.

2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.
4. Use Related to Exposure: NT (nontraffic).
5. Use Related to Joint Substrates: G (glass), A (aluminum), and, as applicable to joint substrates indicated, O (other).

    a. Use O Joint Substrates: Coated glass, color anodic aluminum, aluminum coated with a high-performance coating, galvanized steel, brick and masonry, ceramic tile, and wood.

6. Stain-Test-Response Characteristics: Nonstaining to porous substrates per ASTM C 1248.

7. Applications: Exterior and interior joints in vertical surfaces of concrete; between metal and concrete and mortar; perimeter of metal frames in exterior walls; overhead or ceiling joists.

B. Mildew-Resistant Silicone Sealant: Where joint sealants of this type are indicated, provide products formulated with fungicide that are intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposure of high humidity and temperature extremes, and that comply with the following:

1. Products:

   a. 786 Mildew Resistant; Dow Corning.
   b. Omniplus, Sonneborn.
   c. Sanitary 1700; GE Silicones.
   d. Tremsil 600 White; Tremco.
   e. Sololastic 150, Sonneborn.

2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.
4. Use Related to Exposure: NT (nontraffic).
5. Use Related to Joint Substrates: G, A, and, as applicable to joint substrates indicated, O.

   a. Use O Joint Substrates: Coated glass, color anodic aluminum, aluminum coated with a high-performance coating, galvanized steel, and ceramic tile.

6. Applications: Interior joints in vertical surfaces of ceramic tile in toilet rooms, and showers.

C. Multicomponent Pourable Urethane Sealant: Where joint sealants of this type are indicated, provide products complying with the following:

1. Products:

   a. Vulkem 245; Mameco International.
   b. Elasto-Thane 920 Pourable; Pacific Polymers, Inc.
   c. Sikaflex – 2c SL; Sika Corporation.
   d. SL 2; Sonneborn Building Products Div., Chem Rex Inc.

2. Type and Grade: M (multicomponent) and P (pourable).
3. Class: 25.
4. Use Related to Exposure: T (traffic) and NT (nontraffic).
5. Use Related to Joint Substrates: M, A, and, as applicable to joint substrates indicated, O.

   a. Use O Joint Substrates: Coated glass, color anodic aluminum, aluminum coated with a high-performance coating, galvanized steel, brick and masonry, ceramic tile, and wood.

6. Applications: Traffic joints.

D. Single-Component Nonsag Urethane Sealant: Where joints sealants of this type are indicated, provide products complying with the following:

1. Products:

a. Vulkem 921; Mameco International.
b. Dynatrol I; Pecora Corporation.
c. DyMonic; Tremco.
d. NP1; Sonneborn.

2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.
4. Use Related to Exposure: NT (nontraffic).
5. Use Related to Joint Substrates: M, A, and, as applicable to joint substrates indicated, O.

a. Use O Joint Substrates: Coated glass, color anodic aluminum, aluminum coated with a high-performance coating, galvanized steel, brick and masonry, ceramic tile, and wood.

6. Applications: Joints in concrete.

3.7 LATEX JOINT-SEALANT SCHEDULE

A. Latex Sealant: Where joint sealants of this type are indicated, provide products complying with the following:

1. Products:

a. AC-20; Pecora Corporation.
b. Sonolac; Sonneborn Building Products Div., Chem Rex Inc.
c. Tremflex 834; Tremco.

2. Applications: Interior joints in field-painted vertical and overhead surfaces at hollow metal door frames, gypsum drywall, and concrete; and all other locations not indicated otherwise.

3.8 SMOKE AND ACOUSTIC SEALANT

A. Smoke and Acoustical Sealant for Joints between metal decks and walls (non-fire rated): Where joint sealants of this type are indicated, provide products complying with the following:

1. Products (where flutes are parallel to the wall):

a. Provide CP767 Speed Strips pre-formed mineral wool plugs by Hilti if required.
b. CP 506 Smoke and Acoustic Sealant; Hilti.

2. Products (where flutes are perpendicular to the wall):

a. Provide CP777 Speed Strips pre-formed mineral wool plugs by Hilti. Press into flutes.
b. CP 572 Smoke and Acoustic Sealant; Hilti.

END OF SECTION 079200

SECTION 079513.13 - INTERIOR EXPANSION JOINT COVER ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes interior expansion joint cover assemblies.

B. Related Requirements:

1. Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For each expansion joint cover assembly.

1. Include plans, elevations, sections, details, splices, block-out requirement, attachments to other work, and line diagrams and a tabular schedule of expansion joint cover assemblies.

C. Samples: For each expansion joint cover assembly and for each color and texture specified.

PART 2 - PRODUCTS

2.1 ASSEMBLY DESCRIPTION

A. Furnish units in longest practicable lengths to minimize field splicing.

B. Include factory-fabricated closure materials and transition pieces, T-joints, corners, curbs, cross-connections, and other accessories as required to provide continuous expansion joint cover assemblies.

2.2 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Expansion joint cover assemblies shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

B. Expansion Joint Design Criteria

1. Type of Movement: Seismic.

a. Joint Movement: As indicated on Drawings.

2.3 WALL EXPANSION JOINT COVERS

A. Elastomeric-Seal Wall Joint Cover Assembly consisting of elastomeric seal anchored to frames fixed to sides of joint gap.

1. Basis of Design: FWF Series, Construction Specialties, Inc. or approved equal.
2. Application: Wall to wall and Wall to corner.
3. Exposed Metal:

    a. Aluminum: Manufacturer's standard.

4. Seal: Preformed elastomeric membranes or extrusions.

    a. Color: As selected by Architect from manufacturer's full range.

2.4 CEILING EXPANSION JOINT COVERS

A. Elastomeric-Seal Ceiling Joint Cover Assembly consisting of elastomeric seal anchored to frames fixed to sides of joint gap.
1. Basis of Design: FWF Series, Construction Specialties, Inc. or approved equal.
2. Application: Ceiling to ceiling and Wall to ceiling.
3. Seal: Preformed elastomeric membranes or extrusions.

    a. Color: As selected by Architect from manufacturer's full range.

2.5 MATERIALS

A. Aluminum: ASTM B 221 (ASTM B 221M), Alloy 6063-T5 for extrusions; ASTM B 209 (ASTM B 209M), Alloy 6061-T6 for sheet and plate.

B. Elastomeric Seals: Manufacturer's standard preformed elastomeric membranes or extrusions to be installed in metal frames.

C. Moisture Barrier: Manufacturer's standard, flexible elastomeric material.

D. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M.

2.6 ALUMINUM FINISHES

A. Mill finish.

B. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

2.7 ACCESSORIES

A. Moisture Barriers: Manufacturer's standard continuous, waterproof membrane within joint and attached to substrate on sides of joint.

1. Provide where indicated on Drawings.

B. Manufacturer's standard attachment devices, as indicated or required for complete installations.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Prepare substrates according to expansion joint cover assembly manufacturer's written instructions.

B. Coordinate and furnish anchorages, setting drawings, and instructions for installing expansion joint cover assemblies.

C. Comply with manufacturer's written instructions for storing, handling, and installing expansion joint cover assemblies and materials unless more stringent requirements are indicated.

D. Metal Frames: Perform cutting, drilling, and fitting required to install expansion joint cover assemblies.

1. Repair or grout block out as required for continuous frame support using nonmetallic, shrinkage-resistant grout.
2. Install frames in continuous contact with adjacent surfaces.
    a. Shimming is not permitted.
3. Install in true alignment and proper relationship to joints and adjoining finished surfaces measured from established lines and levels.
4. Adjust for differences between actual structural gap and nominal design gap due to ambient temperature at time of installation.
5. Cut and fit ends to accommodate thermal expansion and contraction of metal without buckling of frames.
6. Locate anchors at interval recommended by manufacturer, but not less than 3 inches (75 mm) from each end and not more than 24 inches (600 mm) o.c.

E. Seals: Install elastomeric seals and membranes in frames to comply with manufacturer's written instructions. Install with minimum number of end joints.

1. Provide in continuous lengths for straight sections.
2. Seal transitions. Vulcanize or heat-weld field-spliced joints as recommended by manufacturer.
3. Installation: Mechanically lock seals into frames or adhere to frames with adhesive or pressure-sensitive tape as recommended by manufacturer.

F. Install with hairline mitered corners where expansion joint cover assemblies change direction or abut other materials.

G. Terminate exposed ends of expansion joint cover assemblies with field- or factory-fabricated termination devices.

H. Moisture Barrier Drainage: If indicated, provide drainage fittings and connect to drains.

3.2 PROTECTION

A. Do not remove protective covering until finish work in adjacent areas is complete.

B. Protect the installation from damage by work of other Sections.

END OF SECTION 079513.13

081113	HOLLOW METAL DOORS & FRAMES
081416	FLUSH WOOD DOORS
08229.23	SLIDING AUTOMATIC ENTRANCES
083313	COILING COUNTER DOOR
083613	SECTIONAL DOORS
084113	ALUMINUM FRAMED STOREFRONTS
087100	DOOR HARDWARE
088000	GLAZING

DOORS & WINDOWS

division 8

SAA

SANDERS ASSOCIATES ARCHITECTS

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes hollow-metal work.

B. Related Sections:

1. Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include elevations, door edge details, frame profiles, metal thicknesses, preparations for hardware, and other details.

C. Schedule: Prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings.

1.4 INFORMATIONAL SUBMITTALS

A. Product test reports.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Amweld International, LLC.
2. Apex Industries, Inc.
3. Ceco Door Products; an Assa Abloy Group company.
4. Commercial Door & Hardware Inc.
5. Concept Frames, Inc.
6. Curries Company; an Assa Abloy Group company.
7. Custom Metal Products.

8. Daybar.
9. Deansteel.
10. de La Fontaine Industries.
11. DKS Steel Door & Frame Sys. Inc.
12. Door Components, Inc.
13. Fleming-Baron Door Products.
14. Gensteel Doors Inc.
15. Greensteel Industries, Ltd.
16. HMF Express.
17. Hollow Metal Inc.
18. Hollow Metal Xpress.
19. J/R Metal Frames Manufacturing, Inc.
20. Karpen Steel Custom Doors & Frames.
21. L.I.F. Industries, Inc.
22. LaForce, Inc.
23. Megamet Industries, Inc.
24. Mesker Door Inc.
25. Michbi Doors Inc.
26. MPI Group, LLC (The).
27. National Custom Hollow Metal.
28. North American Door Corp.
29. Philipp Manufacturing Co (The).
30. Pioneer Industries, Inc.
31. Premier Products, Inc.
32. Republic Doors and Frames.
33. Rocky Mountain Metals, Inc.
34. Security Metal Products Corp.
35. Shanahans Manufacturing Ltd.
36. Steelcraft; an Ingersoll-Rand company.
37. Steward Steel; Door Division.
38. Stiles Custom Metal, Inc.
39. Titan Metal Products, Inc.
40. Trillium Steel Doors Limited.
41. West Central Mfg. Inc.

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings and temperature-rise limits indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

1. Smoke-and Draft-Control Assemblies: Provide an assembly with gaskets listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing according to UL 1784 and installed in compliance with NFPA 105.

B. Thermally Rated Door Assemblies: Provide door assemblies with U-factor of not more than 0.37 deg Btu/F x h x sq. ft. when tested according to ASTM C 518.

2.3 INTERIOR DOORS AND FRAMES

A. Heavy-Duty Doors and Frames: SDI A250.8, Level 2.

1. Physical Performance: Level B according to SDI A250.4.
2. Doors:

    a. Type: As indicated in the Door and Frame Schedule.
    b. Thickness: 1-3/4 inches (44.5 mm).
    c. Face: Uncoated, and Metallic-coated, cold-rolled steel sheet, minimum thickness of 0.042 inch (1.0 mm). (Refer to door schedule).
    d. Edge Construction: Model 2, Seamless.
    e. Core: Manufacturer's standard. (Provide Insulated doors where indicated in Door Schedule)

3. Frames:

    a. Materials: Uncoated, and Metallic-coated, steel sheet, minimum thickness of 0.053 inch (1.3 mm).
    b. Construction: Face Welded.

4. Exposed Finish: Prime.

2.4 EXTERIOR HOLLOW-METAL DOORS AND FRAMES

A. Extra-Heavy-Duty Doors and Frames: SDI A250.8, Level 3.

1. Physical Performance: Level A according to SDI A250.4.
2. Doors:

    a. Type: As indicated in the Door and Frame Schedule.
    b. Thickness: 1-3/4 inches (44.5 mm).
    c. Face: Metallic-coated steel sheet, minimum thickness of 0.053 inch (1.3 mm), with minimum A40 (ZF120) coating.
    d. Edge Construction: Model 2, Seamless.
    e. Core: Polyurethane

3. Thermal-Rated Doors: Provide doors fabricated with thermal-resistance value (U-value) of not less than 0.37 deg F x h x sq. ft. when tested according to ASTM C 518.

4. Frames:

    a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch (1.3 mm), with minimum A40 (ZF120) coating.
    b. Construction: Face Welded.

5. Exposed Finish: Prime.

2.5 FRAME ANCHORS

A. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch (1.0 mm) thick, with corrugated or perforated straps not less than 2 inches (51 mm) wide by 10 inches (254 mm) long; or wire anchors not less than 0.177 inch (4.5 mm) thick.

2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch (1.0 mm) thick.
3. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch- (9.5-mm-) diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch (1.0 mm), and as follows:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

2.6 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.

D. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z (12G) coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.

E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

F. Power-Actuated Fasteners in Concrete: From corrosion-resistant materials.

G. Grout: ASTM C 476, except with a maximum slump of 4 inches (102 mm), as measured according to ASTM C 143/C 143M.

H. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing).

I. Glazing: Section 088000 "Glazing."

J. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mil (0.4-mm) dry film thickness per coat.

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. Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
3. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
4. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.
5. Jamb Anchors: Provide number and spacing of anchors as follows:

    a. Masonry Type: Locate anchors not more than 16 inches (406 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c., to match coursing, and as follows:

        1) Two anchors per jamb up to 60 inches (1524 mm) high.
        2) Three anchors per jamb from 60 to 90 inches (1524 to 2286 mm) high.
        3) Four anchors per jamb from 90 to 120 inches (2286 to 3048 mm) high.
        4) Four anchors per jamb plus one additional anchor per jamb for each 24 inches (610 mm) or fraction thereof above 120 inches (3048 mm) high.

    b. Stud-Wall Type: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c. and as follows:

        1) Three anchors per jamb up to 60 inches (1524 mm) high.
        2) Four anchors per jamb from 60 to 90 inches (1524 to 2286 mm) high.
        3) Five anchors per jamb from 90 to 96 inches (2286 to 2438 mm) high.
        4) Five anchors per jamb plus one additional anchor per jamb for each 24 inches (610 mm) or fraction thereof above 96 inches (2438 mm) high.

    c. Postinstalled Expansion Type: Locate anchors not more than 6 inches (152 mm) from top and bottom of frame. Space anchors not more than 26 inches (660 mm) o.c.

6. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers.

    a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.

C. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.

1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.

D. Stops and Moldings: Provide stops and moldings around glazed lites and louvers where indicated. Form corners of stops and moldings with mitered hairline joints.

1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow-metal work.

2. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
3. Provide loose stops and moldings on inside of hollow-metal work.
4. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

2.8 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.

1. Shop Primer: SDI A250.10.

2.9 ACCESSORIES

A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.

B. Grout Guards: Formed from same material as frames, not less than 0.016 inch (0.4 mm) thick.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Hollow-Metal Frames: Install hollow-metal frames of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

    a. At fire-rated openings, install frames according to NFPA 80.
    b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
    c. Install frames with removable stops located on secure side of opening.
    d. Install door silencers in frames before grouting.
    e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
    f. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
    g. Field apply bituminous coating to backs of frames that will be filled with grout containing antifreezing agents.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
5. Concrete Walls: Solidly fill space between frames and concrete with mineral-fiber insulation.

6. 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.
7. In-Place Metal or Wood-Stud Partitions: Secure slip-on drywall frames in place according to manufacturer's written instructions.
8. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb 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.

B. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Steel Doors:

    a. Between Door and Frame Jambs and Head: 1/8 inch (3.2 mm) plus or minus 1/32 inch (0.8 mm).
    b. At Bottom of Door: 5/8 inch (15.8 mm) plus or minus 1/32 inch (0.8 mm).
    c. Between Door Face and Stop: 1/16 inch (1.6 mm) to 1/8 inch (3.2 mm) plus or minus 1/32 inch (0.8 mm).

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
3. Smoke-Control Doors: Install doors and gaskets according to NFPA 105.

C. Glazing: Comply with installation requirements in Section 088000 "Glazing" and with hollow-metal manufacturer's written instructions.

1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches (230 mm) o.c. and not more than 2 inches (51 mm) o.c. from each corner.

3.2 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow-metal work immediately after installation.

C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

D. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

E. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION 081113

SECTION 081416 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Solid-core doors with wood-veneer faces.
2. Factory finishing flush wood doors.
3. Factory fitting flush wood doors to frames and factory machining for hardware.

B. Related Sections:

1. Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

2. Section 8 "Hollow metal Doors & Frames" for frames.

1.2 SUBMITTALS

A. Product Data: For each type of door. Include details of core and edge construction, trim for openings, and louvers.
1. Include factory-finishing specifications.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.
1. Indicate dimensions and locations of mortises and holes for hardware.
2. Indicate dimensions and locations of cutouts.
3. Indicate requirements for veneer matching.
4. Indicate doors to be factory finished and finish requirements.
5. Indicate fire ratings for fire doors.

C. Samples for Initial Selection: Color charts consisting of actual materials in small sections for the following:
1. Faces of factory-finished doors. Show the full range of colors available.

D. Samples for Verification: As follows:
1. Corner sections of doors approximately 8 by 10 inches (200 by 250 mm) with door faces and edgings representing the typical range of color and grain for each species of veneer and solid lumber required. Finish sample with same materials proposed for factory-finished doors.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.

B. Source Limitations: Obtain flush wood doors through one source from a single manufacturer.

C. Quality Standard: Comply with the following standard:
   1. WDMA I.S.1-A, "Architectural Wood Flush Doors."

D. Forest Certification: Provide doors made with not less than 70 percent of wood products obtained from forests certified by an FSC-accredited certification body to comply with FSC STD- "FSC Principles and Criteria for Forest Stewardship."

E. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.
   1. Test Pressure: Test at atmospheric pressure.
   2. Oversized, Fire-Rated Wood Doors: For door assemblies exceeding sizes of tested assemblies, provide manufacturer's certificate stating that doors comply with all standard construction requirements of tested and labeled fire-door assemblies except for size.
   3. Temperature-Rise Rating: At stairwell enclosures, provide doors that have a temperature-rise rating of 250 deg F (139 deg C) maximum in 30 minutes of fire exposure.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Protect doors during transit, storage, and handling to prevent damage, soiling, and deterioration. Comply with requirements of referenced standard and manufacturer's written instructions.
   1. Individually package doors in cardboard cartons and wrap bundles of doors in plastic sheeting.

B. Mark each door with individual opening numbers used on Shop Drawings. Use removable tags or concealed markings.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until building is enclosed, wet-work is complete, and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period.

1.6 WARRANTY

A. General Warranty: Door manufacturer's warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

B. Door Manufacturer's Warranty: Submit written agreement on door manufacturer's standard form, signed by manufacturer, Installer, and Contractor, agreeing to repair or replace defective doors that have warped (bow, cup, or twist) more than 1/4 inch (6.35 mm) in a 42-by-84-inch (1067-by-2134-mm) section or that show telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch (0.25 mm in a 75-mm) span, or do not comply with tolerances in referenced quality standard.
   1. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.

2. Warranty shall be in effect during the following period of time after the date of Substantial Completion:
   a. Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Flush Wood Doors:
   a. Algoma Hardwoods Inc.
   b. Eggers Industries; Architectural Door Division.
   c. Graham Manufacturing Corp.
   d. Ideal Wood Products, Inc.
   e. Marshfield Industries, Inc.
   f. Oshkosh, Inc

2.2 DOOR CONSTRUCTION, GENERAL

A. Low-Emitting Materials: Provide doors made with adhesives and composite wood products that do not contain urea formaldehyde.

B. WDMA I.S.1-A Performance Grade:
1. Heavy Duty unless otherwise indicated.
2. Extra Heavy Duty: Public toilets, janitor's closets, assembly spaces, exits.

C. Particleboard-Core Doors:

1. Particleboard: ANSI A208.1, **Grade LD-2, made with binder containing no urea-formaldehyde**.
2. Blocking: Provide wood blocking in particleboard-core doors as needed to eliminate through-bolting hardware.
   a. 5-inch (125-mm) top-rail blocking, in doors indicated to have closers.
   b. 5-inch (125-mm) bottom-rail blocking, in exterior doors and doors indicated to have kick, mop, or armor plates.
   c. 5-inch (125-mm) midrail blocking, in doors indicated to have exit devices.

2.3 DOORS FOR OPAQUE FINISH

A. Interior Solid-Core Doors:

1. Grade: **Premium with Grade AA Faces**.
2. Species: **White Oak (Rift Cut).**
3. Match between Veneer Leaves: **Book** match.
4. Assembly of Veneer Leaves on Door Faces: **Center-balance** match.
5. Pair and Set Match: Provide for doors hung in same opening **or separated only by mullions**.
6. Exposed Vertical and Top Edges: same species as face any closed-grain hardwood.
7. Core: Particleboard.

8. Construction: Five plies. Stiles and rails are bonded to core, then entire unit abrasive planed before veneering.
9. WDMA I.S.1-A Performance Grade: **Extra Heavy Duty**.

2.4 Fire-Rated Doors: Comply with the following requirements:

1. Construction: Construction and core specified above for type of face indicated or manufacturer's standard mineral-core construction as required to provide fire rating indicated.
2. Blocking: Provide composite blocking with improved screw-holding capability approved for use in doors of fire ratings indicated and as follows:
   a. 5-inch (125-mm) top-rail blocking.
   b. 5-inch (125-mm) bottom-rail blocking, at doors indicated to have kick, mop, or armor plates.
   c. 4-1/2-by-10-inch (114-by-250-mm) lock blocks.
   d. 5-inch (125-mm) midrail blocking, at doors indicated to have exit devices.
   e. As necessary to eliminate need for through-bolting hardware.
3. Edge Construction: At hinge stiles, provide manufacturer's standard laminated-edge construction with improved screw-holding capability and split resistance and with outer stile matching face veneer.
4. Pairs: Provide fire-rated pairs with fire-retardant stiles that are labeled and listed for kinds of applications indicated without formed-steel edges and astragals.

2.5 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
   1. Comply with clearance requirements of referenced quality standard for fitting. Comply with NFPA 80 requirements for fire-rated doors.

B. Factory machine doors for hardware that is not surface applied. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.
   1. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before factory machining.
   2. Metal Astragals: Pre-machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.

C. Openings: Cut and trim openings through doors to comply with applicable requirements of referenced standards for kind(s) of door(s) required.
   1. Light Openings: Trim openings with moldings of material and profile indicated.

2.6 FACTORY FINISHING

A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.

1. Finish faces, all four edges, edges of cutouts, and mortises. Fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.

B. Finish wood doors at Factory.

C. Transparent Finish:

1. Grade: **Premium**.
2. Finish: Manufacturer's standard finish with performance requirements comparable to
1. AWS System 10 UV cured polyurethane.
2. Staining: **none**.
3. Effect: **Filled finish**
4. Sheen: **Semigloss**.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Hardware: For installation, see **Section 8 "Door Hardware."**

B. Manufacturer's Written Instructions: Install wood doors to comply with manufacturer's written instructions, referenced quality standard, and as indicated.
1. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80. C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

C. Factory-Finished Doors: Restore finish before installation, if fitting or machining is required at Project site.

3.2 ADJUSTING AND PROTECTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Refinish or replace doors damaged during installation.

C. Protect doors as recommended by door manufacturer to ensure that wood doors are without damage or deterioration at the time of Substantial Completion

END OF SECTION 081416

SECTION 084229.23 - SLIDING AUTOMATIC ENTRANCES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following types of automatic entrances:
1. Exterior and interior, single slide and bi-parting, sliding automatic entrances.
2. Entrances shall have access control locking.

B. Related Sections:

1. Section 016001 “Buy American Preference Requirements” for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

2. Division 7 Sections for caulking to the extent not specified in this section.
3. Division 8 Section "Aluminum-Framed Entrances and Storefronts" for entrances furnished and installed separately in Division 8 Section.
4. Division 8 Section "Door Hardware" for hardware to the extent not specified in this Section.
5. Division 8 Section Glazing for materials and installation requirements of glazing for automatic entrances.
6. Division 26 Sections for electrical connections provided separately, including conduit and wiring, for power to and monitoring of sliding automatic entrances.
7. Division 28 Section “Electronic Safety and Security” for systems not specified in this section.

1.2 REFERENCES

A. General: Standards listed by reference, including revisions by issuing authority, form a part of this specification section to extent indicated. Standards listed are identified by issuing authority, authority abbreviation, designation number, title or other designation established by issuing authority. Standards subsequently referenced herein are referred to by issuing authority abbreviation and standard designation.

B. Underwriters Laboratories (UL):
1. UL 325 – Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems.

C. American National Standards Institute (ANSI) / Builders’ Hardware Manufacturers Association (BHMA):
1. ANSI/BHMA A156.10: Standard for Power Operated Pedestrian Doors.
2. ANSI/BHMA A156.5: Standard for Auxiliary Locks and Associated Products

D. American Society for Testing and Materials (ASTM):
1. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
2. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate

3. ASTM E283 - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

E. American Association of Automatic Door Manufacturers (AAADM):

F. ASHRAE 90.1: Energy Standard for Buildings Except Low-Rise Residential Buildings.

G. National Fire Protection Association (NFPA):
1. NFPA 101 – Life Safety Code.
2. NFPA 70 – National Electric Code.

H. National Fenestration Rating Council (NRFC).
1. NFRC 100: Procedure for Determining Fenestration Product U-factors.
2. NFRC 200: Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence.
3. NFRC 400: Procedure for Determining Fenestration Product Air Leakage
4. NFRC 500: Procedure for Determining Fenestration Product Condensation Resistance Values.

I. International Code Council (ICC):
1. IBC: International Building Code
2. IECC: International Energy Conservation Code

J. Building Officials and Code Administrators International (BOCA), 1999:

K. International Organization for Standardization (ISO):
1. ISO 9001 - Quality Management Systems
2. ISO 14025 – Environmental Labels and Declarations -- Type III Environmental Declarations -- Principles and Procedures
3. ISO14040 – Environmental Management -- Life Cycle Assessment -- Principles and Framework
4. ISO 14044 – Environmental Management -- Life Cycle Assessment -- Requirements and Guidelines
5. ISO 21930 – Sustainability in Buildings and Civil Engineering Works -- Core Rules For Environmental Product Declarations Of Construction Products And Services

L. LEED: Leadership in Energy and Environmental Design

M. National Association of Architectural Metal Manufacturers (NAAMM):
1. Metal Finishes Manual for Architectural and Metal Products.

N. American Architectural Manufacturers Association (AAMA):
1. AAMA 606.1 – Integral Color Anodic Finishes for Architectural Aluminum.
2. AAMA 611 Voluntary Specification for Anodized Architectural Aluminum.
3. AAMA 701 Voluntary Specification for Pile Weatherstripping and Replaceable Fenestration Weatherseals.

O. United Nations Central Product Classification (UNCPC):
1. UNCPC 4212 - Product Category Rules for Preparing an Environmental Product Declaration for Power-Operated Pedestrian Doors and Revolving Doors

1.3 DEFINITIONS

A. Activation Device: Device that, when actuated, sends an electrical signal to the door operator to open the door.

B. Safety Device: Device that prevents a door from opening or closing, as appropriate.

1.4 PERFORMANCE REQUIREMENTS

A. General: Provide automatic entrance door assemblies capable of withstanding loads and thermal movements based on testing manufacturer's standard units in assemblies similar to those indicated for this Project.

B. Operating Range: Minus 30 deg F (Minus 34 deg C) to 130 deg F (54 deg C).

C. Opening-Force Requirements for Egress Doors: Force shall be adjustable; but, not more than 50 lbf (222 N) required to manually set swinging egress door panel(s) in motion.

D. Closing-Force Requirements: Not more than 30 lbf (133 N) required to prevent door from closing.

E. Air Infiltration: Maximum air leakage through fixed glazing and framing areas of 1.0 cfm/sf. (5.1 L/s-m^2) of fixed entrance system area when tested according to ASTM E 283 and NFRC 400 at a minimum static-air-pressure difference of 1.57 lbf/sf (75 Pa).

F. Sliding automatic entrances specified with access control locking shall be designed to function as follows when set for secure operation:
1. Entrances shall be normally closed and locked by access control locking system with exterior motion activation system disabled. Interior motion activation system to remain enabled, free egress.
2. Upon signal from exterior secure activation device, sliding automatic entrances will unlock and open enabling motion activation system. Entrance will be held open as long as an object or pedestrian remains in the activation or safety zones.
3. Once all activation and safety zones have cleared the entrance will close and re-lock, returning to normal state.
4. At any time during the cycle emergency egress can be achieved by utilizing the emergency breakaway feature.

G. Energy Performance Requirements: Sliding automatic entrances shall be evaluated to confirm compliance with energy performance requirements as follows:
1. U-Factor: 0.95 – 0.75 BTU/hr-ft^2-°F in accordance with NFRC 100.
2. Solar Heat Gain Coefficient (SHGC): 0.45 in accordance with NFRC 200.
3. Visible Light Transmittance (VT): 30 – 60 Percent in accordance with NFRC 200.
4. Condensation Resistance (CR): 19 – 21 in accordance with NFRC 500.

1.5 SUBMITTALS

A. General: Submit the following in accordance with Conditions of the Contract and Division 1 Specification Sections.

B. Shop Drawings: Include plans, elevations, sections, details, hardware mounting heights, and attachments to other work.

C. Color Samples for selection of factory-applied color finishes.

D. Closeout Submittals:

1. Owner's Manual.
2. Warranties.

E. Reports: Based on evaluation performed by a qualified agency, for automatic entrance door assemblies.
1. Environmental Product Declaration.
2. Evaluation Report for compliance with IBC.

F. Informational Submittals: Manufacturer's product information and applicable sustainability program credits that are available to contribute towards a LEED rated project certification. Credit MR 4.1 and 4.2: Manufacturer's or fabricator's certificate indicating percentage of post-consumer recycled content by weight and pre-consumer recycled content by weight for each Product specified under this Section.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative, with certificate issued by AAADM, who is trained for installation and maintenance of units required for this Project.

B. Manufacturer Qualifications: A qualified manufacturer with a manufacturing facility certified under ISO 9001.

C. Manufacturer shall have in place a national service dispatch center providing 24 hours a day, 7 days a week, emergency call back service.

D. Certifications: Automatic sliding door systems shall be certified by the manufacturer to meet performance design criteria in accordance with the following standards:
1. ANSI/BHMA A156.10.
2. NFPA 101.
3. UL 325 listed.
4. IBC 2009 and 2012.
5. BOCA.
6. ASHRAE 90.1: Air leakage, U-Factor, SHGC, VT, CR.
7. IECC: U-Factor, SHGC, VT, CR.

E. Source Limitations: Obtain automatic entrance door assemblies through one source from a single manufacturer.

F. Product Options: Drawings indicate sizes, profiles, and dimensional requirements of automatic entrance door assemblies and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."

G. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

H. Emergency-Exit Door Requirements: Comply with requirements of authorities having jurisdiction for automatic entrances serving as a required means of egress.

1.7 PROJECT CONDITIONS

A. Field Measurements: General Contractor shall verify openings to receive automatic entrance door assemblies by field measurements before fabrication and indicate measurements on Shop

Drawings.

B. Mounting Surfaces: General Contractor shall verify all surfaces to be plumb, straight and secure; substrates to be of proper dimension and material.

C. Other trades: General Contractor shall advise of any inadequate conditions or equipment.

1.8 COORDINATION

A. Templates: Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing automatic entrances to comply with indicated requirements.

A. Electrical System Roughing-in: Coordinate layout and installation of automatic entrance door assemblies with connections to power supplies and remote monitoring systems, and security access control system. See Division 28 Section “Electronic Safety and Security” for systems not provided under this section.

B. System Integration: Integrate sliding automatic entrances with other systems as required for a complete working installation.
1. Provide electrical interface to allow for remote monitoring of automatic entrance door panel status.

1.2 WARRANTY

A. Automatic Entrances shall be free of defects in material and workmanship for a period of one (1) year from the date of substantial completion.

B. During the warranty period the Owner shall engage a factory-trained technician to perform service and affect repairs. A safety inspection shall be performed after each adjustment or repair and a completed inspection form shall be submitted to the Owner.

C. During the warranty period all warranty work, including but not limited to emergency service, shall be performed during normal working hours.

PART 2 - PRODUCTS

2.1 AUTOMATIC ENTRANCES

A. Basis of Design: Stanley Access Technologies; Dura-Glide™ GreenStar **3000** Series sliding automatic entrances, or approved equal.

2.2 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
1. Headers, stiles, rails, and frames: 6063-T6.
2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
3. Sheet and Plate: ASTM B 209.

B. Sealants and Joint Fillers: Performed under Division 7 Section "Joint Sealants".

2.3 AUTOMATIC ENTRANCE DOOR ASSEMBLIES

A. General: Provide manufacturer's standard automatic entrance door assemblies including doors, sidelights, framing, headers, carrier assemblies, roller tracks, door operators, activation and safety devices, and accessories required for a complete installation.

B. Sliding Automatic Entrances:
   1. Bi-Parting Entrances:
      a. Configuration: Two sliding leaves and two full sidelights.
      b. Traffic Pattern: Two-way.
      c. Emergency Breakaway Capability: Sliding leaves and sidelights.
      d. Mounting: Between jambs.

2.4 COMPONENTS

A. Framing Members: Manufacturer's standard extruded aluminum reinforced as required to support imposed loads.
   1. Nominal Size: 1 3/4 inch by 6 inch
   2. Concealed Fastening: Framing shall incorporate a concealed fastening pocket, and continuous flush insert cover, extending full length of each framing member.

B. Stile and Rail Doors and Sidelights: Manufacturer's standard 1 ¾ inch (45 mm) thick glazed doors with extruded-aluminum tubular stile and rail members. Incorporate concealed tie-rods that span full length of top and bottom rails.
   1. Glazing Stops and Gaskets: Snap-on, extruded-security aluminum stops and preformed gaskets.
   2. Stile Design: Narrow stile; 2 inch (51 mm) width.
   3. Bottom Rail Design: Minimum 4 inch (102 mm) nominal height.
   4. Muntin Bars: Horizontal tubular rail member for each door; 4 ¼" if access controlled

C. Glazing: Furnished under Division 8 Section Glazing. All Glazing furnished under separate section shall be 1 inch (25 mm) insulated, hermetically sealed, with inboard and outboard glass 1/4 inch (6 mm) tempered.
   1. U-Factor Winter Night-Time: **0**.28 BTU/hr-ft^2-°F (1.68 W/m^2-°K)
   2. SHGC: 0.27 (Solarban 70)
   3. VT: 64 Percent

D. Headers: Fabricated from extruded aluminum and extending full width of automatic entrance door units to conceal door operators, carrier assemblies, and roller tracks. Provide hinged or removable access panels for service and adjustment of door operators and controls. Secure panels to prevent unauthorized access.
   1. Mounting: Concealed, with one side of header flush with framing.
   2. Capacity: Capable of supporting up to 220 lb (100 kg) per panel, up to four panels, over spans up to 14 feet (4.3 m) without intermediate supports.

E. Carrier Assemblies and Overhead Roller Tracks: Manufacturer's standard carrier assembly that allows vertical adjustment of at least 1/8 inch (3 mm); consisting of urethane with precision steel lubricated ball-bearing wheels, operating on a continuous roller track. Support panels from carrier assembly by load wheels and anti-riser wheels with factory adjusted cantilever and pivot assembly. Minimum two ball-bearing load wheels and two anti-rise rollers for each active leaf. Minimum load wheel diameter shall be 2 1/2 inch (64 mm); minimum anti-rise roller diameter shall be 2 inch (51 mm).

F. Thresholds: Manufacturer's standard thresholds as indicated below:

1. Continuous standard tapered extrusion double bevel.
2. All thresholds to conform to details and requirements for code compliance.

G. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding fasteners and accessories compatible with adjacent materials.

H. Signage: Provide signage in accordance with ANSI/BHMA A156.10.

2.5 DOOR OPERATORS

A. General: Provide door operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for long-term, operation under normal traffic load for type of occupancy indicated.

B. Electromechanical Operators: Self-contained overhead unit powered by a minimum of 1/4 horsepower, permanent-magnet DC motor with gear reduction drive, microprocessor controller; and encoder.
1. Operation: Power opening and power closing.
2. Features:
   a. Adjustable opening and closing speeds.
   b. Adjustable open check and close check speeds.
   c. Adjustable hold-open time between 0 and 30 seconds.
   d. Obstruction recycle.
   e. On/Off switch to control electric power to operator.
   f. Energy conservation switch that reduces door-opening width.
   g. Closed loop speed control with active braking and acceleration.
   h. Adjustable obstruction recycle time delay.
   i. Self-adjusting stop position.
   j. Self-adjusting closing compression force.
   k. Onboard sensor power supply.
   l. Onboard sensor monitoring.
   m. Optional Switch to open/Switch to close operation.
   n. Fire alarm interface, configurable to safely open or close the entrance on signal from fire alarm system.
3. Mounting: Concealed.
4. Drive System: Synchronous belt type.

C. Electrical service to door operators shall be provided under Division 26 Electrical. Minimum service to be 120 VAC, 5 amps.

2.6 ELECTRICAL CONTROLS

A. Electrical Control System: Electrical control system shall include a microprocessor controller and a high-resolution position encoder. The encoder shall monitor revolutions of the operator shaft and send signals to microprocessor controller to define door position and speed.
1. The high-resolution encoder shall have a resolution of not less than 1024 counts per revolution. Systems utilizing external magnets and magnetic switches are not acceptable.
2. Electrical control system shall include a 24 VDC auxiliary output rated at 1 amp.

B. Performance Data: The microprocessor shall collect, and store performance data as follows:
1. Counter: A non-resettable counter to track operating cycles.
2. Event Reporting: Unit shall include non-volatile event and error recording including number of occurrences of events and errors, and cycle count of most recent events and errors.

3. LED Display: Display presenting the current operating state of the controller.

C. Controller Protection: The microprocessor controller shall incorporate the following features to ensure trouble free operation:
1. Automatic Reset Upon Power Up.
2. Main Fuse Protection.
3. Electronic Surge Protection.
4. Internal Power Supply Protection.
5. Resetable sensor supply fuse protection.
6. Motor Protection, over-current protection.

D. Soft Start/Stop: A “soft-start” “soft-stop” motor driving circuit shall be provided for smooth normal opening and recycling.

E. Obstruction Recycle: Provide system to recycle the sliding panels when an obstruction is encountered during the closing cycle. If an obstruction is detected, the system shall search for that object on the next closing cycle by reducing door closing speed prior to the previously encountered obstruction location, and will continue to close in check speed until doors are fully closed, at which time the doors will reset to normal speed. If obstruction is encountered again, the door will come to a full stop. The doors shall remain stopped until obstruction is removed and operate signal is given, resetting the door to normal operation.

F. Programmable Controller: Microprocessor controller shall be field programmable.
1. The following parameters may be adjusted:
   a. Operating speeds and forces as required to meet specified ANSI/BHMA standard.
   b. Adjustable and variable features specified.
   c. Reduced opening position.
2. Manual programming shall be available through local interface which has a two-digit display with a selection control including three push buttons.

2.7 ACTIVATION AND SAFETY DEVICES

A. Combined Activation and Safety Sensors: Combined activation and safety sensors shall, in a single housing, detect motion and presence in accordance with ANSI/BHMA A156.10. Motion shall be detected using K-band microwave technology, presence by active infrared reflection technology.
1. Mounting Height: Up to 11.5 feet (3.5 m) above finish floor
2. Temperature Range: Between -31°F and 131°F (-35°C to 55°C) in all environmental conditions
3. Relays: Form C, 50V at 0.3A for both activation and safety. Hold time of less than 0.5 seconds.
4. Detection Pattern: When detection is made in the activation zone, and the entrance opens, the safety zone shall extend through the threshold on each side; creating an X-pattern. When activation and safety zones are cleared and the entrance closes the sensor will ignore the X-pattern safety zones.
5. Combined motion and presence sensors shall be equal to or better than X-Zone Sensor by Optex.

B. Photoelectric Beams: In addition to the threshold sensor include a minimum of two (2) doorway holding beams. Photoelectric beams shall be pulsed infrared type, including sender receiver assemblies for recessed mounting.

C. Presence Sensor Monitoring: Sliding automatic entrances control system shall include a means to verify the functionality of all active presence sensors in accordance with ANSI/BHMA

A156.10. A detected fault shall cause automatic operation to cease until the fault is corrected.

2.8 HARDWARE

A. General: Provide units in sizes and types recommended by automatic entrance door and hardware manufacturers for entrances and uses indicated.

B. Emergency Breakaway Feature: Provide release hardware that allows panel(s) to swing out in direction of egress to full 90 degrees from any position in sliding mode. Maximum force to open panel shall be 50 lbf (222 N) according to ANSI/BHMA A156.10. Interrupt powered operation of panel operator while in breakaway mode.
1. Emergency breakaway feature shall include at least one magnetic latching device mounted in the top of each breakaway panel to control panel breakaway force.
2. Panel Closer: Provide factory installed concealed hydraulic door closer in each breakaway panel to return panels that have broken out to a fully closed position.
3. Emergency breakaway feature shall be equal to or better than Stanley Access Technologies Green-Set-Go.
4. Limit Arms: Limit arms shall be provided to control swing of non-sliding panels on break-out; swing shall not exceed 90 degrees. Limit arms shall be spring loaded to prevent shock, and include adjustable friction damping.

B. Deadlocks: None

C. Access Control Locking System: Provide access control locking hardware on sliding automatic entrances as follows:
1. System shall include:
   a. A fail-secure electric solenoid locking device with a self-contained solid-state electronic control factory mounted inside the header.
   b. Vertical rod exit devices incorporated into the sliding door panels that prevent breakout until rod is released.
2. When set for secure operation, the automatic sliding entrance(s) shall electrically latch in the closed position preventing door panels from sliding manually, returning the system to its locked status.

3. During a power interruption:
   a. The solenoid lock shall be engaged, preventing the doors from sliding manually.
   b. Means of egress shall be accomplished by exit device. Exit device shall be concealed vertical rod tamper proof exit device with recessed flush mounted interior release hardware that shall prohibit manual breakout of door(s) from exterior. Flush mounted release hardware shall be concealed within the horizontal muntin bar.

4. Key Switch: Provide exterior mounted key switch with momentary action switch for control of sliding automatic entrances. Key switch shall be jamb style, designed for mounting in 1 3/4-inch (44 mm) framing. Key switch shall include standard 1 1/8 (29 mm) inch mortise cylinder and construction core. Switch shall be SPDT with momentary action contacts rated at a minimum of 3 amps. Faceplate shall be stainless steel with tamper proof screws.

5. Alarm Contacts: Sliding automatic entrances shall include factory installed integrated alarm contacts which shall provide a closed-circuit dry contact for remote monitoring of sliding panel security. Alarm contacts shall be configured to signal forced entry, normal sliding, and emergency breakout conditions.

D. Control Switch: Provide manufacturer's rotary key switch mounted on the interior jamb and door position switch to allow for full control of the automatic entrance door. Controls to include, but are not limited to:

C.

1. One-way traffic
2. Reduced Opening
3. Open/Closed/Automatic

D. Power Switch: Sliding automatic entrances shall be equipped with a two position On/Off rocker keyed rotary switch to control power to the door.

E. Sealing System: Manufacturer's standard air infiltration control system with replaceable components complying with AAMA 701; made of wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.

1. Meeting Stiles and Stiles Meeting Frames: Slide in type, dual pile.
2. Header/Carrier: Single pile
3. Pivoting Stiles: Pivoting stile seals at threshold.
4. Overlapping Stiles: Dual pile seals.
5. Weather Sweeps: Adjustable dual nylon brush sweeps, concealed in the bottom rail.
6. Air Restriction Blocks: Manufacturer's standard stile sealing blocks, top and bottom of all stiles.
7. Sealing system shall be equal to or better than Stanley Access Technologies GreenFit sealing system.

2.9 FABRICATION

A. General: Factory fabricates automatic entrance door assembly components to designs, sizes, and thickness indicated and to comply with indicated standards.

1. Form aluminum shapes before finishing.
2. Use concealed fasteners to greatest extent possible.
   a. Where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration, use self-locking devices.
   b. Reinforce members as required to receive fastener threads.

B. Framing: Provide automatic entrances as prefabricated assemblies.

1. Fabricate tubular and channel frame assemblies with manufacturer's standard mechanical or welded joints. Provide sub-frames and reinforcement as required for a complete system to support required loads.
2. Perform fabrication operations in manner that prevents damage to exposed finish surfaces.
3. Form profiles that are sharp, straight, and free of defects or deformations.
4. Prepare components to receive concealed fasteners and anchor and connection devices.
5. Fabricate components with accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion.

C. Doors: Factory fabricated and assembled in profiles indicated. Reinforce as required to support imposed loads and for installing hardware.

D. Door Operators: Factory fabricated and installed in headers, including adjusting and testing.

E. Glazing: Fabricate framing with minimum glazing edge clearances for thickness and type of glazing indicated.

F. Hardware: Factory install hardware to the greatest extent possible; remove only as required for final finishing operation and for delivery to and installation at Project site.

2.10 ALUMINUM FINISHES

A. General: Comply with NAAMM Metal Finishes Manual for Architectural and Metal Products for recommendations for applying and designing finishes. Finish designations prefixed by AA comply with system established by Aluminum Association for designing finishes.

B. Class I, Color Anodic Finish: AA-M12C22A42/A44 Mechanical Finish: as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.70 mils minimum complying with AAMA 611-98, and the following:
1. Color: Dark Bronze.
2. AAMA 606.1

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine conditions for compliance with requirements for installation tolerances, header support, and other conditions affecting performance of automatic entrances. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Do not install damaged components. Fit frame joints to produce joints free of burrs and distortion. Rigidly secure non-movement joints.

B. Entrances: Install automatic entrances plumb and true in alignment with established lines and grades without warp or rack of framing members and doors. Anchor securely in place.
1. Install surface-mounted hardware using concealed fasteners to greatest extent possible.
2. Set headers, carrier assemblies, tracks, operating brackets, and guides level and true to location with anchorage for permanent support.

C. Door Operators: Connect door operators to electrical power distribution system as specified in Division 26 Sections.

D. Glazing: Performed under Division 8 Section "Glazing" in accordance with sliding automatic entrance manufacturer’s instructions.

E. Sealants: Comply with requirements specified in Division 7 Section "Joint Sealants".

3.3 FIELD QUALITY CONTROL

A. Testing Services: Factory Trained Installer shall test and inspect each automatic entrance door to determine compliance of installed systems with applicable ANSI standards.

3.4 ADJUSTING

A. Adjust door operators, controls, and hardware for smooth and safe operation, for tight closure, and complying with requirements in ANSI/BHMA A156.10.

3.5 CLEANING AND PROTECTION

A. Clean glass and aluminum surfaces promptly after installation. Remove excess glazing and sealant compounds, dirt, and other substances. Repair damaged finish to match original finish. Comply with requirements in Division 8 Section “Glazing”, for cleaning and maintaining glass.

END OF SECTION 084229.23

SECTION 083313 - COILING COUNTER DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Counter doors.

B. Related Requirements:

1. **Section 016001 “Buy American Preference Requirements” for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.**

2. Section 055000 "Metal Fabrications" for door-opening framing and corner guards.

3. Section 087100 for “Door Hardware” lock cylinders.

1.2 ACTION SUBMITTALS

A. Product Data: For each type and size of coiling counter door and accessory.

B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data.

1. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
2. Show locations of controls, locking devices, detectors or replaceable fusible links, and other accessories.
3. Include diagrams for power, signal, and control wiring.

C. Samples: For each exposed product and for each color and texture specified.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.4 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.

1.5 WARRANTY

A. Warranty: Manufacturer's limited door warranty for 2 years for all parts and components.

PART 2 - PRODUCTS

2.1 COUNTER DOOR ASSEMBLY (Door 116D)

A. Counter Door: Coiling counter door formed with curtain of interlocking metal slats.

1. Basis of Design: Overhead Door Corporation, 651 Series.

B. Operation Cycles: Door components and operators capable of operating for not less than 20,000.

C. Door Curtain Material: Stainless steel.

D. Door Curtain Slats: Flat profile slats of 1-1/4-inch (32-mm) center-to-center height.

E. Bottom Bar: Manufacturer's standard continuous channel or tubular shape, fabricated stainless steel and finished.

F. Curtain Jamb Guides: Stainless steel with exposed finish matching curtain slats. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise.

G. Hood: Match curtain material and finish Stainless steel.

1. Mounting: Face of wall.

H. Sill Configuration: No sill.

I. Locking Devices: Equip door with locking device assembly.

1. Locking Device Assembly: Single-jamb side locking bars, operable from inside with cylinder.

J. Manual Door Operator: Push-up operation.

K. Curtain Accessories: Equip door with push/pull handles.

L. Door Finish:

1. Stainless-Steel Finish: No. 4 (polished directional satin).
2. Interior Curtain-Slat Facing: Match finish of exterior curtain-slat face.

2.2 DOOR CURTAIN MATERIALS AND CONSTRUCTION

A. Door Curtains: Fabricate coiling counter door curtain of interlocking metal slats in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:

1. Metal Interior Curtain-Slat Facing: Match metal of exterior curtain-slat face.

B. Curtain Jamb Guides: Manufacturer's standard angles or channels and angles of same material and finish as curtain slats unless otherwise indicated, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain.

2.3 HOODS

A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.

B. Integral Frame, Hood, and Fascia: Welded sheet metal assembly of the following sheet metal(s):

2.4 LOCKING DEVICES

A. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.

1. Lock Cylinders: As specified in Section 087100 "Door Hardware" keyed to building keying system.

2.5 CURTAIN ACCESSORIES

A. Smoke Seals: Equip each fire-rated door with replaceable smoke-seal perimeter gaskets or brushes for smoke and draft control as required for door listing and labeling by a qualified testing agency.

B. Push/Pull Handles: Equip each push-up-operated or emergency-operated door with lifting handles on each side of door, finished to match door.

2.6 COUNTERBALANCE MECHANISM

A. General: Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.

B. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

2.7 MANUAL DOOR OPERATORS

A. General: Equip door with manual door operator by door manufacturer.

B. Push-up Door Operation: Design counterbalance mechanism so that required lift or pull for door operation does not exceed 25 lbf (111 N).

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install coiling counter doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.

B. Fire-Rated Doors: Install according to NFPA 80.

C. Smoke-Control Doors: Install according to NFPA 80 and NFPA 105.

3.2 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain coiling counter doors.

END OF SECTION 083313

SECTION 083613 - SECTIONAL DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes electrically operated sectional doors.

B. Related Section:

C. Related Sections:

1. **Section 016001 “Buy American Preference Requirements” for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.**

2. Section 055000 "Metal Fabrications" for miscellaneous steel supports.

3. Division 8 Section "Door Hardware" for cylinders and keys.

4. Division 26 Sections for electrical connections provided separately, including conduit and wiring, for power to and monitoring of sliding automatic entrances.

5. Division 28 Section “Electronic Safety and Security” for systems not specified in this section.

1.2 PERFORMANCE REQUIREMENTS

A. General Performance: Sectional doors shall meet performance requirements specified without failure due to defective manufacture, fabrication, installation, or other defects in construction and without requiring temporary installation of reinforcing components.

B. Structural Performance: Exterior sectional doors shall withstand the effects of gravity loads, and the following loads and stresses within limits and under conditions indicated according to ASCE/SEI 7

1. Wind Loads: Uniform pressure (velocity pressure) of 25 lbf/sq. ft. (960 Pa), acting inward and outward. Testing to meet ASTM E 330.

C. Air Infiltration: Maximum rate not more than indicated when tested according to ASTM E 283.

1. Air Infiltration: Maximum rate of 0.08 cfm/sq. ft. (0.406 L/s per sq. m) at 15 and 25 mph (24.1 and 40.2 km/h).

D. Seismic Performance: Sectional doors shall withstand the effects of earthquake motions determined according to ASCE/SEI 7

1.3 ACTION SUBMITTALS

A. Product Data: For each type and size of sectional door and accessory.

B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data. Include plans, elevations, sections, details, and attachments to other work.

C. Samples: For each exposed product and for each color and texture specified.

D. Seismic Qualification Certificates: For sectional doors, accessories, and components, from manufacturer.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.

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

C. Standard for Sectional Doors: Fabricate sectional doors to comply with DASMA 102 unless otherwise indicated.

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of sectional doors that fail in materials or workmanship within specified warranty period.

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

B. Special Finish Warranty: Manufacturer's standard form in which 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 STEEL DOOR SECTIONS

A. Exterior Section Faces and Frames: Fabricate from manufacturer's standard zinc-coated (galvanized), cold-rolled, steel sheet.

1. Roll horizontal meeting edges to a continuous, interlocking, keyed, rabbeted, shiplap, or tongue-in-groove weathertight seal, with a reinforcing flange return.
2. For insulated doors, provide sections with continuous thermal-break construction, separating the exterior and interior faces of door.

B. Section Ends and Intermediate Stiles: Enclose open ends of sections with channel end stiles formed from galvanized-steel sheet welded to door section. Provide intermediate stiles formed from galvanized-steel sheet, cut to door section profile, and welded in place. Space stiles not more than 48 inches (1219 mm) apart.

C. Reinforce bottom section with a continuous channel or angle conforming to bottom-section profile.

D. Reinforce sections with continuous 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.

E. Provide reinforcement for hardware attachment.

F. Thermal Insulation: Insulate interior of steel sections with door manufacturer's standard CFC-free insulation, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E 84. Enclose insulation completely within steel sections that incorporate the following interior facing material, with no exposed insulation:

1. Interior Facing Material: Zinc-coated (galvanized), cold-rolled, commercial steel (CS) sheet.

2.2 TRACKS, SUPPORTS, AND ACCESSORIES

A. Tracks: Manufacturer's standard, galvanized-steel track system of configuration indicated, sized for door size and weight, designed for lift type indicated and clearances shown on Drawings. Provide complete track assembly including brackets, bracing, and reinforcement for rigid support of ball-bearing roller guides for required door type and size. Slot vertical sections of track spaced 2 inches (51 mm) apart for door-drop safety device. Slope tracks at proper angle from vertical or design tracks to ensure tight closure at jambs when door unit is closed.

B. Track Reinforcement and Supports: Galvanized-steel track reinforcement and support members. Secure, reinforce, and support tracks as required for door size and weight to provide strength and rigidity without sag, sway, and vibration during opening and closing of doors.

C. Weatherseals: Replaceable, adjustable, continuous, compressible weather-stripping gaskets of flexible vinyl, rubber, or neoprene fitted to bottom and top of sectional door unless otherwise indicated.

D. Windows: Manufacturer's standard window units of type and size indicated and in arrangement shown. Provide removable stops of same material as door-section frames.

2.3 HARDWARE

A. General: Provide heavy-duty, corrosion-resistant hardware, with hot-dip galvanized, stainless-steel, or other corrosion-resistant fasteners, to suit door type.

B. Hinges: Heavy-duty, galvanized-steel hinges at each end stile and at each intermediate stile, according to manufacturer's written recommendations for door size. Attach hinges to door sections through stiles and rails.

C. Rollers: Heavy-duty rollers with steel ball-bearings in case-hardened steel races, mounted with varying projections to suit slope of track. Provide 3-inch- (76-mm-) diameter roller tires for 3-inch- (76-mm-) wide track and 2-inch- (51-mm-) diameter roller tires for 2-inch- (51-mm-) wide track.

D. Push/Pull Handles: For push-up or emergency-operated doors, provide galvanized-steel lifting handles on each side of door.

2.4 COUNTERBALANCE MECHANISM

A. Torsion Spring: Counterbalance mechanism consisting of adjustable-tension torsion springs mounted on torsion shaft made of steel tube or solid steel. Provide springs designed for number of operation cycles indicated.

B. Cable Drums and Shaft for Doors: Cast-aluminum or gray-iron casting cable drums mounted on torsion shaft and grooved to receive door-lifting cables as door is raised. Mount counterbalance mechanism with manufacturer's standard ball-bearing brackets at each end of torsion shaft.

C. Cables: Galvanized-steel lifting cables.

D. Cable Safety Device: Include, on each side-edge of door, a device designed to automatically stop door if either lifting cable breaks.

E. Bracket: Provide anchor support bracket as required to connect stationary end of spring to the wall and to level the shaft and prevent sag.

F. Provide a spring bumper at each horizontal track to cushion door at end of opening operation.

2.5 ELECTRIC DOOR OPERATORS

A. General: Electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and "operation cycles" requirement] specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, remote-control stations, control devices, integral gearing for locking door, and accessories required for proper operation.

1. Comply with NFPA 70.
2. Provide 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.

B. Usage Classification: Electric operator and components capable of operating for not less than number of cycles per hour indicated for each door.

C. Door-Operator Type: Unit of type indicated, consisting of electric motor, gears, pulleys, belts, sprockets, chains, and controls needed to operate door and meet required usage classification.

D. Electric Motors: Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Section 110513 "Common Motor Requirements for Equipment" unless otherwise indicated.

1. Electrical Characteristics:

a. Phase: Single phase.
b. Volts: 115V.
c. Hertz: 60.

2. Motor Type and Controller: Reversible motor and controller (disconnect switch) for motor exposure indicated.
3. Motor Size: Minimum size as indicated. If not indicated, large enough 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.
4. Operating Controls, Controllers (Disconnect Switches), Wiring Devices, and Wiring: Manufacturer's standard unless otherwise indicated.

E. Obstruction Detection Device: Equip motorized door with indicated external automatic safety sensor capable of protecting full width of door opening. Activation of device immediately stops and reverses downward door travel.

1. Photoelectric Sensor: Manufacturer's standard system designed to detect an obstruction in door opening without contact between door and obstruction. Provide self-monitoring capability designed to interface with door-operator control circuit to detect damage to or disconnection of sensor device.
2. Sensor Edge: Automatic safety sensor edge, located within astragal or weather stripping mounted to bottom bar. Contact with sensor activates device. Connect to control circuit using manufacturer's standard take-up reel or self-coiling cable. Provide self-monitoring capability designed to interface with door-operator control circuit to detect damage to or disconnection of sensor device.

F. Card Reader Control: Interior and or exterior locations connected to operator controls.

G. Emergency Manual Operation: Equip each electrically powered door with capability for emergency manual operation. Design manual mechanism so required force for door operation does not exceed 25 lbf (111 N).

H. Emergency Operation Disconnect Device: Equip operator with 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.

I. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.

2.6 DOOR ASSEMBLY

A. Steel Sectional Door: Sectional door formed with hinged sections.

1. Basis-of-Design Product: Subject to compliance with requirements, provide **'C.H.I. Overhead Doors,' 3216 Series Thermally-Broken Insulated Steel Sandwich Sectional Door;** or comparable product by one of the following:

a. Amarr Garage Doors.
b. Arm-R-Lite.
c. C.H.I. Overhead Doors.

d. General American Door Company.
e. Haas Door; a Nofziger company.
f. Martin Door Manufacturing.
g. Overhead Door Corporation.
h. Raynor.
i. Rite-Hite Corporation.
j. Wayne-Dalton Corp.
k. Windsor Republic Doors.

B. Operation Cycles: Not less than 50,000.

C. R-Value: 17.5 deg F x h x sq. ft./Btu (3.082 K x sq. m/W).

D. Steel Sections: Zinc-coated (galvanized) steel sheet, formed into sections 2 inches (51 mm) thick.

1. Exterior-Face Surface: Flat, textured.
2. Exterior Steel: 26 gauge, galvanized.
3. Exterior Color: **Color and gloss as selected by Architect from manufacturer's full range.**
4. Interior Facing Material: 27 gauge, zinc-coated (galvanized) steel sheet, pre-finished color.

E. Track Configuration: **High Lift Standard angle mount,** to meet ceiling height conditions.

F. Weatherseals: Fitted to bottom and top and around entire perimeter of door. Provide combination bottom weatherseal and sensor edge.

G. Manual Door Operator: Push-up operation.

H. Electric Door Operator:

1. Basis-of-Design Product: Subject to compliance with requirements, provide **'Micanan' PRO-J Commercial Operator** or comparable product by one of the following:

a. Amarr Garage Doors.
b. Arm-R-Lite.
c. C.H.I. Overhead Doors.
d. General American Door Company.
e. Haas Door; a Nofziger company.
f. Martin Door Manufacturing.
g. Overhead Door Corporation.
h. Raynor.
i. Rite-Hite Corporation.
j. Wayne-Dalton Corp.
k. Windsor Republic Doors.

2. Usage Classification: Heavy duty, 60 to 90 cycles per hour.
3. Operator Type: Jackshaft, center mounted.
4. Motor Exposure: Interior, clean, and dry.
5. Emergency Manual Operation: Push-up type.
6. Obstruction-Detection Device: Automatic photoelectric sensor pneumatic sensor edge on bottom bar.
7. Lock:

a. Keyed lock with interlock switch for automatic operator

8. Other Equipment: Card reader controls where occurs.

I. Door Finish:

1. Baked-Enamel or Powder-Coated Finish: Color and gloss as selected by Architect from manufacturer's full range.
2. Finish of Interior Facing Material: Finish as selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install sectional doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.

B. Tracks: Provide sway bracing, diagonal bracing, and reinforcement as required for rigid installation of track and door-operating equipment. Repair galvanized coating on tracks according to ASTM A 780.

C. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion. Adjust doors and seals to provide weathertight fit around entire perimeter.

3.2 DEMONSTRATION

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

END OF SECTION 083613

SECTION 084113 - ALUMINUM-FRAMED STOREFRONTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exterior Storefront framing.

B. Related Sections: The following sections contain requirements that relate to this Section:

1. Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

2. Division 8 Section "Glazing" for glazing installed in aluminum storefronts, including entrances specified to be factory glazed.
3. Division 8 Section "Door Hardware."

1.2 SUBMITTALS

A. General: Submit the following in accordance with Conditions of the Contract and Division 1 Specification Sections.
1. Product data for each aluminum entrance and storefront system required, including:
   a. Manufacturer's standard details and fabrication methods.
   b. Data on finishing, hardware and accessories.
   c. Recommendations for maintenance and cleaning of exterior surfaces.
2. Shop drawings for each aluminum entrance and storefront system required, including:
   a. Layout and installation details, including relationship to adjacent work. b. Elevations at 1/4-inch scale.
   b. Detail sections of typical composite members.
   c. Anchors and reinforcement.
   d. Hardware mounting heights.
   e. Provisions for expansion and contraction.
   f. Glazing details.
3. Hardware Schedule: Submit complete hardware schedule organized into sets based on hardware specified. Coordinate hardware with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish. Include item name, name of the manufacturer and complete designations of every item required for each door opening.
   a. Where intent is shown in schematic schedules as specified herein, provide complete operating system for doors indicated.
4. Test Reports: Provide certified test reports from a qualified independent testing laboratory showing that aluminum entrance and storefront systems have been tested in accordance with specified test procedures and comply with performance characteristics indicated.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has completed not less than 15 installations of aluminum storefront and entrances similar in design and extent to those required for the project and whose work has resulted in construction with a record of successful in-service performance for a period of 10 years.

B. Single Source Responsibility: Obtain aluminum entrance and storefront systems from one source and from a single manufacturer.

C. Design Criteria: The drawings indicate the size, profile, and dimensional requirements of aluminum entrance and storefront work required. Aluminum storefront by specified manufacturers may be considered, provided deviations in dimensions and profiles are minor and do not change the design concept as judged by the Architect. The burden of proof of equality is on the proposer.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver aluminum entrance and storefront components in the manufacturer's original protective packaging.

B. Store aluminum components in a clean dry location away from uncured masonry or concrete. Cover components with waterproof paper, tarpaulin or polyethylene sheeting in a manner to permit circulation of air.
   1. Stack framing components in a manner that will prevent bending and avoid significant or permanent damage.

1.5 PROJECT CONDITIONS

A. Field Measurements: Check openings by accurate field measurement before fabrication. Show recorded measurements on shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of the work.
   1. Where necessary, proceed with fabrication without field measurements, and coordinate fabrication tolerances to ensure proper fit.

1.6 WARRANTY

A. Warranty: Submit a written warranty, executed by the manufacturer, agreeing to repair or replace units that fail in materials or workmanship within the specified warranty period. Failures include, but are not necessarily limited to:
   1. Structural failures including excessive deflection, excessive leakage or air infiltration.
   2. Faulty operation.
   3. Deterioration of metals, metal finishes and other materials beyond normal weathering.

B. Warranty Period: 5 years after the date of Substantial Completion.

C. The warranty shall not deprive the Owner of other rights or remedies the Owner may have under other provisions of the Contract Documents, and is in addition to and runs concurrent with other warranties made by the Contractor under requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed entrances and storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.

1. Aluminum-framed entrances and storefronts shall withstand movements of supporting structure, including, but not limited to, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
2. Failure also includes the following:

    a. Thermal stresses transferring to building structure.
    b. Glass breakage.
    c. Noise or vibration created by wind and thermal and structural movements.
    d. Loosening or weakening of fasteners, attachments, and other components.
    e. Failure of operating units.

B. Structural Loads:

1. Wind Loads: As indicated on Drawings.
2. Other Design Loads: As indicated on Drawings.

C. Deflection of Framing Members: At design wind pressure, as follows:

1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane not exceeding 1/175 of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 3/4 inch (19.1 mm), whichever is less.
2. Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span or 1/8 inch (3.2 mm), whichever is smaller.

    a. Operable Units: Provide a minimum 1/16-inch (1.6-mm) clearance between framing members and operable units.

3. Cantilever Deflection: Where framing members overhang an anchor point, as follows:

    a. Perpendicular to Plane of Wall: No greater than 1/240 of clear span plus 1/4 inch (6.35 mm) for spans greater than 11 feet 8-1/4 inches (3.6 m) or 1/175 times span, for spans of less than 11 feet 8-1/4 inches (3.6 m).

D. Structural: Test according to ASTM E 330/E 330M as follows:

1. When tested at positive and negative wind-load design pressures, storefront assemblies, including entrance doors, do not evidence deflection exceeding specified limits.
2. When tested at **150** percent of positive and negative wind-load design pressures, storefront assemblies, including entrance doors and anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0**.2** percent of span.
3. Test Durations: As required by design wind velocity, but not less than **10** seconds.

E. Air Infiltration: Test according to ASTM E 283 for infiltration as follows:

1. Fixed Framing and Glass Area:

a. Maximum air leakage of 0.06 cfm/sq. ft. (0.30 L/s per sq. m) at a static-air-pressure differential of 6.24 lbf/sq. ft. (300 Pa).

2. Entrance Doors:

a. Single Doors: Maximum air leakage of 0.5 cfm/sq. ft. (2.54 L/s per sq. m) at a static-air-pressure differential of 1.57 lbf/sq. ft. (75 Pa).

F. Water Penetration under Static Pressure: Test according to ASTM E 331 as follows:

1. No evidence of water penetration through fixed glazing and framing areas, including entrance doors, when tested according to a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft. (300 Pa).

G. Energy Performance: Certify and label energy performance according to NFRC as follows:

1. Thermal Transmittance (U-factor):
   a. Exterior fixed glazing and framing areas as a system shall have U-factor of not more than 0.38 Btu/sq. ft. x h x deg F as determined according to NFRC 100.
   b. Exterior doors as a system shall have U-factor of not more than 0.77 Btu/sq. ft. x h x deg F as determined according to NFRC 100.
2. Solar Heat Gain Coefficient (SHGC): Exterior fixed glazing and framing areas as a system shall have SHGC of no greater than 0.38 as determined according to NFRC 200.
3. Condensation Resistance: Fixed glazing and framing areas as a system shall have an NFRC-certified condensation resistance rating of no less than 25 as determined according to NFRC 500.

H. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes.

1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 STOREFRONT SYSTEMS

A. **Basis-of-Design:** Subject to compliance with requirements, provide KAWNEER Storefront Systems, or comparable product by the following:

1. Kawneer North America; an Alcoa company, “Basis of Design.”
2. Tubelite Division of Indal, Inc.
3. YKK AP America Inc.

B. Framing Members: Manufacturer's extruded or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.

C. **Exterior Framing Members:** Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads. **Basis-of-design:** Provide KAWNEER Trifab 601UT Storefront Systems, Center Plane.

1. Construction: Thermally broken.
2. Glazing System: Retained mechanically with gaskets on four sides.
3. Glazing Plane: Center. (**Refer to drawings for locations**)
4. Finish: **Dark Bronze** Anodic Finish
5. Fabrication Method: Field-fabricated stick system.

D. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.

E. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

2.3 GLAZING

A. Glazing: Comply with Section 088000 "Glazing."

B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.

C. Glazing Sealants: As recommended by manufacturer.

2.4 MATERIALS

A. Sheet and Plate: ASTM B 209 (ASTM B 209M).

B. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221 (ASTM B 221M).

C. Extruded Structural Pipe and Tubes: ASTM B 429/B 429M.

D. Structural Profiles: ASTM B 308/B 308M.

E. Steel Reinforcement:

1. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
2. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
3. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.
4. Primer: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM, and prepare surfaces according to applicable SSPC standard.

2.5 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Physical and thermal isolation of glazing from framing members.
4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
5. Provisions for field replacement of glazing from exterior.
6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.

E. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.6 ALUMINUM FINISHES

A. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.

1. Color: Dark bronze.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

1. Comply with manufacturer's written instructions.
2. Do not install damaged components.
3. Fit joints to produce hairline joints free of burrs and distortion.
4. Rigidly secure nonmovement joints.
5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
6. Seal perimeter and other joints watertight unless otherwise indicated.

B. Metal Protection:

1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.
2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Set continuous sill members and flashing in full sealant bed, as specified in Section 079200 "Joint Sealants," to produce weathertight installation.

D. Install components plumb and true in alignment with established lines and grades.

E. Install operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.

F. Install glazing as specified in Section 088000 "Glazing."

END OF SECTION 084113

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes:

1. Mechanical and electrified door hardware
2. Electronic access control system components

B. Section excludes:

1. Windows
2. Cabinets (casework), including locks in cabinets
3. Signage
4. Toilet accessories
5. Overhead doors

C. Related Sections:

1. **Section 016001 “Buy American Preference Requirements” for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.**
2. Division 01 Section "Alternates" for alternates affecting this section.
3. Division 06 Section "Rough Carpentry"
4. Division 06 Section "Finish Carpentry"
5. Division 07 Section "Joint Sealants" for sealant requirements applicable to threshold installation specified in this section.
6. Division 08 Sections:
   a. "Metal Doors and Frames"
   b. "Flush Wood Doors"
   c. "Interior Aluminum Doors and Frames"
   d. "Aluminum-Framed Entrances and Storefronts"
   e. "Special Function Doors"
7. Division 26 "Electrical" sections for connections to electrical power system and for low-voltage wiring.
8. Division 28 "Electronic Safety and Security" sections for coordination with other components of electronic access control system and fire alarm system.

1.02 REFERENCES

A. UL LLC

1. UL 10B - Fire Test of Door Assemblies
2. UL 10C - Positive Pressure Test of Fire Door Assemblies
3. UL 1784 - Air Leakage Tests of Door Assemblies
4. UL 305 - Panic Hardware

B. DHI - Door and Hardware Institute

1. Sequence and Format for the Hardware Schedule
2. Recommended Locations for Builders Hardware
3. Keying Systems and Nomenclature
4. Installation Guide for Doors and Hardware

C. NFPA – National Fire Protection Association

1. NFPA 70 – National Electric Code
2. NFPA 80 – 2016 Edition – Standard for Fire Doors and Other Opening Protectives
3. NFPA 101 – Life Safety Code
4. NFPA 105 – Smoke and Draft Control Door Assemblies
5. NFPA 252 – Fire Tests of Door Assemblies

D. ANSI - American National Standards Institute

1. ANSI A117.1 – 2017 Edition – Accessible and Usable Buildings and Facilities
2. ANSI/BHMA A156.1 - A156.29, and ANSI/BHMA A156.31 - Standards for Hardware and Specialties
3. ANSI/BHMA A156.28 - Recommended Practices for Keying Systems
4. ANSI/WDMA I.S. 1A - Interior Architectural Wood Flush Doors
5. ANSI/SDI A250.8 - Standard Steel Doors and Frames

1.03 SUBMITTALS

A. General:

1. Submit in accordance with Conditions of Contract and Division 01 Submittal Procedures.
2. Prior to forwarding submittal:
   a. Review drawings and Sections from related trades to verify compatibility with specified hardware.
   b. Highlight, encircle, or otherwise specifically identify on submittals: deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.

B. Action Submittals:

1. Product Data: Submit technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
2. Riser and Wiring Diagrams: After final approval of hardware schedule, submit details of electrified door hardware, indicating:
   a. Wiring Diagrams: For power, signal, and control wiring and including:
      1) Details of interface of electrified door hardware and building safety and security systems.
      2) Schematic diagram of systems that interface with electrified door hardware.
      3) Point-to-point wiring.
      4) Risers.

3. Samples for Verification: If requested by Architect, submit production sample of requested door hardware unit in finish indicated and tagged with full description for coordination with schedule.

a. Samples will be returned to supplier. Units that are acceptable to Architect may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.

4. Door Hardware Schedule:
   a. Submit concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate fabrication of other work critical in Project construction schedule.
   b. Submit under direct supervision of a Door Hardware Institute (DHI) certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule published by DHI.
   c. Indicate complete designations of each item required for each opening, include:
      1) Door Index: door number, heading number, and Architect's hardware set number.
      2) Quantity, type, style, function, size, and finish of each hardware item.
      3) Name and manufacturer of each item.
      4) Fastenings and other pertinent information.
      5) Location of each hardware set cross-referenced to indications on Drawings.
      6) Explanation of all abbreviations, symbols, and codes contained in schedule.
      7) Mounting locations for hardware.
      8) Door and frame sizes and materials.
      9) Degree of door swing and handing.
      10) Operational Description of openings with electrified hardware covering egress, ingress (access), and fire/smoke alarm connections.

5. Key Schedule:
   a. After Keying Conference, provide keying schedule that includes levels of keying, explanations of key system's function, key symbols used, and door numbers controlled.
   b. Use ANSI/BHMA A156.28 "Recommended Practices for Keying Systems" as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
   c. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
   d. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
   e. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion. Forward bitting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.
   f. Prepare key schedule by or under supervision of supplier, detailing Owner's final keying instructions for locks.

C. Informational Submittals:

1. Provide Qualification Data for Supplier, Installer and Architectural Hardware Consultant.
2. Provide Product Data:
   a. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
   b. Include warranties for specified door hardware.

3. Buy American Certification: Manufacturer is accredited under an accredited third-party Quality Control Program, including IAS AC472 and based upon chapter 17 of the International Building Code (IBC).

D. Closeout Submittals:

1. Operations and Maintenance Data: Provide in accordance with Division 01 and include:
   a. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
   b. Catalog pages for each product.
   c. Final approved hardware schedule edited to reflect conditions as installed.
   d. Final keying schedule
   e. Copy of warranties including appropriate reference numbers for manufacturers to identify project.
   f. As-installed wiring diagrams for each opening connected to power, both low voltage and 110 volts.

E. Inspection and Testing:

1. Submit written reports to the Owner and Authority Having Jurisdiction (AHJ) of the results of functional testing and inspection for:
   a. Fire door assemblies, in compliance with NFPA 80.
   b. Required egress door assemblies, in compliance with NFPA 101.

1.04 QUALITY ASSURANCE

A. Qualifications and Responsibilities:

1. Supplier: Recognized architectural hardware supplier with a minimum of 5 years documented experience supplying both mechanical and electromechanical door hardware similar in quantity, type, and quality to that indicated for this Project. Supplier to be recognized as a factory direct distributor by the manufacturer of the primary materials with a warehousing facility in the Project's vicinity. Supplier to have on staff, a certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) available to Owner, Architect, and Contractor, at reasonable times during the Work for consultation.
2. Installer: Qualified tradesperson skilled in the application of commercial grade hardware with experience installing door hardware similar in quantity, type, and quality as indicated for this Project.
3. Architectural Hardware Consultant: 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 meets these requirements:
   a. For door hardware: DHI certified AHC or DHC.
   b. Can provide installation and technical data to Architect and other related subcontractors.
   c. Can inspect and verify components are in working order upon completion of installation.
   d. Capable of producing wiring diagram and coordinating installation of electrified hardware with Architect and electrical engineers.

4. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.

B. Certifications:

1. Fire-Rated Door Openings:
   a. Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction.

b. Provide only items of door hardware that are listed products tested by UL LLC, Intertek Testing Services, or other testing and inspecting organizations acceptable to authorities having jurisdiction for use on types and sizes of doors indicated, based on testing at positive pressure and according to NFPA 252 or UL 10C and in compliance with requirements of fire-rated door and door frame labels.

2. Smoke and Draft Control Door Assemblies:
   a. Provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105
   b. Comply with the maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at tested pressure differential of 0.3-inch wg (75 Pa) of water.

3. Electrified Door Hardware
   a. Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction.

4. Accessibility Requirements:
   a. Comply with governing accessibility regulations cited in "REFERENCES" article 087100, 1.02.D3 herein for door hardware on doors in an accessible route. This project must comply with all Federal Americans with Disability Act regulations and all Local Accessibility Regulations.

C. Pre-Installation Meetings

1. Keying Conference
   a. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:
      1) Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
      2) Preliminary key system schematic diagram.
      3) Requirements for key control system.
      4) Requirements for access control.
      5) Address for delivery of keys.

2. Pre-installation Conference
   a. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
   b. Inspect and discuss preparatory work performed by other trades.
   c. Inspect and discuss electrical roughing-in for electrified door hardware.
   d. Review sequence of operation for each type of electrified door hardware.
   e. Review required testing, inspecting, and certifying procedures.
   f. Review questions or concerns related to proper installation and adjustment of door hardware.

3. Electrified Hardware Coordination Conference:
   a. Prior to ordering electrified hardware, schedule and hold meeting to coordinate door hardware with security, electrical, doors and frames, and other related suppliers.

D. Buy American Compliance: Materials provided under work of this section shall comply with the following requirements:

1. Buy American Act of 1933 BAA-41 U.S.C., 10a - 10d
2. Buy American Act provision of section 1605 of the American Recovery and Reinvestment Act of 2009 (ARRA)

1.05 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site. Promptly replace products damaged during shipping.

B. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package. Deliver each article of hardware in manufacturer's original packaging.

C. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.

D. Provide secure lock-up for door hardware delivered to Project. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.

E. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.

F. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

1.06 COORDINATION

A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete.

B. Installation Templates: Distribute for doors, frames, and other work specified to be factory or shop 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.

C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.

D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

1.07 WARRANTY

A. Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within published warranty period.

1. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.
2. Warranty Period: Beginning from date of Substantial Completion, for durations indicated in manufacturer's published listings.
    a. Mechanical Warranty
        1) Locks
            a) Schlage L Series: 3 years
            b) Schlage ND Series: 10 years
        2) Exit Devices
            a) Von Duprin: 3 years

3) Closers
   a) LCN 4000 Series: 30 years
   b) Falcon Concealed: 5 years
4) Automatic Operators
   a) LCN: 2 years

b. Electrical Warranty
   1) Locks
      a) Schlage: 1 year
   2) Exit Devices
      a) Von Duprin: 1 year

1.08 MAINTENANCE

A. Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.

B. Turn over unused materials to Owner for maintenance purposes.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Approval of alternate manufacturers and/or products other than those listed as "Scheduled Manufacturer" or "Acceptable Manufacturers" in the individual article for the product category are only to be considered by official substitution request in accordance with section 01 25 00.

B. Approval of products from manufacturers indicated in "Acceptable Manufacturers" is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer's product.

C. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Architect's approval.

2.02 MATERIALS

A. Fabrication

1. Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. provide screws according to manufacturer's recognized installation standards for application intended.
2. Finish exposed screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.
3. Provide concealed fasteners wherever possible for hardware units exposed when door is closed. Coordinate with "Metal Doors and Frames", "Flush Wood Doors", "Stile and Rail Wood Doors" to ensure proper reinforcements. Advise the Architect where visible fasteners, such as thru bolts, are required.

B. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.

1. Where fasteners are exposed to view: Finish to match adjacent door hardware material.

C. Cable and Connectors:

1. Where scheduled in the hardware sets, provide each item of electrified hardware and wire harnesses with number and gage of wires enough to accommodate electric function of specified hardware.
2. Provide Molex connectors that plug directly into connectors from harnesses, electric locking and power transfer devices.
3. Provide through-door wire harness for each electrified locking device installed in a door and wire harness for each electrified hinge, electrified continuous hinge, electrified pivot, and electric power transfer for connection to power supplies.

2.03 HINGES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. Ives 5BB series

2. Acceptable Manufacturers and Products:
   a. Hager BB1191/1279 series
   b. McKinney TB series
   c. Best FBB series

B. Requirements:

1. Provide hinges conforming to ANSI/BHMA A156.1.
2. Provide five knuckle, ball bearing hinges.
3. 1-3/4 inch (44 mm) thick doors, up to and including 36 inches (914 mm) wide:
   a. Exterior: Standard weight, bronze or stainless steel, 4-1/2 inches (114 mm) high
   b. Interior: Standard weight, steel, 4-1/2 inches (114 mm) high

4. 1-3/4 inch (44 mm) thick doors over 36 inches (914 mm) wide:
   a. Exterior: Heavy weight, bronze/stainless steel, 5 inches (127 mm) high
   b. Interior: Heavy weight, steel, 5 inches (127 mm) high

5. 2 inches or thicker doors:
   a. Exterior: Heavy weight, bronze or stainless steel, 5 inches (127 mm) high
   b. Interior: Heavy weight, steel, 5 inches (127 mm) high

6. Adjust hinge width for door, frame, and wall conditions to allow proper degree of opening.
7. Provide three hinges per door leaf for doors 90 inches (2286 mm) or less in height, and one additional hinge for each 30 inches (762 mm) of additional door height.
8. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
   a. Steel Hinges: Steel pins
   b. Non-Ferrous Hinges: Stainless steel pins
   c. Out-Swinging Exterior Doors: Non-removable pins
   d. Out-Swinging Interior Lockable Doors: Non-removable pins
   e. Interior Non-lockable Doors: Non-rising pins

9. Provide hinges with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware. Locate electric hinge at second hinge from bottom or nearest to electrified locking component. Provide mortar guard for each electrified hinge specified.

2.04 CONTINUOUS HINGES

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

2. Acceptable Manufacturers:
   a. Select
   b. Roton
   c. ABH

B. Requirements:

1. Provide aluminum geared continuous hinges conforming to ANSI/BHMA A156.26, Grade 1.
2. Provide aluminum geared continuous hinges, where specified in the hardware sets, fabricated from 6063-T6 aluminum.
3. Provide split nylon bearings at each hinge knuckle for quiet, smooth, self-lubricating operation.
4. Provide hinges capable of supporting door weights up to 450 pounds, and successfully tested for 1,500,000 cycles.
5. On fire-rated doors, provide aluminum geared continuous hinges classified for use on rated doors by testing agency acceptable to authority having jurisdiction.
6. Provide aluminum geared continuous hinges with electrified option scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware.
7. Provide hinges 1 inch (25 mm) shorter in length than nominal height of door, unless otherwise noted or door details require shorter length and with symmetrical hole pattern.

2.05 ELECTRIC POWER TRANSFER

A. Manufacturers:

1. Scheduled Manufacturer and Product:
   a. Von Duprin EPT-10

2. Acceptable Manufacturers and Products:
   a. Securitron CEPT-10
   b. Precision EPT-12C

B. Requirements:

1. Provide power transfer with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware.
2. Locate electric power transfer per manufacturer's template and UL requirements, unless interference with operation of door or other hardware items.

2.06 FLUSH BOLTS

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

2. Acceptable Manufacturers:
   a. Burns
   b. Rockwood
   c. Trimco

B. Requirements:

1. Provide automatic, constant latching, and manual flush bolts with forged bronze or stainless-steel face plates, extruded brass levers, and with wrought brass guides and strikes. Provide 12 inch (305 mm) steel or brass rods at doors up to 90 inches (2286 mm) in height. For doors over 90 inches (2286 mm) in height increase top rods by 6 inches (152 mm) for each additional 6 inches (152 mm) of door height. Provide dust-proof strikes at each bottom flush bolt.

2.07 MORTISE LOCKS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. Schlage L9000 series

2. Acceptable Manufacturers and Products:
   a. Accurate 9000/9100 series
   b. Best 45H series

B. Requirements:

1. Provide mortise locks conforming to ANSI/BHMA A156.13 Series 1000, Grade 1, and UL Listed for 3-hour fire doors.
2. Indicators: Where specified, provide indicator window measuring a minimum 2-inch x 1/2 inch with 180-degree visibility. Provide messages color-coded with full text and/or symbols, as scheduled, for easy visibility.
3. Provide locks manufactured from heavy gauge steel, containing components of steel with a zinc dichromate plating for corrosion resistance.
4. Provide lock case that is multi-function and field reversible for handing without opening case. Cylinders: Refer to "KEYING" article, herein.
5. Provide locks with standard 2-3/4 inches (70 mm) backset with full 3/4 inch (19 mm) throw stainless steel mechanical anti-friction latchbolt. Provide deadbolt with full 1-inch (25 mm) throw, constructed of stainless steel.
6. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim. Provide electrified options as scheduled in the hardware sets. Where scheduled, provide switches and sensors integrated into the locks and latches.
7. Provide motor based electrified locksets that comply with the following requirements:
   a. Universal input voltage – single chassis accepts 12 or 24VDC to allow for changes in the field without changing lock chassis.
   b. Fail Safe/Fail Secure – changing mode between electrically locked (fail safe) and electrically unlocked (fail secure) is field selectable without opening the lock case.

c. Low maximum current draw – maximum 0.4 amps to allow for multiple locks on a single power supply.
d. Low holding current – maximum 0.01 amps to produce minimal heat, eliminate "hot levers" in electrically locked applications, and to provide reliable operation in wood doors that provide minimal ventilation and air flow.
e. Connections – provide quick-connect Molex system standard.

8. Lever Trim: Solid brass, bronze, or stainless steel, cast or forged in design specified, with wrought roses and external lever spring cages. Provide thru-bolted levers with 2-piece spindles.
   a. Vandlgard: Provide levers with vandal resistant technology for use at heavy traffic or abusive applications.
   b. Lever Design: Rhodes

2.08 EXIT DEVICES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. Von Duprin 98/35A series

2. Acceptable Manufacturers and Products:
   a. Precision APEX 2000 series
   b. Sargent 19-43-GL-80 series

B. Requirements:

1. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1 and UL listed for Panic Exit or Fire Exit Hardware.
2. Cylinders: Refer to "KEYING" article, herein.
3. Provide smooth touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
4. Touchpad must extend a minimum of one half of door width. No plastic inserts are allowed in touchpads.
5. Provide exit devices with deadlatching feature for security and for future addition of alarm kits and/or other electrified requirements.
6. Provide exit devices with weather resistant components that can withstand harsh conditions of various climates and corrosive cleaners used in outdoor pool environments.
7. Provide flush end caps for exit devices.
8. Provide exit devices with manufacturer's approved strikes.
9. Provide exit devices cut to door width and height. Install exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect.
10. Mount mechanism case flush on face of doors or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.
11. Provide cylinder or hex-key dogging as specified at non fire-rated openings.
12. Removable Mullions: 2 inches (51 mm) x 3 inches (76 mm) steel tube. Where scheduled as keyed removable mullion, provide type that can be removed by use of a keyed cylinder, which is self-locking when re-installed.
13. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and where noted in hardware sets.
14. Provide electrified options as scheduled.
15. Top latch mounting: double- or single-tab mount for steel doors, face mount for aluminum doors eliminating requirement of tabs, and double tab mount for wood doors.

16. Provide exit devices with optional trim designs to match other lever and pull designs used on the project.
17. Special Options:
    a. CX
        1) Provide delayed egress devices, where scheduled, that are UL 294 listed, meet National Fire Protection Association (NFPA) and International Building Code (IBC) governing delayed egress, and/or other local and national fire codes acceptable to authority having jurisdiction as required.
            a) Provide non-handed and field sizable device with 3/4 (19mm) throw deadlocking latch bolt. Device incorporates an internal RX switch that detects attempt to exit from applying less than 15lbs to the push pad, which causes this switch to start an irreversible alarm cycle. Key switch in device is capable of arming, disarming, or resetting the device; and indicator lamp determines status of the device.
            b) Provide devices capable of standard 15 second release delay and indefinite release delay as required by code, when tied into fire alarm system will release immediately when an alarm condition exists.
            c) Provide devices with all control inputs – door position input, external inhibit input, fire alarm input; auxiliary locking; nuisance alarm and internal horn; and, remote signaling output self-contained in the device assembly.
    b. CVC
        1) Provide cable-actuated concealed vertical latch system in two-point for non-rated or fire rated wood doors up to a 90 minute rating and less bottom latch (LBL) configuration for non-rated or fire rated wood doors up to 20 minute rating. Vertical rods not permitted.
            a) Cable: Stainless steel with abrasive resistant coating. Conduit and core wire ends snap into latch and center slides without use of tools.
            b) Wood Door Prep: Maximum 1 inch x 1.1875 inch x 3.875 inches top latch pocket and 1 inch x 1.1875 inch x 5 inches bottom latch pocket which does not require the use of a metal wrap or edge for non-rated or fire rated wood doors up to a 45 minute rating.
            c) Latchbolts and Blocking Cams: Manufactured from sintered metal low carbon copper- infiltrated steel, with molybdenum disulfide low friction coating.
            d) Top Latchbolt: Minimum 0.38 inch (10 mm) and greater than 90-degree engagement with strike to prevent door and frame separation under high static load.
            e) Bottom Latchbolt: Minimum of 0.44-inch (11 mm) engagement with strike.
            f) Product Cycle Life: 1,000,000 cycles.
            g) Latch Operation: Top and bottom latch operate independently of each other. Top latch fully engages top strike even when bottom latch is compromised. Separate trigger mechanisms not permitted.
            h) Latch release does not require separate trigger mechanism.
            i) Cable and latching system characteristics:
                i. Installed independently of exit device installation, and capable of functioning on door prior to device and trim installation.
                ii. Connected to exit device at single point in steel and aluminum doors, and two points for top and bottom latches in wood doors.
                iii. Bottom latch height adjusted, from single point for steel and aluminum doors and two points for wood doors, after system is installed and connected to exit device, while door is hanging
                iv. Bottom latch position altered up and down minimum of 2 inches (51 mm) in steel and aluminum doors without additional adjustment. Bottom latch deadlocks in every adjustment position in wood doors.
                v. Top and bottom latches in steel and aluminum doors and top latch in wood doors may be removed while door is hanging.

2.09 ELECTRIC STRIKES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. Von Duprin 6000 Series

2. Acceptable Manufacturers and Products:
   a. Folger Adam 300 Series

B. Requirements:

1. Provide electric strikes designed for use with type of locks shown at each opening.
2. Provide electric strikes UL Listed as burglary resistant that are tested to a minimum endurance test of 1,000,000 cycles.
3. Where required, provide electric strikes UL Listed for fire doors and frames.
4. Provide transformers and rectifiers for each strike as required. Verify voltage with electrical contractor.

2.10 CYLINDERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. Schlage Everest 29 R

2. Acceptable Manufacturers and Products:
   a. Best Preferred Patented
   b. Medeco X4

B. Requirements:

1. Provide cylinders/cores compliant with ANSI/BHMA A156.5; latest revision; cylinder face finished to match lockset; manufacturer's series as indicated. Refer to "KEYING" article, herein.
2. Provide cylinders in the below-listed configuration(s), distributed throughout the Project as indicated.
   a. Patented Restricted Small Format: cylinder with small format interchangeable cores (SFIC) with restricted, patented keyway.

3. Patent Protection: Cylinders/cores requiring use of restricted, patented keys, patent protected.
4. Nickel silver bottom pins.

2.11 CYLINDERS

A. Manufacturers and Products:

1. Scheduled Manufacturer:
   a. MEDECO

2. Acceptable Manufacturers and Products:
   a. No Substitute

B. Requirements:

1. Provide cylinders/cores compliant with ANSI/BHMA A156.5; latest revision; cylinder face finished to match lockset; manufacturer's series as indicated. Refer to "KEYING" article, herein.
2. Provide cylinders in the below-listed configuration(s), distributed throughout the Project as indicated.
   a. Restricted: cylinder with small format interchangeable core (SFIC) core with TSA Authorized keyway
   b. Source from authorized MEDECO dealer; IMLSS

2.12 KEYING

A. Scheduled System:

1. New factory registered system:
   a. Provide a factory registered keying system, complying with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.

B. Requirements:

1. Construction Keying:
   a. Replaceable Construction Cores.
      1) Provide temporary construction cores replaceable by permanent cores, furnished in accordance with the following requirements.
         a) 3 construction control keys
         b) 12 construction change (day) keys.
      2) Owner or Owner's Representative will replace temporary construction cores with permanent cores.

2. Permanent Keying:
   a. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.
      1) Master Keying system as directed by the Owner.
   b. Forward bitting list and keys separately from cylinders, by means as directed by Owner. Failure to comply with forwarding requirements will be cause for replacement of cylinders/cores involved at no additional cost to Owner.
   c. Provide keys with the following features:
      1) Material: Nickel silver; minimum thickness of .107-inch (2.3mm)
      2) Patent Protection: Keys and blanks protected by one or more utility patent(s).
      3) Geographically Exclusive: Where High Security or Security cylinders/cores are indicated, provide nationwide, geographically exclusive key system complying with the following restrictions.
   d. Identification:
      1) Mark permanent cylinders/cores and keys with applicable blind code for identification. Do not provide blind code marks with actual key cuts.
      2) Identification stamping provisions must be approved by the Architect and Owner.
      3) Stamp cylinders/cores and keys with Owner's unique key system facility code as established by the manufacturer; key symbol and embossed or stamped with "DO NOT DUPLICATE" along with the "PATENTED" or patent number to enforce the patent protection.
      4) Failure to comply with stamping requirements will be cause for replacement of keys involved at no additional cost to Owner.

5) Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.

e. Quantity: Furnish in the following quantities.
1) Change (Day) Keys: 3 per cylinder/core.
2) Permanent Control Keys: 3.
3) Master Keys: 6.

2.13 KEY CONTROL SYSTEM

A. Manufacturers:

1. Scheduled Manufacturer:
a. Telkee

2. Acceptable Manufacturers:
a. HPC
b. Lund

B. Requirements:

1. Provide key control system, including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet, all as recommended by system manufacturer, with capacity for 150% of number of locks required for Project.
a. Provide complete cross index system set up by hardware supplier, and place keys on markers and hooks in cabinet as determined by final key schedule.
b. Provide hinged-panel type cabinet for wall mounting.

2.14 DOOR CLOSERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
a. LCN 4040XP series

2. Acceptable Manufacturers and Products:
a. Sargent 281 series

B. Requirements:

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. ISO 9000 certify closers. Stamp units with date of manufacture code.
2. Provide door closers with fully hydraulic, full rack and pinion action with high strength cast iron cylinder, and full complement bearings at shaft.
3. Cylinder Body: 1-1/2-inch (38 mm) diameter piston with 5/8-inch (16 mm) diameter double heat-treated pinion journal. QR code with a direct link to maintenance instructions.
4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards. Provide snap-on cover clip, with plastic covers, that secures cover to spring tube.

6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck. Provide graphically labelled instructions on the closer body adjacent to each adjustment valve. Provide positive stop on reg valve that prevents reg screw from being backed out.
7. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers.
8. Pressure Relief Valve (PRV) Technology: Not permitted.
9. Finish for Closer Cylinders, Arms, Adapter Plates, and Metal Covers: Powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI Standard A156.4 and ASTM B117, or has special rust inhibitor (SRI).
10. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

2.15 PROTECTION PLATES

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

2. Acceptable Manufacturers:
   a. Trimco
   b. Rockwood

B. Requirements:

1. Provide protection plates with a minimum of 0.050 inch (1 mm) thick, beveled four edges as scheduled. Furnish with sheet metal or wood screws, finished to match plates.
2. Sizes plates 2 inches (51 mm) less width of door on single doors, pairs of doors with a mullion, and doors with edge guards. Size plates 1 inch (25 mm) less width of door on pairs without a mullion or edge guards.
3. At fire rated doors, provide protection plates over 16 inches high with UL label.

2.16 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS

A. Manufacturers:

1. Scheduled Manufacturers:
   a. Glynn-Johnson

2. Acceptable Manufacturers:
   a. Rixson
   b. Sargent
   c. ABH

B. Requirements:

1. Provide overhead stop at any door where conditions do not allow for a wall stop or floor stop presents tripping hazard.
2. Provide friction type at doors without closer and positive type at doors with closer.

2.17 DOOR STOPS AND HOLDERS

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

2. Acceptable Manufacturers:
   a. Trimco
   b. Rockwood

B. Provide door stops at each door leaf:

1. Provide wall stops wherever possible. Provide concave type where lockset has a push button of thumbturn.
2. Where a wall stop cannot be used, provide universal floor stops.
3. Where wall or floor stop cannot be used, provide overhead stop.
4. Provide roller bumper where doors open into each other and overhead stop cannot be used.

2.18 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Zero International

2. Acceptable Manufacturers:
   a. National Guard
   b. Pemko

B. Requirements:

1. Provide thresholds, weather-stripping, and gasketing systems as specified and per architectural details. Match finish of other items.
2. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
3. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.
4. Size thresholds 1/2 inch (13 mm) high by 5 inches (127 mm) wide by door width unless otherwise specified in the hardware sets or detailed in the drawings.

2.19 SILENCERS

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

2. Acceptable Manufacturers:
   a. Rockwood

b. Trimco

B. Requirements:

1. Provide "push-in" type silencers for hollow metal or wood frames.
2. Provide one silencer per 30 inches (762 mm) of height on each single frame, and two for each pair frame.
3. Omit where gasketing is specified.

2.20 DOOR POSITION SWITCHES

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Schlage

2. Acceptable Manufacturers:
   a. GE-Interlogix
   b. Sargent

B. Requirements:

1. Provide recessed or surface mounted type door position switches as specified.
2. Coordinate door and frame preparations with door and frame suppliers. If switches are being used with magnetic locking device, provide minimum of 4 inches (102 mm) between switch and magnetic locking device.

2.21 FINISHES

A. FINISH: BHMA 626/652 (US26D); EXCEPT:

1. Hinges at Exterior Doors: BHMA 630 (US32D)
2. Aluminum Geared Continuous Hinges: BHMA 628 (US28)
3. Push Plates, Pulls, and Push Bars: BHMA 630 (US32D)
4. Protection Plates: BHMA 630 (US32D)
5. Overhead Stops and Holders: BHMA 630 (US32D)
6. Door Closers: Powder Coat to Match
7. Wall Stops: BHMA 630 (US32D)
8. Latch Protectors: BHMA 630 (US32D)
9. Weatherstripping: Clear Anodized Aluminum
10. Thresholds: Mill Finish Aluminum

B. FINISH: BHMA 613/640 (US10B); EXCEPT:

1. Door Closers: Powder Coat to Match.
2. Latch Protectors: US32D (BHMA 630).
3. Weatherstripping: Dark Bronze Anodized Aluminum.
4. Thresholds: Extruded Architectural Bronze, Oil-Rubbed

PART 3 - EXECUTION

3.01 EXAMINATION

A. Prior to installation of hardware, 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. Verify doors, frames, and walls have been properly reinforced for hardware installation.

B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

C. Submit a list of deficiencies in writing and proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. 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.
2. Custom Steel Doors and Frames: HMMA 831.
3. Interior Architectural Wood Flush Doors: ANSI/WDMA I.S. 1A
4. Installation Guide for Doors and Hardware: DHI TDH-007-20

B. Install door hardware in accordance with NFPA 80, NFPA 101 and provide post-install inspection, testing as specified in section 1.03.E unless otherwise required to comply with governing regulations.

C. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.

D. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.

E. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.

F. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

G. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.

H. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated.

I. Lock Cylinders:

1. Install construction cores to secure building and areas during construction period.
2. Replace construction cores with permanent cores as indicated in keying section.
3. Furnish permanent cores to Owner for installation.

J. Wiring: Coordinate with Division 26, ELECTRICAL and Division 28 ELECTRONIC SAFETY AND SECURITY sections for:

1. Conduit, junction boxes and wire pulls.
2. Connections to and from power supplies to electrified hardware.
3. Connections to fire/smoke alarm system and smoke evacuation system.
4. Connection of wire to door position switches and wire runs to central room or area, as directed by Architect.
5. Connections to panel interface modules, controllers, and gateways.
6. Testing and labeling wires with Architect's opening number.

K. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.

L. Door Closers: Mount closers on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Mount closers so they are not visible in corridors, lobbies and other public spaces unless approved by Architect.

M. Closer/Holders: Mount closer/holders on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.

N. Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings or in equipment room, or alternate location as directed by Architect.

O. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."

P. 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 may impede traffic or present tripping hazard.

Q. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

R. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

S. Door Bottoms and Sweeps: Apply to bottom of door, forming seal with threshold when door is closed.

3.03 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. Spring Hinges: Adjust to achieve positive latching when door can close freely from an open position of 30 degrees.
2. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
3. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.

B. Occupancy Adjustment: Approximately three to six months after date of Substantial Completion, examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors and door hardware.

3.04 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items per manufacturer's instructions to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.05 DOOR HARDWARE SCHEDULE

A. The intent of the hardware specification is to specify the hardware for interior and exterior doors, and to establish a type, continuity, and standard of quality. However, it is the door hardware supplier's responsibility to thoroughly review existing conditions, schedules, specifications, drawings, and other Contract Documents to verify the suitability of the hardware specified.

B. Discrepancies, conflicting hardware, and missing items are to be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application.

C. Hardware items are referenced in the following hardware schedule. Refer to the above specifications for special features, options, cylinders/keying, and other requirements.

D. Hardware Sets:

Abbreviation	Name
GLY	Glynn-Johnson Corp
IVE	H.B. Ives
LCN	Lcn Commercial Division
MED	Medeco High Security Locks Inc
SCE	Schlage Electronic Security
SCH	Schlage Lock Company
VON	Von Duprin
ZER	Zero International Inc

HW SET: 105

For use on Door #(s):
134A

Each to have:

3	EA	HINGE	5BB1 4.5 X 4.5 NRP		630	IVE
1	EA	STOREROOM LOCK	LV9080BD 06A		626	SCH
1	EA	SFIC EVEREST CORE	80-037 EV29 R		626	SCH
1	EA	ELECTRIC STRIKE	6211 FSE 12/16/24/28 VAC/VDC	↯	630	VON
1	EA	LOCK GUARD	LG14		630	IVE
1	EA	SURFACE CLOSER	4040XP SCUSH MC		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	RAIN DRIP	142AA		AA	ZER
1	SET	GASKETING	429AA-S		AA	ZER
1	EA	DOOR SWEEP	8197AA		AA	ZER
1	EA	THRESHOLD	655A-223		A	ZER
1	EA	CREDENTIAL READER.	BY DIVISION 28	↯		
1	EA	DOOR CONTACT	679-05HM	↯	BLK	SCE
1	EA	REX.	BY DIVISION 28	↯		
1	EA	LOW VOLTAGE POWER.	BY DIVISION 28	↯		

OPERATION:
DOOR NORMALLY CLOSED AND LOCKED.
ENTRY BY CREDENTIAL READER TO TEMPORARILY RELEASE THE ELECTRIC STRIKE, USER OPENS DOOR TO ENTER.
DOOR POSITION IS MONITORED THROUGH ACCESS CONTROL SYSTEM.
EGRESS AT ALL TIMES BY INSIDE LEVER.

HW SET: 305

For use on Door #(s):
134G

Each to have:

3	EA	HINGE	5BB1 4.5 X 4.5 NRP		652	IVE
1	EA	INSTITUTION LOCK	L9082BD 06A		626	SCH
2	EA	SFIC EVEREST CORE	80-037 EV29 R		626	MED
1	EA	ELECTRIC STRIKE	6211 FSE 12/16/24/28 VAC/VDC	↯	630	VON
1	EA	SURFACE CLOSER	4040XP EDA MC		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CCV		630	IVE
3	EA	SILENCER	SR64		GRY	IVE
2	EA	CREDENTIAL READER.	BY DIVISION 28	↯		
1	EA	LOW VOLTAGE POWER.	BY DIVISION 28	↯		

OPERATION:
DOOR NORMALLY LOCKED AND SECURED FROM BOTH SIDES.
ENTRY / EXIT BY CREDENTIAL READER TO TEMPORARILY RELEASE THE ELECTRIC STRIKE.
NO FREE EGRESS

HW SET: 306

For use on Door #(s):
135B

Each to have:

3	EA	HINGE	5BB1 4.5 X 4.5 NRP		652	IVE
1	EA	INSTITUTION LOCK	L9082BD 06A		626	SCH
1	EA	SFIC EVEREST CORE	80-037 EV29 R		626	MED
1	EA	ELECTRIC STRIKE	6211 FSE 12/16/24/28 VAC/VDC	↯	630	VON
1	EA	SURFACE CLOSER	4040XP RW/PA M		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CCV		630	IVE
3	EA	SILENCER	SR64		GRY	IVE
1	EA	CREDENTIAL READER.	BY DIVISION 28	↯		
1	EA	LOW VOLTAGE POWER.	BY DIVISION 28	↯		

OPERATION:
DOOR NORMALLY LOCKED AND SECURED FROM BOTH SIDES.
ENTRY / EXIT BY CREDENTIAL READER TO TEMPORARILY RELEASE THE ELECTRIC STRIKE.
NO FREE EGRESS

HW SET: 308

For use on Door #(s):
142A 143A 144A

Each to have:

3	EA	HINGE	5BB1 4.5 X 4.5 NRP		652	IVE
1	EA	STOREROOM LOCK	L9080BD 06A		626	SCH
1	EA	SFIC EVEREST CORE	80-037 EV29 R		626	SCH
1	EA	ELECTRIC STRIKE	6211 FSE 12/16/24/28 VAC/VDC	↯	630	VON
1	EA	SURFACE CLOSER	4040XP EDA MC		689	LCN
1	EA	WALL STOP	WS406/407CCV		630	IVE
3	EA	SILENCER	SR64		GRY	IVE
1	EA	CREDENTIAL READER.	BY DIVISION 28	↯		
1	EA	LOW VOLTAGE POWER.	BY DIVISION 28	↯		

REQUIRES NEW DOOR

OPERATION:
DOOR NORMALLY CLOSED AND LOCKED.
ENTRY BY CREDENTIAL READER TO TEMPORARILY RELEASE THE ELECTRIC STRIKE, USER OPENS DOOR TO ENTER.
EGRESS AT ALL TIMES BY INSIDE LEVER.

HW SET: 402

For use on Door #(s):
B120A

Each to have:

3	EA	HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1	EA	PANIC HARDWARE	98-L-NL-06	626	VON
1	EA	SFIC RIM HOUSING	80-129	626	SCH
1	EA	SFIC EVEREST CORE	80-037 EV29 R	626	SCH
1	EA	SURFACE CLOSER	4040XP EDA MC	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	GASKETING	188SBK PSA	BK	ZER

HW SET: 403

For use on Door #(s):
B108A B119A B121A B124A

Each to have:

3	EA	HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1	EA	STOREROOM LOCK	LV9080BD 06A	626	SCH
1	EA	SFIC EVEREST CORE	80-037 EV29 R	626	SCH
1	EA	SURFACE CLOSER	4040XP EDA MC	689	LCN
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HW SET: 409

For use on Door #(s):
B102A B103A

Each to have:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PRIVACY LOCK	L9040 06A L583-363 L283-722	626	SCH
1	EA	SURFACE CLOSER	4040XP RW/PA MC	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	GASKETING	188SBK PSA	BK	ZER

HW SET: 410

For use on Door #(s):
135A

Each to have:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	OFFICE W/SIM RETRACT	L9056BD 06A 09-544	626	SCH
1	EA	SFIC EVEREST CORE	80-037 EV29 R	626	SCH
1	EA	SURFACE CLOSER	4040XP RW/PA MC	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HW SET: 500

For use on Door #(s):
140A 140B

Each to have:

	EA	NOTE	ALL HARDWARE BY DOOR SUPPIER/MANUFACTURER		
1	EA	SFIC EVEREST CORE	80-037 EV29 R	626	SCH

OPERATION:
SLIDING AUTOMATIC ENTRANCES: ACCESS CONTROLLED LOCKING SYSTEM, FAIL-SECURE

HW SET: 501

For use on Door #(s):
134B 134C

Each to have:

1	EA	SFIC MORTISE HOUSING	80-102 -CAM AS REQ'D FOR HARDWARE	626	SCH
1	EA	SFIC EVEREST CORE	80-037 EV29 R	626	SCH
	EA	NOTE	BALANCE OF HARDWARE BY DOOR SUPPLIER/MANUFACTURER		
2	EA	CREDENTIAL READER.WITH PEDESTAL CONNECTED TO BOTH DOORS	BY DIVISION 28		
1	EA	LOW VOLTAGE POWER.	BY DIVISION 28		

OPERATION:
SECTIONAL DOOR 134B: AUTHORIZED CREDENTIAL AT OUTSIDE CARD READER MOUNTED ON PEDESTAL. CARD READER RELEASES DOOR OPERATOR.

SECTIONAL DOOR 134C: OPERATOR CONNECTED TO 134B CARD READER AND TIMED FOR RELEASE.

HW SET: 503

For use on Door #(s):
134E 134F

Each to have:

1	EA	SFIC MORTISE HOUSING	80-102 -CAM AS REQ'D FOR HARDWARE	626	SCH
1	EA	SFIC EVEREST CORE	80-037 EV29 R	626	SCH
	EA	NOTE	BALANCE OF HARDWARE BY DOOR SUPPLIER/MANUFACTURER		

OPERATION:
COILING COUNTER DOOR OPENING: DOORS 134E & 134F ARE RELOCATED EXISTING DOORS THAT WILL HAVE THE CYLINDERS REPLACED.

SECTION 088000 – GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Glass for windows, doors, glazed curtain walls and storefront framing.
2. Glazing sealants and accessories.

B. Related Requirements:

1. Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 COORDINATION

A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches (300 mm) square.

C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

A. Preconstruction adhesion and compatibility test report.

1.5 QUALITY ASSURANCE

A. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

1.6 PRECONSTRUCTION TESTING

A. Preconstruction Adhesion and Compatibility Testing: Test each glass product, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.

1. Testing is not required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.

1.7 WARRANTY

A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.

1. Warranty Period: 10 years from date of Substantial Completion.

B. Manufacturer's Special Warranty for Insulating Glass: Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. AGC Glass Company North America, Inc.
2. Guardian Glass; SunGuard.
3. Northwestern Industries, Inc.
4. Oldcastle BuildingEnvelope™.

2.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined according to the International Building Code and ASTM E 1300.

1. Design Wind Pressures: As indicated on Drawings.
2. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.

B. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.

C. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:

1. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F (W/sq. m x K).
2. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
3. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.3 GLASS PRODUCTS, GENERAL

A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. GANA Publications: Glazing Manual."
2. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."

B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

C. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.

D. Thickness: Where glass thickness is indicated, it is a minimum.

E. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass. Where fully tempered float glass is indicated, provide fully tempered float glass.

2.4 GLASS PRODUCTS

A. Clear Annealed Float Glass: ASTM C 1036, Type I, Class 1 (clear), Quality-Q3.

B. Tinted Annealed Float Glass: ASTM C 1036, Type I, Class 2 (tinted), Quality-Q3.

C. Fully Tempered Float Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.

D. Heat-Strengthened Float Glass: ASTM C 1048, Kind HS (heat strengthened), Type I, Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.

2.5 INSULATING GLASS

A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190.

1. Sealing System: Dual seals.

2. Perimeter Spacer: Manufacturer's standard spacer material and construction Aluminum with mill or clear anodic finish.

2.6 GLAZING SEALANTS

A. General:

1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use NT.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

   a. Dow Corning Corporation. 790
   b. GE Construction Sealants; Momentive Performance Materials Inc. UltrPruf SCS2300.
   c. Tremco Incorporated. Spectrum 1

2. Applications: Coated glass, color anodic aluminum, aluminum coated with a high-performance coating, galvanized steel, and wood.
3. Colors: As selected by architect.

2.7 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:

1. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:

1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.8 MISCELLANEOUS GLAZING MATERIALS

A. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

B. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

C. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

D. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

PART 3 - EXECUTION

3.1 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.

C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

F. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm).

G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

3.2 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Apply heel bead of elastomeric sealant.

F. Center glass lites in openings on setting blocks, and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

G. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.3 GASKET GLAZING (DRY)

A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

E. Install gaskets so they protrude past face of glazing stops.

3.4 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.5 CLEANING AND PROTECTION

A. Immediately after installation remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.

1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.

C. Remove and replace glass that is damaged during construction period.

3.6 MONOLITHIC GLASS SCHEDULE

A. Glass Type: '**GL-3**', and '**GL-4**,' Clear annealed or fully tempered float glass.

1. Minimum Thickness: (1/4")
2. Safety glazing where required.

3.7 INSULATING GLASS SCHEDULE

A. Glass Type:'**GL-1**,' and '**GL-2**,' Low-E-coated, insulating glass.

1. Basis-of-Design Product: VITRO Architectural Glass (PPG), **SOLARBAN 90 (2) Clear + Clear**.
2. Overall Unit Thickness: 1 inch (25 mm).
3. Minimum Thickness of Each Glass Lite: 6 mm.
4. Outdoor Lite: Tinted heat-strengthened or fully tempered float glass. If FT (fully tempered) glass is not indicated on the drawings; but is required by the governing code, provide FT (fully tempered) glass.
5. Interspace Content: Air.
6. Indoor Lite: Clear heat-strengthened or fully tempered float glass. If FT (fully tempered) glass is not indicated on the drawings; but is required by the governing code, provide FT (fully tempered) glass.
7. Low-E Coating: Sputtered on second surface.
8. Winter Nighttime U-Factor: **0.24** maximum.
9. Visible Light Transmittance: **51** percent minimum.
10. Solar Heat Gain Coefficient: **0.23** maximum.
11. Safety glazing required.

END OF SECTION 088000

092200 NON-LOAD-BEARING STEEL FRAMING
092900 GYPSUM BOARD ASSEMBLIES
093000 TILING
095113 ACOUSTICAL PANEL CEILINGS
096513 RESILIENT BASE & ACCESSORIES
096813 TILE CARPETING
097200 WALL COVERINGS
099113 EXTERIOR PAINTING
099123 INTERIOR PAINTING

FINISHES

division 9

SAA

SANDERS ASSOCIATES ARCHITECTS

SECTION 092200 – NON-LOAD-BEARING STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes non-load-bearing steel framing members for the following applications:

1. Interior framing systems (e.g., supports for partition walls, framed soffits, furring, etc.).
2. Interior suspension systems (e.g., supports for ceilings, suspended soffits, etc.).

B. Related Sections:

1. Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 SUBMITTALS

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

1.3 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

PART 2 - PRODUCTS

2.1 NON-LOAD-BEARING STEEL FRAMING, GENERAL

A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.

1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal, unless otherwise indicated.
2. Protective Coating: ASTM A 653/A 653M, G40, hot-dip galvanized zinc coating, unless otherwise indicated.

2.2 SUSPENSION SYSTEM COMPONENTS

A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch-diameter wire, or double strand of 0.048-inch-diameter wire.

B. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.162-inch diameter.

C. Flat Hangers: Steel sheet, in size indicated on Drawings 1 by 3/16 inch by length indicated.

D. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.053 inch and minimum 1/2-inch wide flanges.

1. Depth: 2-1/2 inches

E. Furring Channels (Furring Members):

1. Cold-Rolled Channels: 0.053 bare-steel thickness, with minimum 1/2-inch wide flanges, 3/4 inch deep.
2. Steel Studs: ASTM C 645.

a. Minimum Base-Metal Thickness: 0.033 inch.
b. Depth: As indicated on Drawings

3. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch deep.

a. Minimum Base Metal Thickness: 0.033 inch

4. Resilient Furring Channels: 1/2-inch deep members designed to reduce sound transmission.

a. Configuration: Asymmetrical

F. Grid Suspension System for Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:

a. Armstrong World Industries, Inc.; Drywall Grid Systems.
b. Chicago Metallic Corporation; Drywall Furring System.
c. USG Corporation; Drywall Suspension System.

2.3 STEEL FRAMING FOR FRAMED ASSEMBLIES

A. Steel Studs and Runners: ASTM C 645.

1. Minimum Base-Metal Thickness: 0.033 inch

B. Slip-Type Head Joints: Where indicated, provide one of the following:

1. Single Long-Leg Runner System: ASTM C 645 top runner with 2-inch deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top runner and with continuous bridging located within 12 inches of the top of studs to provide lateral bracing.
2. Double-Runner System: ASTM C 645 top runners, inside runner with 2-inch deep flanges in thickness not less than indicated for studs and fastened to studs, 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 studs and in width to accommodate depth of studs.

a. Products: Subject to compliance with requirements, provide one of the following:

1) Steel Network Inc. (The); VertiClip SLD or VertiTrack VTD Series.
2) Superior Metal Trim; Superior Flex Track System (SFT).

C. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.

1. Minimum Base-Metal Thickness: 0.033 inch

D. Cold-Rolled 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, 0.068-inch thick, galvanized steel.

E. Hat-Shaped, Rigid Furring Channels: ASTM C 645.

1. Minimum Base Metal Thickness: 0.033 inch
2. Depth: 7/8 inch

F. Resilient Furring Channels: 1/2-inch deep, steel sheet members designed to reduce sound transmission.

1. Configuration: Asymmetrical

G. Cold-Rolled Furring Channels: 0.0538-inch bare-steel thickness, with minimum 1/2-inch wide flanges.

1. Depth: 3/4 inch
2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum bare-steel thickness of 0.033 inch.
3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch diameter wire, or double strand of 0.048-inch

2.4 AUXILIARY MATERIALS

A. Fasteners for Metal 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 one of the following:

1. Asphalt-Saturated Organic Felt: ASTM D 226, Type I (No. 15 asphalt felt), nonperforated.
2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Installation Standard: ASTM C 754.

1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.

3.2 INSTALLING SUSPENSION SYSTEMS

A. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.

B. Suspend hangers from building structure as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.

a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.

a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.

3. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
4. Do not connect or suspend steel framing from ducts, pipes, or conduit.

C. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.

D. Seismic Bracing: Sway-brace suspension systems with hangers used for support.

E. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

F. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

3.3 INSTALLING FRAMED ASSEMBLIES

A. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

B. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating 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 runner track section (for cripple studs) at head and secure to jamb studs.

    a. Install two studs at each jamb, unless otherwise indicated.
    b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch 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.

3. Other Framed Openings: Frame openings other than door openings the same as required for door openings, unless otherwise indicated. 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 and support closures and to make partitions continuous from floor to underside of solid structure.

C. Direct Furring:

1. Screw to wood framing.
2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.

D. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

END OF SECTION 092200

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior gypsum board.
2. Tile backer units.
3. Sound attenuation insulation.

B. Related Sections:

1. Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

2.2 INTERIOR GYPSUM BOARD

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. CertainTeed Corp.
2. Domtar Gypsum.
3. National Gypsum Company.
4. Pacific Building Products, Inc.
5. USG Corporation.

B. **Gypsum Wallboard,** ASTM C 36 and as follows:
1. Type: Type X where required for fire-resistance-rated assemblies.
2. Edges: Tapered and featured (rounded or beveled) for prefilling.
3. Thickness: 5/8 inch (15.9 mm)

C. **Moisture- and Mold-Resistant Gypsum Board**: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.

1. Core: **5/8 inch (15.9 mm), Type X**.
2. Long Edges: Tapered.
3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.3 TILE BACKING PANELS

A. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and correspond with support system indicated.

B. **Glass-Mat**, **Water-Resistant Backing Board**:

1. Complying with ASTM C 1178/C 1178M.

   a. Product: Subject to compliance with requirements, provide "DensShield Tile Guard" by G-P Gypsum.

2. Core: **5/8 inch (15.9 mm), Type X**.

2.4 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized steel sheet.

B. Interior Extruded Trim:

1. Material: Aluminum extruded alloy 6063 T5 with one taped edge.
2. Manufacturer: Fry Reglet Corporation
3. Types:
   a. DRML-100, 1 inch “L” trim molding, primed finish. (Refer to drawings for locations).
   b. DRML-200, 2 inch “L” trim molding, primed finish. (Refer to drawings for locations).

2.5 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:

1. Interior Gypsum Board: Paper.
2. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
3. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

2.6 AUXILIARY MATERIALS

A. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

1. Laminating adhesive shall have a VOC content of [50] <Insert value> g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Laminating adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

B. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

C. **Sound Attenuation Blankets**: ASTM C 665, Type I (unfaced).

D. **Acoustical Joint Sealant**: ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings as demonstrated by testing according to ASTM E 90.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Accumetric LLC; BOSS 824 Acoustical Sound Sealant.
b. Grabber Construction Products; Acoustical Sealant GSC.
c. Pecora Corporation; AIS-919.
d. Specified Technologies, Inc.; Smoke N Sound Acoustical Sealant.
e. USG Corporation; SHEETROCK Acoustical Sealant.

2. Acoustical joint sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Acoustical joint sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

E. **Thermal Insulation**: As specified in Division 7 "Thermal Insulation."

F. **Vapor Retarder**: As specified in Division 7 "Thermal Insulation."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates to which gypsum board assemblies attach or abut, installed hollow metal frames, cast-in-anchors, and structural framing, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of assemblies specified in this Section. Do not proceed with installation until unsatisfactory conditions have been corrected.
1. Furnish devices indicated to other trades for installation well in advance of time needed for coordination with other construction.

3.2 INSTALLING STEEL FRAMING, GENERAL

A. Steel Framing Installation Standard: Install steel framing to comply with ASTM C 754 and with ASTM C 840 requirements that apply to framing installation.

B. Install supplementary framing, blocking, and bracing at terminations in gypsum board assemblies to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction. Comply with details indicated and with recommendations of gyp- sum board manufacturer or, if none available, with United States Gypsum Co.'s "Gypsum Construction Handbook."
1. Install deflection track top runner to attain lateral support and avoid axial loading.
2. Install deflection and firestop track top runner at fire-resistance-rated assemblies where indicated.
    a. Attach jamb studs at openings to tracks using manufacturer's standard stud clip.

C. Do not bridge building control and expansion joints with steel framing or furring members. Independently frame both sides of joints with framing or furring members as indicated.

3.3 INSTALLING STEEL FRAMING FOR SUSPENDED AND FURRED CEILINGS

A. Suspended ceiling hangers from building structural members and as follows:
1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or ceiling suspension system. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with the location of hangers required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
3. Secure wire hangers by looping and wire-tying, either directly to structures or to inserts, eyescrews, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause them to deteriorate or otherwise fail.
4. Secure flat, angle, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eyescrews, or other devices and fasteners that are secure and appropriate for structure as well as for type of hanger involved, and in a manner that will not cause them to deteriorate or otherwise fail.
5. Do not attach hangers to steel deck tabs.
6. Do not attach hangers to steel roof deck. Attach hangers to structural members.
7. Do not connect or suspend steel framing from ducts, pipes, or conduit.

B. Sway-brace suspended steel framing with hangers used for support.

C. Install suspended steel framing components in sizes and at spacings indicated, but not less than that required by the referenced steel framing installation standard.
1. Wire Hangers: 48 inches (1219 mm) o.c.
2. Carrying Channels (Main Runners): 48 inches (1219 mm) o.c.
3. Furring Channels (Furring Members): 16 inches (406 mm) o.c.

D. Installation Tolerances: Install steel framing components for suspended ceilings so that cross-furring or grid suspension members are level to within 1/8 inch in 12 feet (3 mm in 3.6 m) as measured both lengthwise on each member and transversely between parallel members.

E. Wire-tie or clip furring members to main runners and to other structural supports as indicated.

F. Grid Suspension System: Attach perimeter wall track or angle where grid suspension system meets vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

3.4 INSTALLING STEEL FRAMING FOR WALLS AND PARTITIONS

A. Install runners (tracks) at floors, ceilings, and structural walls and columns where gypsum board stud assemblies abut other construction.
   1. Where studs are installed directly against exterior walls, install asphalt felt strips or foam gaskets between studs and wall.

B. Installation Tolerances: Install each steel framing and furring member so that fastening surfaces do not vary more than 1/8 inch (3 mm) from the plane formed by the faces of adjacent framing.

C. Extend partition framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing over frames for doors and openings and frame around ducts penetrating partitions above ceiling to provide support for gypsum board.
   1. For STC-rated and fire-resistance-rated partitions that extend to the underside of floor/roof slabs and decks or other continuous solid structural surfaces to obtain ratings, install framing around structural and other members extending below floor/roof slabs and decks, as needed, to support gypsum board closures needed to make partitions continuous from floor to underside of solid structure.

D. Terminate partition framing at suspended ceilings only where indicated.

E. Install steel studs and framing in sizes and at spacings indicated.
   1. Single-Layer Construction: Space studs 16 inches (406 mm) o.c., unless otherwise indicated.

F. Install steel studs so flange point in the same direction and leading edge or end of each gypsum board panel can be attached to open (unsupported) edges of stud flanges first.
   1. Position studs vertically with open sides facing in same direction and engaging floor and ceiling runners. Begin and end each arc with a stud and space intermediate studs equally along arcs at stud spacing recommended by gypsum board manufacturer for radii indicated. Attach studs to runners with 3/8-inch- (9.5-mm-) long pan head framing screws. On straight lengths at ends of arcs, place studs 6 inches (150 mm) o.c. with last stud left free standing.

G. Frame door openings to comply with GA-219, and with applicable published recommendations of gypsum board manufacturer, unless otherwise indicated. Attach vertical studs at jambs with screws either directly to frames or to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
   1. Install 2 studs at each jamb, unless otherwise indicated.
   2. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch (12.7-mm) clearance from jamb stud to allow for installation of control joint.
   3. Extend jamb studs through suspended ceilings and attach to underside of floor or roof structure above.

H. Frame openings other than door openings to comply with details indicated or, if none indicated, as required for door openings. Install framing below sills of openings to match framing required above door heads.

I. Install insulation as follows:
   1. Erect insulation vertically and hold in place with friction fit or supplemental clips if required.

3.5 APPLYING AND FINISHING GYPSUM BOARD, GENERAL

A. Gypsum Board Application and Finishing Standards: Install and finish gypsum panels to comply with ASTM C 840 and GA-216.

B. Install sound-attenuation blankets, where indicated, prior to installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

C. Install ceiling board panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in the central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

D. Install gypsum panels with face side out. Do not install imperfect, damaged, or damp panels. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.

E. Locate both edge or end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Avoid joints other than control joints at corners of framed openings where possible.

F. Attach gypsum panels to steel studs so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

G. Attach gypsum panels to framing provided at openings and cutouts.

H. Form control and expansion joints at locations indicated and as detailed, with space between edges of adjoining gypsum panels, as well as supporting framing behind gypsum panels.

I. Cover both faces of steel stud partition framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases that are braced internally.
   1. Except where concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. (0.7 sq. m) in area.
   2. Fit gypsum panels around ducts, pipes, and conduits.
   3. Where partitions intersect open structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by coffers, joists, and other structural members; allow 1/4- to 3/8-inch- (6.4- to 9.5-mm-) wide joints to install sealant.

J. Isolate perimeter of nonload-bearing gypsum board partitions at structural abutments, except floors, as detailed. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at these locations and trim edges with U-bead edge trim where edges of gypsum panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

K. Where STC-rated gypsum board assemblies are indicated, seal construction at perimeters, behind control and expansion joints, openings, and penetrations with a continuous bead of acoustical sealant including a bead at both faces of the partitions. Comply with ASTM C 919 and manufacturer's recommendations for location of edge trim and closing off sound-flanking paths around or through gypsum board assemblies, including sealing partitions above acoustical ceilings.

L. Space fasteners in gypsum panels according to referenced gypsum board applications and finishing standard and manufacturer's recommendations.
1. Space screws a maximum of 12 inches (304.8 mm) o.c. for vertical applications.

M. Space fasteners in panels that are tile substrates a maximum of 8 inches (203.2 mm) o.c.

3.6 GYPSUM BOARD APPLICATION METHODS

A. Single-Layer Application: Install gypsum wallboard panels as follows:
1. On Ceilings, apply gypsum panels prior to wall/partition board application to the greatest extent possible and at right angles to framing, unless otherwise indicated.
2. On partitions/walls, apply gypsum panels horizontally (perpendicular to framing), unless parallel application is required for fire-resistance-rated assemblies. Use maximum-length panels to minimize end joints.
   a. Stagger abutting end joints not less than one framing member in alternate courses of board.
   b. At stairwells and other high walls, install panels horizontally.
   c. Install abuse resistant panels in hall/corridors and training rooms to a height of 4'-0" AFF.

B. Wall Tile Substrates: For substrates indicated to receive ceramic tile and similar rigid applied wall finishes, comply with the following:
1. Paperless Gypsum Backing Board: Install where indicated. Install with 1/4-inch (6.4-mm) gap where panels abut other construction or penetrations.
2. Where tile backing panels abut other types of panels in the same plane, shim surfaces to produce a uniform plane across panel surfaces.

C. Single Layer Fastening Methods: Apply gypsum panels to supports as follows:
1. Fasten with screws.

3.7 INSTALLING TRIM ACCESSORIES

A. General: For trim accessories with back flanges, fasten to framing with the same fasteners used to fasten gypsum board. Otherwise, fasten trim accessories according to accessory manufacturer's directions for type, length, and spacing of fasteners.

B. Install cornerbead at external corners.

C. Install edge trim where edge of gypsum panels would otherwise be exposed. Provide edge trim type with face flange formed to receive joint compound, except where other types are indicated.
1. Install LC-bead where gypsum panels are tightly abutted to other construction
2. Install L-bead where edge trim can only be installed after gypsum panels are installed.
3. Install U-bead where indicated.
4. Install aluminum trim and other accessories where indicated.

D. Install control joints according to ASTM C 840 and manufacturer's recommendations and in specific locations approved by Architect for visual effect.

E. Install metal reveals and trim in locations indicated. Coordinate with adjacent contrasting finish materials.

3.8 FINISHING GYPSUM BOARD ASSEMBLIES

A. General: Treat gypsum board joints, interior angles, flanges of cornerbead, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration.

B. Prefill Prefill open joints, rounded or beveled edges, and damaged areas using setting-type joint com- pound.

C. Apply joint tape over gypsum board joints, except those with trim accessories having flanges not requiring tape.

D. Gypsum Board Finish Levels: Provide the following levels of gypsum board finish per GA-214:

1. **Level 1**: For ceiling plenum areas, concealed areas, and where indicated, unless a higher level of finish is required for fire-resistance-rated assemblies and sound-rated assemblies.
2. **Level 4**: **At wall surfaces that will be exposed to view unless otherwise indicated.**

E. Use one of the following joint compound combinations as applicable to the finish levels specified:
1. Embedding and First Coat: Setting-type joint compound. Fill (Second) Coat: Setting-type joint compound. Finish (Third) Coat: Sandable, setting-type joint compound.

F. For level 4 gypsum board finish, embed tape in joint compound and apply first, fill (second), and finish (third) coats of joint compound over joints, angles, fastener heads, and accessories. Touch up and sand between coats and after last coat as needed to produce a surface free of visual defects and ready for decoration.

G. Where Level 1 gypsum board finish is indicated, embed tape in joint compound.

H. Finish tile backer units to comply with unit manufacturer's directions.

3.9 FIELD QUALITY CONTROL

A. Above Ceiling Observation: Architect will conduct an above-ceiling observation prior to installation of gypsum board ceilings and report any deficiencies in the Work observed. Do not proceed with installation of gypsum board to ceiling support framing until deficiencies have been corrected.
1. Notify Architect one week in advance of the date and the time when the Project, or part of the Project, will be ready for an above-ceiling observation.
2. Prior to notifying Architect, complete the following in areas to receive gypsum board ceilings:
   a. Installation of 80 percent of lighting fixtures, powered for operation.
   b. Installation, insulation, and leak and pressure testing of water piping systems.

c. Installation of air duct systems.
d. Installation
e. Installation
f. Installation

3.10 CLEANING AND PROTECTION

A. Promptly remove any residual joint compound from adjacent surfaces.

B. Provide final protection and maintain conditions, in a manner acceptable to Installer, that ensure gypsum board assemblies are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 092900

SECTION 093000 – TILING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 SUMMARY

A. Section Includes:
1. Glazed wall tile.
2. Metal edge strips.

1.3 DEFINITIONS

A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.

B. ANSI A 108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in its "Specifications for Installation of Ceramic Tile."

C. Module Size: Actual tile size plus joint width indicated.

D. Face Size: Actual tile size, excluding spacer lugs.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review requirements in ANSI A108.01 for substrates and for preparation by other trades.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.

C. Samples for Verification:

1. Full-size units of each type and composition of tile and for each color and finish required.
2. Full-size units of each type of trim and accessory for each color and finish required.
3. Metal edge strips in 6-inch lengths.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.

C. Product Certificates: For each type of product.

D. Product Test Reports: For tile-setting and –grouting products and certified porcelain tile.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.
2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

1.8 QUALITY ASSURANCE

A. Installer Qualifications:
1. Installer is a five-star member of the National Tile Contractors Association or a Trowel of Excellence member of the Tile Contractors' Association of America.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements of A137.1 for labeling tile packages.

B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.

C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.

D. Store liquid materials in unopened containers and protected from freezing.

1.10 FIELD CONDITIONS

A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Tile: Obtain tile from single source or producer.

1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.

B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from a single manufacturer and each aggregate from single source or producer.

1. Obtain setting and grouting materials, except for unmodified Portland cement and aggregate, from single manufacturer.
2. Obtain waterproof membrane and crack isolation membrane, except for sheet products, from manufacturer of setting and grouting materials.

C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer:

1. Crack isolation membrane.
2. Cementitious backer units.
3. Metal edge strips.

2.2 PRODUCTS, GENERAL

A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.

1. Provide tile complying with Standard grade requirements.

B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.

C. Factory Blending: For tile exhibiting color variations with ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

D. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.

2.3 TILE PRODUCTS

A. Ceramic Tile Type: Porcelain tile.

1. Product: Subject to compliance with requirements, provide product indicated on the finish schedule.
2. Certification: Tile certified by the Porcelain Tile Certification Agency.
3. Grout Color: As indicated on the finish schedule.
4. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile.

2.4 METAL JOINT TRIM

A. Acceptable Manufacturer: Subject to compliance with requirements of Contract Documents, provide products by manufacturer listed below.

1. Schluter Systems, **www.schluter.com**

B. Finish: Satin anodized Aluminum.

2.5 TILE BACKING PANELS

(Refer to Section 092900 – Gypsum Board for tile backer boards).

2.6 SETTING MATERIALS

A. Latex-Portland Cement Mortar (Thinset): ANSI A118.4.

1. Manufacturers: Subject to compliance with requirements, provide products by the following manufacturers:

a. MAPEI Corporation. **Ultraflex LFT** (or approved equal)

2.7 GROUT MATERIALS

A. Water-Cleanable Epoxy Grout: ANSI A118.3.

1. Manufacturers: Subject to compliance with requirements:

a. MAPEI Corporation. **FLEXCOLOR CQ** (or approved equal)

2.8 MISCELLANEOUS MATERIALS

A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.

B. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

C. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturer's written instructions.

D. Add materials, water and additives in accurate proportions.

E. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of Work.

1. Verify that substrates for setting tile are firm, dry, clean, free of coatings that are incompatible with tile-setting materials including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.

2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
3. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated adjust locations in consultation with Architect.

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

3.2 PREPARATION

A. Blending: For tile exhibiting color variations, verify that tile has been factory blended tile and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 CERAMIC TILE INSTALLATION

A. Comply with TCA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 Series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.

1. For the following installations, follow procedures in the ANSI A108 Series of tile installation standards for providing 95 percent mortar coverage:

B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

D. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.

1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
2. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
3. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.

E. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:

1. Porcelain Tile: 1/16 inch.

F. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.

1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.

G. Metal Edge Strips: **Install at locations indicated.**

3.4 ADJUSTING AND CLEANING

A. Remove and replace tile that is damaged or that does not match adjoining tile. Provide new matching units, installed as specified and in a manner to eliminate evidence of replacement.

B. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

1. Remove grout residue from tile as soon as possible.
2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

3.5 PROTECTION

A. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear.

B. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

END OF SECTION 093000

SECTION 095113 - ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes acoustical ceiling tile, suspension system and accessories.

B. Related Sections:

1. Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 QUALITY ASSURANCE

A. Source Limitations:
1. Acoustical This Section includes ceilings consisting of acoustical panels and exposed suspension systems - heavy duty to comply with IBC requirements.

B. Fire Performance Characteristics: Provide acoustical ceiling components that are identical to those tested for the following fire performance characteristics, according to ASTM test method indicated, by UL or other testing and inspecting agency acceptable to authorities having jurisdiction. Identify acoustical ceiling components with appropriate marking of applicable testing and inspecting agency.

1. Surface Burning Characteristics: As follows, tested per ASTM E 84.

a. Flame Spread: 25 or less.

b. Smoke Developed: 50 or less.,

2. Fire Resistance Ratings: As indicated by reference to design designation in UL "Fire Resistance Directory" or "FM Approval Guide", for floor, roof or beam assemblies in which acoustical ceilings function as a fire protective membrane; tested per ASTM E 119. Provide protection materials for lighting fixtures and air ducts to comply with requirements indicated for rated assembly.

C. Seismic Standard: Provide acoustical panel ceilings designed and installed to withstand the effects of earthquake motions according to the following:

1. CISA's Guidelines for Systems Requiring Seismic Restraint: Comply with CISCA's "Guidelines for Seismic Restraint of Direct-Hung Suspended Ceiling Assemblies-Seismic Zones 3 & 4."

D. Coordination of Work: Coordinate layout and installation of acoustical ceiling units and suspension system components with other work supported by or penetrating through, ceilings, including light fixtures, HVAC equipment, fire-suppression system components (if any), and partition system (if any).

1.3 SUBMITTALS

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

B. Coordination Drawings: Reflected ceiling plans drawn to scale and coordinating penetrations and ceiling-mounted items. Show the following:
   1. Ceiling suspension system members.
   2. Method of attaching suspension system hangers to building structure.
   3. Ceiling-mounted items including light fixtures; air outlets and inlets; speakers; sprinklers; and special moldings at walls, column penetrations, and other junctures of acoustical ceilings with adjoining construction.

C. Samples: Full-size units of each type of ceiling assembly indicated; in sets for each color, texture, and pattern specified, showing the full range of variations expected in these characteristics. Manufacturer's suspension systems, and moldings showing the full range of colors, textures, and patterns available for each type of ceiling assembly indicated.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical ceiling units to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination or other causes.

B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.5 PROJECT CONDITIONS

A. Space Enclosure: Do not install interior acoustical ceilings until space is enclosed and weatherproof, wet-work in space is completed and nominally dry, work above ceilings completed, and ambient conditions of temperature and humidity will be continuously maintained at values near those indicated for final occupancy

1.6 COORDINATION

A. Coordinate layout and installation of acoustical panels and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire suppression system, and partition assemblies.

1.7 EXTRA MATERIALS

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

   1. Acoustical Ceiling Panels: Full-size equal to 2.0 percent of quantity installed.

   2. Suspension System Components: Quantity of each exposed component equal to 2.0 percent of quantity installed.

3. Hold-Down Clips: Equal to 2.0 percent of amount installed.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include:

1. Suspension System: Armstrong World Industries, Inc.
   a. See Finish Schedule

2. Acoustical Tile: Armstrong World Industries, Inc.
   a. See Finish Schedule

3. Acoustical Sealant:
   a. Tremco Acoustical Sealant; Tremco.
   b. USG Acoustical Sealant; United States Sypsum Co.
   c. Chem-Calk 600; Woodmont Products, Inc.
   d. Pecora Corp; AC 20 FTR Acoustical and Insulation Sealant

2.2 MATERIALS

A. Acoustical Ceiling Units:

1. General: Provide manufacturer's standard units of configuration indicated which are prepared for mounting method designated and which comply with FS SS-S-118 requirements, including those indicated by reference to type, form, pattern, grade (NRC or NIC's as applicable), light reflectance coefficient (LR), edge detail, and joint detail (if any).

2. Mounting Method for Measuring NRC: No. 7 (mechanically mounted on special metal support), FS SS-S-118; or Type E-400 mounting as per ASTM E 795.

3. Sound Attenuation Performance: Provide acoustical ceiling units with ratings for ceiling sound transmission class (STC) of range indicated as determined according to AMA 1-11 "Ceiling Sound Transmission Test by Two-Room Method" with ceilings continuous at partitions and supported by a metal suspension system of type appropriate for ceiling unit of configuration indicated (concealed for tile, exposed for panels).

B. Ceiling Types:

1. **See Finish Schedule.**

C. Metal Suspension System: Provide metal suspension systems of type, structural classification and finish indicated which comply with applicable ASTM C 635 requirements.

1. Finishes and Colors: Provide manufacturer's standard finish for type of system indicated, unless otherwise required. For exposed suspension members and accessories with painted finish, provide color indicated or, if not otherwise indicated, as selected by Architect from manufacturer's full range of standard colors.

2. Attachment Devices: Size for 5 times design load indicated in ASTM C 635, Table 1, Direct Hung.

3. Hanger Wire: Galvanized carbon steel wire, ASTM A 641, soft temper, pre-stretched, Class 1 coating, sized so that stress at 3- times hanger design load (ASTM C 635, Table 1, Direct Hung), will be less than yield stress of wire, but provide not less than 12 gage.

4. Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that fit acoustical panel edge details and suspension systems indicated; formed from sheet metal of same material and finish as that used for exposed flanges of suspension system runners.
   a. For lay-in panels with reveal edge details, provide stepped edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member.
   b. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.
   c. Provide shadow reveal molding with width of reveal equal to depth of reveal.
   d. Colors of Moldings and Trims: As selected by Architect.

5. Hold-Down Clips: Minimum 24 gauge spring steel, 1-7/16 inches deep x 7/8 inches wide, designed to fit over cross tees. Provide clips spaced symmetrically 2 ft. o.c..

6. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces. Struts will be required at 12 feet on center both ways for all suspended ceilings according to UBC Standard 25-2. (Seismic calculations have been done which require rigid struts as 12 feet on center I order to allow for 7/8" perimeter wall molding in lieu of a 2" perimeter wall mold.) In lieu of compression struts provide a seismic clip with an ES Report number from ICC demonstrating that the compression struts and the 2 inch perimeter wall mold are not required. Equal to;
   a. BERC seismic clips as manufactured by Armstrong.
   b. 1496 Perimeter Clip as manufactured by Chicago Metallic Corp.
   c. ACM-7 clip as manufactured by USG.

7. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, pre-painted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, not less than G30 (Z90) coating designation, with pre-finished 15/16-inch-(24-mm-) wide metal caps on flanges.
   a. Basis of Design: **See finish Schedule**
   b. Structural Classification: Heavy-duty system.
   c. End Condition of Cross Runners: Butt-edge type.
   d. Face Design: Flat, flush.
   e. Cap Material: Steel or aluminum cold-rolled sheet.
   f. Cap Finish: Painted in color as selected from manufacturer's full range.
      1) Colors:
         (a) White.

D. Metal Edge Moldings & Trim:
   1. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product:

      a. Armstrong World Industries, Axiom

   2. Extruded-Aluminum Edge Moldings and Trim: Where indicated, provide manufacturer's extruded-aluminum edge moldings and trim of profile indicated or referenced by

manufacturer's designations, including splice plates, corner pieces, and attachment and other clips, complying with seismic design requirements and the following:

a. Aluminum Alloy: Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of aluminum extrusions complying with ASTM B 221 (ASTM B 221M) for Alloy and Temper 6063-T5.
b. Finish designations prefixed by AA comply with system established by the Aluminum Association for designating aluminum finishes.
c. Baked-Enamel Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; organic coating: as specified below). Apply baked enamel complying with paint manufacturer's written instructions for cleaning, conversion coating, and painting.

1. Organic Coating: Thermosetting, primer/topcoat system with a minimum dry film thickness of 0.8 to 1.2 mils (0.02 to 0.03 mm).

E. Miscellaneous Materials:

1. Acoustical Sealant: Resilient, non-staining, non-shrinking, non-hardening, non-skinning, non-drying, non-sag sealant intended for interior sealing of concealed construction joints.

2. Edge Trim:
   a. Basis of Design: Armstrong Ceilings; Axiom.
   b. Trim Height: 4 inches.
   c. Finish: As selected by Architect from manufacturer’s full range of custom colors.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordination: Furnish layouts for inserts, clips, or other supports required to be installed by other trades for support of acoustical ceilings.

1. Furnish concrete inserts, steel deck hanger clips and similar devices to other trades for installation well in advance of time needed for coordination of other work.

B. Layout: Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less-than-half width units at borders, and comply with reflected ceiling plans wherever possible.

3.2 INSTALLATION

A. General: Install materials in accordance with manufacturer’s printed instructions, and to comply with governing regulations, fire resistance rating requirements as indicated, and industry standards applicable to work.

B. Arrange acoustical units and orient directionally- patterned units (if any) in manner shown by reflected ceiling plans.

1. Install tile with pattern running in one direction.

C. Install suspension systems to comply with ASTM C 636, with hangers supported only from building structural members. Locate hangers not less than 6" from each end and spaced 4'-0" along each carrying channel or direct-hunger runner, unless otherwise indicated, leveling to tolerance of 1/8 in 12'-0". Comply with detail on drawings for seismic bracing.

D. Secure wire hangers by looping and wire-tying, either directly to structures or to inserts, eye-screw, or other devices which are secure and appropriate for substrate and which will not deteriorate or fail with age or elevated temperatures.

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum which are not part of supporting structural or ceiling suspension system. Splay hangers only where required to miss obstructions and offset resulting horizontal force by bracing, countersplaying or other equally effective means.

E. Install edge moldings of type indicated at perimeter of acoustical ceiling area and at locations where necessary to conceal edges of acoustical units.

1. Screw-attach moldings to substrate at intervals not over 16" o.c. and not more than 3" from ends, leveling with ceiling suspension system to tolerance of 1/8" in 12'-0". Miter corners accurately and connect securely.

F. Install acoustical tile in coordination with suspension system into kerfed edges, or insert tile tongues into tile grooves, so that every tile-to-tile joint is closed by double lap of material.

1. Fit adjoining tile to form flush, tight joints. Scribe and cut for accurate fit at borders and around penetrating work.

2. Hold tile field in compression by inserting leaf-type spring steel spacers between tile and moldings, spaced at 12" o.c.

3. Install acoustical panels in coordination with suspension system, with edges concealed by support of suspension members. Scribe and cut panels to fit accurately at borders and at penetrations.

4. Paint cut and exposed edges of acoustical tile.

5. Install hold-down clips in areas indicated, and in areas where required by governing regulations or for fire-resistance ratings; space as recommended by panel manufacturer, unless otherwise indicated or required.

3.3 ADJUST AND CLEAN

A. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members; comply with manufacturer's instructions for cleaning and touch-up of minor finish damage. Remove and replace work with cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 095100

SECTION 096513 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Resilient wall base.
   2. Resilient accessories.

B. Related Sections:

   1. Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 SUBMITTALS

A. Product Data: For each type of product.

B. Samples for Initial Selection: Manufacturer's standard sample sets consisting of sections of units showing the full range of colors and patterns available for each type of product indicated.

C. Samples for Verification: In manufacturer's standard sizes, but not less than 12 inches (300 mm) long, of each product color and pattern specified.

D. Product Certificates: Signed by manufacturers of resilient wall base and accessories certifying that each product furnished complies with requirements.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer to perform work of this Section who has specialized in installing resilient products similar to those required for this Project and with a record of successful in-service performance.

B. Source Limitations: Obtain each type and color of product specified from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.

C. Fire-Test-Response Characteristics: Provide products with the following fire-test-response characteristics as determined by testing identical products per test method indicated below by a testing and inspecting agency acceptable to authorities having jurisdiction.
   1. Critical Radiant Flux: 0.45 W/sq. cm or greater when tested per ASTM E 648.
   2. Smoke Density: Maximum specific optical density of 450 or less when tested per ASTM E 662.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to Project site in manufacturer's original, unopened cartons and containers, each bearing names of product and manufacturer, Project identification, and shipping and handling instructions.

B. Store products in dry spaces protected from the weather, with ambient temperatures maintained between 50 and 90 deg F (10 and 32 deg C).

C. Move products into spaces where they will be installed at least 48 hours before installation, unless longer conditioning period is recommended in writing by manufacturer.

1.5 PROJECT CONDITIONS

A. Maintain a temperature of not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C) in spaces to receive resilient products for at least 48 hours before installation, during installation, and for at least 48 hours after installation, unless manufacturer's written recommendations specify longer time periods. After postinstallation period, maintain a temperature of not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).

B. Do not install products until they are at the same temperature as the space where they are to be installed.

C. For resilient products installed on traffic surfaces, close spaces to traffic during installation and for time period after installation recommended in writing by manufacturer.

D. Coordinate resilient product installation with other construction to minimize possibility of damage and soiling during remainder of construction period. Install resilient products after other finishing operations, including painting, have been completed.

1.6 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.
   1. Furnish not less than 10 linear feet (3 linear m of each different type, color, pattern, and size of resilient product installed.
   2. Deliver extra materials to Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Drawings as indicated.

2.2 RESILIENT WALL BASE

A. Rubber Wall Base: Products complying with FS SS-W-40, Type I and with requirements specified in the Resilient Wall Base and Accessory Schedule.

2.3 RESILIENT ACCESSORIES

A. Rubber Accessories: Products complying with requirements specified in the Resilient Wall Base and Accessory Schedule.

2.4 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based formulation provided or approved by resilient product manufacturer for applications indicated.

B. Stair-Tread-Nose Filler: Two-part epoxy compound recommended by resilient tread manufacturer to fill nosing substrates that do not conform to tread contours.

C. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where installation of resilient products will occur, with Installer present, for compliance with manufacturer's requirements, including those for maximum moisture content. Verify that substrates and conditions are satisfactory for resilient product installation and comply with requirements specified. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General: Comply with manufacturer's written installation instructions for preparing substrates indicated to receive resilient products.

B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates.

C. Use stair-tread-nose filler, according to resilient tread manufacturer's written instructions, to fill nosing substrates that do not conform to tread contours.

D. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.

E. Broom and vacuum clean substrates to be covered immediately before installing resilient products. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. General: Install resilient products according to manufacturer's written installation instructions.

B. Apply resilient wall 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 wall base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
   1. Tightly adhere wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
   2. Do not stretch base during installation.
   3. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.
   4. Install premolded outside corners before installing straight pieces.
   5. Form inside corners on job, from straight pieces of maximum lengths possible, by cutting an inverted V-shaped notch in toe of wall base at the point where corner is formed. Shave back of base where necessary to produce a snug fit to substrate.

D. Place resilient products so they are butted to adjacent materials and bond to substrates with adhesive. Install reducer strips at edges of flooring that would otherwise be exposed.

E. Apply resilient products to stairs as indicated and according to manufacturer's written installation instructions.

3.4 CLEANING AND PROTECTION

A. Perform the following operations immediately after installing resilient products:
   1. Remove adhesive and other surface blemishes using cleaner recommended by resilient product manufacturers.
   2. Sweep or vacuum horizontal surfaces thoroughly.
   3. Do not wash resilient products until after time period recommended by resilient product manufacturer.
   4. Damp-mop or sponge resilient products to remove marks and soil.

B. Protect resilient products against mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by resilient product manufacturer.
   1. Cover resilient products installed on floors and stairs with undyed, untreated building paper until inspection for Substantial Completion.

C. Clean resilient products not more than 4 days before dates scheduled for inspections intended to establish date of Substantial Completion in each area of Project. Clean products according to manufacturer's written recommendations.
   1. Before cleaning, strip protective floor polish that was applied to vinyl products on floors and stairs after completing installation only if required to restore polish finish and if recommended by resilient product manufacturer.
   2. After cleaning, reapply polish on vinyl products on floors and stairs to restore protective floor finish according to resilient product manufacturer's written recommendations. Coordinate with Owner's maintenance program.

3.5 RESILIENT WALL BASE AND ACCESSORY SCHEDULE

A. Rubber Wall Base: Provide rubber wall base complying with the following:
   1. Color and Pattern as scheduled on drawings.

2. Style: Cove with top-set toe
3. Minimum Thickness: 1/8 inch (3.2 mm
4. Height: 4 inches
5. Lengths: Coils in lengths standard with manufacturer, but not less than 96 feet (29.26 m)
6. Outside Corners: Premolded.
7. Inside Corners: Job formed
8. Ends: Premolded.
9. Surface: Smooth.

B. Rubber Accessory Molding Provide rubber accessory molding complying with the following:
1. Color: As selected by Architect from manufacturer's full range of colors produced for rubber accessory molding complying with requirements indicated.
2. Product Description: as scheduled on drawings
   a. Resilient Subfloor leveler. As indicated.
   b. Resilient edge for carpet. As indicated.
3. Profile and Dimensions: As indicated.

END OF SECTION 096513

SECTION 096813 - TILE CARPETING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes carpet tile and installation and carpet tile walk-off mats.

B. Related Sections include the following:

1. **Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.**

2. Division 9 Section "Resilient Flooring and Base" for resilient wall base and accessories installed with carpet tile.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated. Include manufacturer's written data on physical characteristics, durability, and fade resistance. Include installation methods.

B. Shop Drawings: Show the following:
1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
2. Existing flooring materials to be removed.
3. Existing flooring materials to remain.
4. Carpet tile type, color, and dye lot.
5. Type of subfloor.
6. Type of installation.
7. Pattern of installation.
8. Pattern type, location, and direction.
9. Pile direction.
10. Type, color, and location of insets and borders.
11. Type, color, and location of edge, transition, and other accessory strips.
12. Transition details to other flooring materials.

C. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.
1. Carpet Tile: Full-size Sample.
2. Exposed Edge Stripping and Accessory: 12-inch- (300-mm-) long Samples.

D. Product Schedule: Use same room and product designations indicated on Drawings and in schedules.

E. Maintenance Data: For carpet tile to include in maintenance manuals specified in Division 1. Include the following:
1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.

2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is certified by the Floor Covering Installation Board or who can demonstrate compliance with its certification program requirements.

B. Fire-Test-Response Characteristics: Provide products with the critical radiant flux classification indicated in Part 2, as determined by testing identical products per ASTM E 648 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

1.4 DELIVERY, STORAGE, AND HANDLING

A. General: Comply with CRI 104, Section 5, "Storage and Handling."

1.5 PROJECT CONDITIONS

A. General: Comply with CRI 104, Section 6.1, "Site Conditions; Temperature and Humidity."

B. Environmental Limitations: Do not install carpet tile until wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

C. Do not install carpet tile over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.

1.6 WARRANTY

A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Special Carpet Tile Warranty: Written warranty, signed by carpet tile manufacturer agreeing to replace carpet tile that does not comply with requirements or that fails within specified warranty period. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, and delamination.
1. Warranty Period: 10 years from date of Substantial Completion.

1.7 EXTRA MATERIALS

A. Furnish extra materials described below, before installation begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Carpet Tile: Full-size units, not less than 10 sq. yd. (8.3 sq. m).

PART 2 - PRODUCTS

2.1 CARPET TILE:

A. Color schemes and Products as scheduled in Finish Schedule.

2.2 CARPET TILE, WALK-OFF MATS

A. Provide the products as scheduled in Finish Schedule.

2.3 INSTALLATION ACCESSORIES.

A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided by or recommended by carpet tile manufacturer.

B. Adhesives: Water-resistant, mildew-resistant, nonstaining type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and that is recommended by carpet tile manufacturer.
   1. VOC Limits: Provide adhesives that comply with the following limits for VOC content when tested according to ASTM D 5116:
      a. Total VOCs: 10.00 mg/sq. m x h.
      b. Formaldehyde: 0.05 mg/sq. m x h.
      c. 2-Ethyl-1-Hexanol: 3.00 mg/sq. m x h.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance. Verify that substrates and conditions are satisfactory for carpet tile installation and comply with requirements specified.

B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:
   1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by carpet tile manufacturer.
   2. Subfloor finishes comply with requirements specified in Division 3 Section "Cast-in-Place Concrete" for slabs receiving carpet tile.
   3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.

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

3.2 PREPARATION

A. General: Comply with CRI 104, Section 6.2, "Site Conditions; Floor Preparation," and carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile installation.

B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates.

C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet tile manufacturer.

D. Broom and vacuum clean substrates to be covered immediately before installing carpet tile. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. General: Comply with CRI 104, Section 13, "Carpet Modules (Tiles)."

B. Installation Method: As recommended in writing by carpet tile manufacturer for Glue-down; install every tile with releasable adhesive.

C. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, and thresholds. Bind or seal cut edges as recommended by carpet tile manufacturer.

D. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

E. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.

3.4 CLEANING AND PROTECTION

A. Perform the following operations immediately after installing carpet tile:
1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet tile manufacturer.
2. Remove yarns that protrude from carpet tile surface.
3. Vacuum carpet tile using commercial machine with face-beater element.

B. Protect carpet tile to comply with CRI 104, Section 15, "Protection of Indoor Installations."

C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION 096813

SECTION 097200 - WALL COVERINGS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. **Vinyl wall covering letters** in areas scheduled.

B. Related Sections: The following Sections contain requirements that relate to this Section:

   1. Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product Data for each type of product specified. Include data on physical characteristics, durability, fade resistance, and flame-resistance characteristics.

C. Shop Drawings showing location and extent of each wall covering type. Indicate seams and termination points.

D. Samples for initial selection in the form of manufacturer's color charts consisting of actual units or sections of units showing the full range of colors, textures, and patterns available.

E. Product certificates signed by manufacturers of wall coverings certifying that their products comply with specified requirements.

F. Maintenance data for wall covering to include in the operation and maintenance manual specified in Division 1.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer who has completed 5 projects similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Fire-Test-Response Characteristics: Provide wall coverings with the following surface-burning characteristics as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
   1. Flame Spread: 25 or less.
   2. 2. Smoke Developed: 450 or less.

1.4 PROJECT CONDITIONS

A. Space Enclosure and Environmental Limitations: Do not install wall covering until space is enclosed and weatherproof, wet-work in space is completed and nominally dry, work above ceilings is complete, and ambient temperature and humidity conditions are and will be continuously maintained at values near those indicated for final occupancy.

B. Lighting: Do not install wall covering until a lighting level of not less than 15 foot-candles (160 lux) is provided on the surfaces to receive wall covering.

C. Ventilation: Provide continuous ventilation during installation and for not less than the time recommended by the wall covering manufacturer for full drying or curing.

PART 2 - PRODUCTS

2.1 VINYL WALL COVERING LETTERS

A. Vinyl Wall Covering Standard: Opaque nonreflective vinyl film, 0.0035-inch minimum, pressure-sensitive adhesive backing.

B. White Wall Covering: 3M 7725-10 White Vinyl, Cut, Weed, & Pre-mask.

C. Colored Wall Covering: 3M IJ180 White Vinyl. Printed to match custom color. Cut, Weed, & Pre-mask.

D. Surface Applied: First Surface Application.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates for compliance with requirements for moisture content and other conditions affecting performance of Work of this Section. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Comply with manufacturer's written instructions for surface preparation.

B. Clean substrates of substances that could impair wall covering's bond, including mold, mildew, oil, grease, incompatible primers, and dirt.

C. Prepare substrates to achieve a smooth, dry, clean surface free of flaking, unsound coatings, cracks, and defects.
1. Painted Surfaces: Treat areas susceptible to pigment bleeding.
2. Moisture Content: Maximum of 5 percent on new substrates
3. Prime new gypsum board with primer recommended by wall covering manufacturer.
4. Allow **7 days for primer cure** time before application of wall covering.

SIGN SCHEDULE

D. **VINYL DIE-CUT SIGNS**

1. Message: **BAGGAGE OFFICE** (1 Set) LOCATED ON WALL
   a. Type: High performance pressure sensitive vinyl.
   b. Size: 2” high
   c. Lettering Style: Montserrat Regular
   d. Color Dark Grey

2. Message: **BAGGAGE CLAIM** (1 Set) LOCATED ON WALL
   a. Type: High performance pressure sensitive vinyl for exterior use.
   b. Size: 2” high
   c. Lettering Style: Montserrat Regular
   d. Color White

3. Message: **AIRPORT OFFICE** (2 Set) LOCATED ON WALL
   e. Type: High performance pressure sensitive vinyl.
   f. Size: 2” high
   g. Lettering Style: Montserrat Regular
   h. Color White

4. Message: **BADGING** (1 Set) LOCATED ON WALL
   i. Type: High performance pressure sensitive vinyl.
   j. Size: 2” high
   k. Lettering Style: Montserrat Regular
   l. Color White

5. Message: **AIRPORT MANAGER** (1 Set) LOCATED ON WALL
   m. Type: High performance pressure sensitive vinyl.
   n. Size: 2” high
   o. Lettering Style: Montserrat Regular
   p. Color White

END OF SECTION 097200

SECTION 099113 - EXTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes surface preparation and the application of paint systems on the following exterior substrates:

1. Steel and iron.

B. Related Requirements:

1. Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 DEFINITIONS

A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.

B. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

C. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.

D. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

E. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

F. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.

B. Samples: For each type of paint system and each color and gloss of topcoat.

1.4 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system.

    a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
    b. Other Items: Architect will designate items or areas required.

2. Final approval of color selections will be based on mockups.

    a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

B. <u>PRODUCT VERIFICATION:</u> PAINT CANS OF THE SPECIFIED MATERIALS WILL BE VERIFIED ON SITE BY ARCHITECT. ARCHITECT RESERVES THE RIGHT TO REQUEST INVOICES OF PRODUCTS BEING INSTALLED.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Sherwin-Williams Company (The); Refer to exterior paint schedule for Basis of Design Product or a comparable product by one of the following:

1. Dulux (formerly ICI Paints); a brand of AkzoNobel.
2. Glidden Professional.
3. PPG Architectural Finishes, Inc.

B. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to products listed in the Exterior Painting Schedule for the paint category indicated.

2.2 PAINT, GENERAL

A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."

B. Material Compatibility:

1. Materials for use within each paint system shall be 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, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.

C. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction.

D. Colors: As indicated in a color schedule.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.
2. Fiber-Cement Board: 12 percent.
3. Masonry (Clay and CMUs): 12 percent.
4. Wood: 15 percent.
5. Portland Cement Plaster: 12 percent.
6. Gypsum Board: 12 percent.

C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

D. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems 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.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Manual."

B. 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.

3.4 CLEANING AND PROTECTION

A. 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.

B. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.5 EXTERIOR PAINTING SCHEDULE

A. Steel and Iron Substrates:

1. Water-Based Light Industrial Coating System MPI EXT 5.1M:

a. Prime Coat: Primer, rust inhibitive, water based MPI #107.

1) "Basis of Design": Sherwin Williams; Pro-Cryl Universal Primer, B66W310

b. Intermediate Coat: Light industrial coating, exterior, water based, and matching topcoat.

c. Topcoat: Light industrial coating, exterior, water based, gloss (MPI Gloss Level 6), MPI #164.

1) "Basis of Design": Sherwin Williams; Pro Industrial High-Performance Acrylic, Gloss, B66W0061

B. Existing EIFS:

1. Water-Based Light Industrial Coating System MPI EXT 5.1M:

a. Prime Coat: Primer, rust inhibitive, water based MPI #107.

1) "Basis of Design": Sherwin Williams; Loxon Concrete & Masonry Primer, A24W8300, <100 g/l VOC

b. Intermediate Coat: Light industrial coating, exterior, water based, and matching topcoat. Sherwin Williams; A-100 Exterior Latex Flat, A6 series, <50 g/l VOC
Thickness: (Mils per Coat) 4.3 wet – 1.2 dry

c. Topcoat: Light industrial coating, exterior, water based, gloss (MPI Gloss Level 6), MPI #164.

1) "Basis of Design": Sherwin Williams; A-100 Exterior Latex Flat, A6 series, <50 g/l VOC

END OF SECTION 099113

SECTION 099123 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes surface preparation and the application of paint systems on the following interior substrates:

1. Steel and iron.
2. Wood. (Fire Treated Plywood Backer Panels).
3. Gypsum board.

B. Related Requirements:

1. Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 DEFINITIONS

A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.

B. MPI Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

C. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

D. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.

E. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

F. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

G. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

1. Include Printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.

B. Samples: For each type of paint system and in each color and gloss of topcoat.

1.4 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system.

a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
b. Other Items: Architect will designate items or areas required.

2. Final approval of color selections will be based on mockups.

a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

B. <u>PRODUCT VERIFICATION:</u> PAINT CANS OF SPECIFIED MATERIALS WILL BE VERIFIED ON SITE BY ARCHITECT. ARCHITECT RESERVES THE RIGHT TO REQUEST INVOICES OF PRODUCTS BEING INSTALLED.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

2.2 Basis-of-Design Product: Subject to compliance with requirements, provide product indicated within the Interior Painting Schedule or comparable product by one of the following:

1. Benjamin Moore & Co.
2. PPG (formerly ICI Paints); a brand of AkzoNobel.
3. Sherwin-Williams Company (The). “Basis of Design”:

B. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to products listed in the Interior Painting Schedule for the paint category indicated.

2.3 PAINT, GENERAL

A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."

B. Material Compatibility:

1. Materials for use within each paint system shall be 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, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.

C. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction and, for interior paints and coatings applied at Project site, the following VOC limits, exclusive of colorants added to a tint base:

1. Flat Paints and Coatings: 50 g/L.
2. Nonflat Paints and Coatings: 150 g/L.
3. Dry-Fog Coatings: 400 g/L.
4. Primers, Sealers, and Undercoaters: 200 g/L.
5. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
6. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
7. Pretreatment Wash Primers: 420 g/L.
8. Floor Coatings: 100 g/L.
9. Shellacs, Clear: 730 g/L.
10. Shellacs, Pigmented: 550 g/L.

D. Low-Emitting Materials: Interior paints and coatings shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

E. Colors: As indicated in Section 090000, “Finish Schedule.”

1. Ten percent of surface area will be painted with deep tones.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.
2. Fiber-Cement Board: 12 percent.
3. Masonry (Clay and CMUs): 12 percent.
4. Wood: 15 percent.
5. Gypsum Board: 12 percent.
6. Plaster: 12 percent.

C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

D. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems 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.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."

B. 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.

3.4 INTERIOR PAINTING SCHEDULE

A. Steel Substrates:

1. Institutional Low-Odor/VOC Latex System MPI INT 5.1S:

a. Prime Coat: Primer, rust inhibitive, water based MPI #107 X-GREEN

1) "Basis of Design": Sherwin Williams; Pro-Cryl Universal Primer B66W310.

b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.

c. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (MPI Gloss Level 5), MPI #147 X-GREEN.

1) "Basis of Design": Sherwin Williams; Pro Industrial High Performance Acrylic, Semi-Gloss Coating. B66W00651

2. Waterborne Acrylic Dryfall (STEEL ON CEILING)

a. Prime Coat: Primer, rust inhibitive, water based MPI #107 X-GREEN

1) "Basis of Design": Sherwin Williams; Pro-Cryl Universal Primer B66W310

b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.

c. Topcoat:

1) "Basis of Design": Sherwin Williams; Pro Industrial, Waterborne Acrylic Dryfall – Flat.

B. Wood Substrates: Fire Treated Plywood Backer Panels:

1. Water Based, Latex Fire Retardant Coating

a. Topcoat: Latex, interior (MPI Gloss Level 1), MPI #64.

1) "Basis of Design": Sherwin Williams; Flame Control, Flat Intumescent Fire Retardant, 20-20

C. Gypsum Board:

1. Institutional Low-Odor/VOC Latex System:

a. Prime Coat: Primer sealer, interior, institutional low odor/VOC.

1) "Basis of Design": Sherwin Williams; ProMar 200 Zero, Interior Latex Primer B28W2600 Series. (4.0 mils Wet, 1.0 Mils dry)

b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.

c. Topcoat: Latex, interior, institutional low odor/VOC, Eg-Shel.

1) "Basis of Design": Sherwin Williams; ProMar 200 Zero, Interior Latex B28W2600 Series. (4.0 mils Wet, 1.7 Mils dry)

D. Gypsum Board (Ceilings):

1. Institutional Low-Odor/VOC Latex System:

a. Prime Coat: Primer sealer, interior, institutional low odor/VOC.

1) "Basis of Design": Sherwin Williams; ProMar 200 Zero, Interior Latex Primer B28W2600 Series. (4.0 mils Wet, 1.0 Mils dry)

b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.

c. Topcoat: Latex, interior, institutional low odor/VOC, Flat.

1) "Basis of Design": Sherwin Williams; ProMar 400 Zero, Interior Latex, Flat B30W04651 Series. (4.0 mils Wet, 1.7 Mils dry)

END OF SECTION 099123

101400 SIGNS
101419 DIMENSIONAL LETTER SIGNAGE
102600 WALL PROTECTION
102800 TOILET ACCESSORIES
104413 FIRE PROTECTION SPECIALTIES

SPECIALTIES

division 10

SAA

SANDERS ASSOCIATES ARCHITECTS

SECTION 101400 - SIGNS

1.1 GENERAL

A. Related Sections:

1. Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

B. Submittals: Submit the following:

1. Shop Drawings: Provide plans, elevations, and sections showing typical members, anchors, layout, reinforcement, accessories, and installation details. Include the following:

a. Message list for each sign with wording and letter layout.
b. Setting drawings, templates, and directions for installing anchors.

2. Samples: For initial selection of color, pattern, and surface texture, and for verification of compliance with requirements indicated.

a. Cast Acrylic Sheet and Plastic Laminate: 8-1/2-by-11-inch sample panel for each material, color, texture, and pattern. Show graphic image process showing style, colors and finishes.

1.2 PRODUCTS

A. Acrylic Sheet: Cast methyl methacrylate monomer plastic sheet with 16,000-psi minimum flexural strength, and minimum allowable continuous service temperature of 176 deg F (80 deg C).

1. Opaque Sheet: Colored opaque acrylic sheet in colors and finishes indicated.

B. Vinyl Film:

C. Fasteners: Concealed noncorrosive metal.

D. Anchors and Inserts: Nonferrous metal or hot-dipped galvanized. Use toothed steel or lead expansion bolt devices for drilled-in-place anchors. Furnish inserts for concrete or masonry work.

E. Colored Coatings for Acrylic Plastic Sheet: Nonfading colored coatings, including inks and paints for copy and background colors.

F. Brackets: Fabricate brackets and fittings from extruded aluminum to suit panel construction and mounting conditions. Factory-paint brackets color matching background color of sign panel.

G. Graphic Content and Style: Provide sign copy that complies with size, style, spacing, content, position, material, finishes, and colors of letters, numbers, and other graphic devices.

H. Applied Copy: Die-cut characters from vinyl film with pressure-sensitive adhesive backing. Apply to exposed face of glass.

1. Letter Height/Style: see product data sheet at end of section.

1.3 EXECUTION

A. Installation: Locate signs where indicated, using mounting methods specified. Install level, plumb, and at the height indicated, with sign surfaces free from distortion or other defects in appearance.

B. Bracket-Mounted Units: Provide brackets, fittings, and hardware as appropriate for signs that project at right angles from walls and ceilings. Attach brackets and fittings securely with concealed fasteners and anchoring devices.

C. Dimensional Letters and Numbers: Mount characters using methods recommended for letter form, type of mounting, wall construction, and condition of exposure indicated. Provide heavy paper template to establish letter spacing and to locate holes for fasteners.

1. Flush Mounting: Backs in contact with wall surface.
2. Projected Mounting: At distance from wall surface indicated.

D. Cleaning: After installation, clean soiled surfaces. Protect units from damage until acceptance by the Owner.

E. SIGN SCHEDULE

SIGNS: Exterior ADA signage
1. Signage: **See Civil Drawings.**

1. ACRYLIC SIGNS

SIGNS: Acrylic
1. Message: **WOMENS** (1 Set)
2. Type: Acrylic panel sign.
3. Size: 8”x8”
4. Mat. Thickness: 1/8”
5. Lettering Style: Montserrat Medium
6. Symbols: ADA
7. Braille:

SIGNS: Acrylic
1. Message: **MENS** (1 Set)
2. Type: Acrylic panel sign.
3. Size: 8”x8”
4. Mat. Thickness: 1/8”
5. Lettering Style: Montserrat Medium
6. Symbols: ADA
7. Braille:

END OF SECTION 101400

SECTION 101419 - DIMENSIONAL LETTERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fabricated dimensional letters.
2. Cast dimensional letters/numbers.

B. Related Sections:

1. Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For dimensional letter signs.

1. Include fabrication and installation details and attachments to other work.
2. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
3. Show message list, typestyles, graphic elements, and layout.
4. Show locations of electrical service connections.
5. Include diagrams for power, signal, and control wiring.

1.3 INFORMATIONAL SUBMITTALS

A. Sample warranty.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.5 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Thermal Movements: For exterior **fabricated channel dimensional characters** allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: **120 deg F (67 deg C), ambient material surfaces**

2.2 CAST DIMENSIONAL CHARACTERS

A. Fabricated Letters **Aluminum faces, 2" side returns and back**, **Arial Font**, formed free from warp and distortion; with uniform faces, sharp corners, and precisely formed lines and profiles; internally braced for stability and for securing fasteners; and as follows.

1. Message: **OGDEN CITY**
2. Character Material: **Aluminum**
3. Character Height: **1'-8"**
4. Character Depth: **2"**
5. Finish: **Powder Coated - BLACK.**
6. Mounting: **Manufacturer's standard for size and design of character**. **Projecting studs**

a. Hold characters at **manufacturer's recommended distance** from wall surface.

B. 1. Message: **HINCKLEY TERMINAL**
2. Character Material: **Aluminum**
3. Character Height: **1'-0"**
4. Character Depth: **2"**
5. Finish: **Powder Coated - BLACK.**
6. Mounting: **Manufacturer's standard for size and design of character**. **Projecting studs**

a. Hold characters at **manufacturer's recommended distance** from wall surface.

C. 1. Message: **REGIONAL AIRPORT**
2. Character Material: **Aluminum**
3. Character Height: **7-1/2"**
4. Character Depth: **2"**
5. Finish: **Powder Coated - BLACK.**
6. Mounting: **Manufacturer's standard for size and design of character**. **Projecting studs**

a. Hold characters at **manufacturer's recommended distance** from wall surface.

2.3

A. Cast Numbers
1. Message: **3909** (1 Set) (Verify number with City)
2. Type: Cast Aluminum with **clear anodized finish** with fine satin finish.

3. Height: **8**”
4. Depth: ¾”
5. Stroke: 3/16”
6. Lettering Style: **Arial**
7. Mounting: Use manufacturer’s projected mount to provide 1” stand-off from Steel mounting surface.

B. Cast Letters

8. Message: **INFORMATION** (Attach letters to ½” x 2” (by required length) aluminum plate at top of letters for attachment to ceiling)
9. Type: Cast Aluminum with **Black anodized finish** with fine satin finish.
10. Height: **8**”
11. Depth: 1-1/2”
12. Stroke: 3/16”
13. Lettering Style: **Arial**
14. Mounting: Use manufacturer’s projected mount to provide 1” stand-off from Steel mounting surface.

2.4 ACCESSORIES

A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signage, noncorrosive and compatible with each material joined, and complying with the following:

1. Use concealed fasteners and anchors unless indicated to be exposed.
2. For exterior exposure, furnish **stainless-steel** devices unless otherwise indicated.
3. Exposed Metal-Fastener Components, General:

    a. Fabricated from same basic metal and finish of fastened metal unless otherwise indicated.

4. Sign Mounting Fasteners:

    a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of sign material, screwed into back of sign assembly, or screwed into tapped lugs cast integrally into back of cast sign material, unless otherwise indicated.
    b. Projecting Studs: Threaded studs with sleeve spacer, welded or brazed to back of sign material, screwed into back of sign assembly, or screwed into tapped lugs cast integrally into back of cast sign material, unless otherwise indicated.
    c. Through Fasteners: Exposed metal fasteners matching sign finish, with type of head indicated, installed in predrilled holes.

2.5 FABRICATION

A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.

1. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
2. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.

3. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
4. Internally brace signs for stability and for securing fasteners.
5. Provide rebates, lugs, and brackets necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.
6. Castings: Fabricate castings free of warp, cracks, blowholes, pits, scale, sand holes, and other defects that impair appearance or strength. Grind, wire brush, sandblast, and buff castings to remove seams, gate marks, casting flash, and other casting marks before finishing.

B. Brackets: Fabricate brackets, fittings, and hardware for bracket-mounted signs to suit sign construction and mounting conditions indicated. Modify manufacturer's standard brackets as required.
1. Stainless-Steel Brackets: Factory finish brackets **to match sign background** finish unless otherwise indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.

1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
2. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

B. Mounting Methods:

1. Projecting Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.

a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place spacers on studs, place sign in position, and push until spacers are pinched between sign and substrate, embedding the stud ends in holes. Temporarily support sign in position until adhesive fully sets.
b. Thin or Hollow Surfaces: Place spacers on studs, place sign in position with spacers pinched between sign and substrate, and install washers and nuts on stud ends projecting through opposite side of surface, and tighten.

C. Remove temporary protective coverings and strippable films as signs are installed.

D. Install using a pre-cut template.

END OF SECTION 101419

SECTION 102600 - WALL PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Corner guards.

B. Related Sections:

1. Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

2. Section 055000 "Metal Fabrications" for steel angle corner guards and pipe guards.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For each type of wall and door protection showing locations and extent.

1. Include plans, elevations, sections, and attachment details

1.3 INFORMATIONAL SUBMITTALS

A. Product certificates.

B. Material certificates.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.5 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of wall- and door-protection units that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Surface Burning Characteristics: Comply with ASTM E 84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less.
2. Smoke-Developed Index: 450 or less.

2.2 CORNER GUARDS

A. Surface-Mounted, Stainless Steel Corner Guards: Manufacturer's standard assembly including mounting hardware; fabricated with 90- or 135-degree turn or u-shaped partition end to match wall condition.

2.3 MATERIALS

A. Stainless Steel: Type 304 Stainless steel, Finish #4 Satin.

B. Fasteners: Aluminum, nonmagnetic stainless-steel, or other noncorrosive metal screws, bolts, and other fasteners compatible with items being fastened. Use security-type fasteners where exposed to view.

C. Adhesive: As recommended by protection product manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation Quality: Install wall and door protection according to manufacturer's written instructions, level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.

B. Mounting Heights: Install wall and door protection in locations and at mounting heights indicated on Drawings.

C. Accessories: Provide splices, mounting hardware, anchors, trim, joint moldings, and other accessories required for a complete installation.

1. Provide anchoring devices and suitable locations to withstand imposed loads.
2. Where splices occur in horizontal runs of more than 20 feet (6.1 m), splice aluminum retainers and plastic covers at different locations along the run, but no closer than 12 inches (305 mm) apart.
3. Adjust end caps as required to ensure tight seams.

END OF SECTION 102600

SECTION 102800 – TOILET ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Grab Bar.
2. Underlavatory guard.
3. Channel-Frame Mirror.
4. Counter Mounted Soap Dispenser.
5. Recessed Papper Towel Dispenser & Waste Receptacle
6. Sanitary Napkin Disposal Unit
7. Toilet Paper Dispensers
8. Mop and Brom Holder

B. Related Sections:

1. Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated. Include the following:

1. Construction details and dimensions.
2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
3. Material and finish descriptions.
4. Features that will be included for Project.
5. Manufacturer's warranty.

B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

1. Identify locations using room designations indicated.

C. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.

1.3 QUALITY ASSURANCE

A. Source Limitations: For products listed together in the same Part 2 articles, obtain products from single source from single manufacturer.

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

1.4 COORDINATION

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.

B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.5 WARRANTY

A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Stainless Steel: ASTM A 666, Type 304, 0.031-inch minimum nominal thickness unless otherwise indicated.

B. Brass: ASTM B 19, flat products; ASTM B 16/B 16M, rods, shapes, forgings, and flat products with finished edges; or ASTM B 30, castings.

C. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.036-inch minimum nominal thickness.

D. Galvanized-Steel Sheet: ASTM A 653/A 653M, with G60 hot-dip zinc coating.

E. Galvanized-Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.

F. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.

G. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).

H. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

I. ABS Plastic: Acrylonitrile-butadiene-styrene resin formulation.

2.2 MANUFACTURERS

A. Subject to compliance with requirements, provide products indicated by the following:

B. **Grab Bars**: **TYPE: TA-1, TA-2, TA-3.** Where this designation is indicated, provide the following:

1. Manufacturer: Provide the following: "Bobrick, B6806 Series." Length as indicated on Drawings.
2. Stainless-Steel Nominal Thickness: Minimum 0.05 inch.
3. Mounting: Concealed with manufacturer's standard flanges and anchors.
4. Finish: Satin.
5. Outside Diameter: 1-1/2 inches for heavy-duty applications.
6. Configuration and Length: As indicated on Drawings.

C. **Toilet Tissue Dispenser**: **TYPE: TA-5.** Where this designation is indicated, provide the following:

1. Manufacturer: Provide the following: "Bobrick, B-2888."

D. **Napkin Disposal**: **TYPE: TA-4.** Where this designation is indicated, provide the following:

1. Manufacturer: Provide the following: "Bobrick, B-270."

E. **Mirror Unit**: **TYPE: TA-6.** Where this designation is indicated, provide the following:
1. Manufacturer: Provide the following: "Bobrick, B-165"
2. Frame: 3/4" x 3/4", Stainless-steel angle frame.
   a. Corners: Welded and ground smooth.

3. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.
   a. One-piece, galvanized-steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.
   b. Wall bracket of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.
   c. Size: As indicated in drawings.

F. **Counter-mounted Soap Dispenser**: **TYPE: TA-7.** Where this designation is indicated, provide the following:

1. Manufacturer: Provide the following: "Bobrick, B-822."

G. **Recessed Towel Dispenser & Waste Bin**: **TYPE: TA-8, TA-9.** Where this designation is indicated, provide the following:

1. Manufacturer: Provide the following: "Bobrick, B-4369 & B-3979."

H. **Mop and Broom Holder**: **TYPE: TA-14.** Where this designation is indicated, provide the following:

1. Manufacturer: Provide the following: "Bobrick, B-223 x 24."

I. **Under-Lavatory Guard**: **TYPE: TA-11.** Provide under-lavatory guard where lavatory piping is exposed below the counter or with wall hung lavatories. Under-lavatory Guards to complying with the following:

1. Basis of Design: Truebro, Inc.

2. Insulating Piping Coverings: White, antimicrobial, molded-vinyl covering for supply and drain piping assemblies intended for use at accessible lavatories to prevent direct contact

with and burns from piping. Provide components as required for applications indicated with flip tops at valves that allow service access without removing coverings.

2.3 FABRICATION

A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.

B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

B. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to ASTM F 446.

3.2 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.

B. Remove temporary labels and protective coatings.

C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION 102800

SECTION 104413 - FIRE PROTECTION SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary

1.2 SUMMARY

A. This Section includes the following:

1. Portable fire extinguishers, equipped with electronic monitoring system.
2. Fire-protection cabinets for portable fire extinguishers.

B. Related Sections:

1. Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.3 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire-protection specialties.
1. Fire Extinguishers: Include rating and classification.
2. Cabinets: Include roughing-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, and panel style.
3. Electronic monitoring modules.

B. Samples for Initial Selection: Manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available for each type of cabinet finish indicated.

C. Samples for Verification: For each type of exposed cabinet finish required, prepared on Samples of size indicated below and of same thickness and material indicated for the Work. If finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.

1. Size: 6-by-6-inch- (150-by-150-mm-) square Samples.

1.4 QUALITY ASSURANCE

A. Fire-Rated, Fire Protection Cabinets: Listed and labeled to comply with requirements in ASTM E 814 for fire-resistance rating of walls where they are installed.

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

C. Source Limitations: Obtain fire extinguishers and cabinets through one source from a single manufacturer.

D. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Standard for Portable Fire Extinguishers."

E. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.
   1. Provide extinguishers listed and labeled by FM.

1.5 COORDINATION

A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include the following:
   1. Portable Fire Extinguishers:
      a. Amerex Corporation.
      b. J.L. Industries, Inc.
      c. Kidde: Walter Kidde, The Fire Extinguisher Co.
      d. Larsen's Manufacturing Company.
      e. Potter-Roemer; Div. of Smith Industries, Inc.

   2. Fire-Protection Cabinets:
      a. J.L. Industries, Inc.
      b. Larsen's Manufacturing Company.
      c. Potter-Roemer; Div. of Smith Industries, Inc.

2.2 MATERIALS

A. Aluminum: Alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated, and as follows:
   1. Sheet: ASTM B 209 (ASTM B 209M).

2.3 PORTABLE FIRE EXTINGUISHERS

A. General: Provide fire extinguishers of type, size, and capacity for each cabinet and other locations indicated.

B. Multipurpose Dry-Chemical Type: UL-rated 4-A:60-B:C, 10-lb (4.5-kg) nominal capacity, in enameled-steel container.

C. Equip extinguishers with hard wired or wireless system designed to alert a central control panel when design pressure of canister falls below designated level. Equal to MIJA, Inc, Rockland MA. Substitutions only allowed if submitted and approved by Owner for compatibility.

2.4 CABINETS

A. Cabinet Construction: Provide manufacturer's standard box (tub), with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated. Weld joints and grind smooth. Miter and weld perimeter door frames.
1. Cabinet Metal: Aluminum sheet.
2. Fire-Rated Cabinets: Construct cabinets with double walls fabricated from 0.0428 inch – (1.1-mm-) thick, cold rolled steel sheet lined with minimum 5/8 inch (16-mm-) thick, fire barrier material. Provide factory-drilled mounting holes. Reference Life Safety Plans for location of rated partitions.

B. Cabinet Type: Suitable for the following:
1. Fire extinguisher.

C. Cabinet Mounting: Suitable for the following mounting conditions as scheduled or shown on drawings
1. Semi-recessed: Cabinet box partially recessed in walls of shallow depth to suit style of trim indicated.

D. Cabinet Trim Style: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.
1. Exposed Trim: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).
a. Rolled-Edge Trim: 2-1/2-inch (64-mm) backbend depth.

E. Cabinet Trim Material: Manufacturer's standard, as follows:
1. Aluminum sheet.

F. Door Material: Manufacturer's standard, as follows:
1. Aluminum sheet.

G. Glazing: Impact resistant as standard with manufacturer.
1. Glass: Clear float glass, ASTM C 1036, Type I, Class 1, Quality q3, 1.5 mm, single strength.

H. Door Style: Manufacturer's standard design, as follows:
1. Vertical duo panel with frame. Lockable with pressure release latch.

I. Door Construction: Fabricate doors according to manufacturer's standards, of materials indicated, and coordinated with cabinet types and trim styles selected.
1. Provide minimum 1/2-inch- (13-mm-) thick door frames, fabricated with tubular stiles and rails, and hollow-metal design.
2. Provide inside latch and lock that releases under pressure.

J. Door Hardware: Provide manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated. Provide either lever handle with cam-action latch, or exposed or concealed door pull and friction latch. Provide concealed or continuous-type hinge permitting door to open 180 degrees.

2.5 ACCESSORIES

A. Door Locks: Provide cylinder lock, with all cabinets keyed alike.

B. Identification: Provide lettering to comply with authorities having jurisdiction for letter style, color, size, spacing, and location. Locate as indicated by Architect.
   1. Identify fire extinguisher in cabinet with the words "FIRE EXTINGUISHER" applied to door.
      a. Application Process: Vinyl letters.
      b. Lettering Color: Red.
      c. Orientation: Vertical.

C. Mounting Brackets: For utility application provide Manufacturer's standard galvanized steel, bracket designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish. Red color unless otherwise indicated.

2.6 FINISHES

A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

B. Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 607.1.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Examine roughing-in for cabinets to verify actual locations of piping connections before cabinet installation.

B. Examine walls and partitions for suitable framing depth and blocking where semirecessed cabinets are to be installed.

C. Examine fire extinguishers for proper charging and tagging.
   1. Remove and replace damaged, defective, or undercharged units.

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

3.2 INSTALLATION

A. Comply with manufacturer's written instructions for installing fire-protection specialties.

B. Install in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.
   1. Prepare recesses for cabinets as required by type and size of cabinet and trim style.
   2. Fasten cabinets to structure, square and plumb.

3. Fasten monitoring system flush with wall, cabinet mounted or located as required to monitor obstructions to the cabinet.

3.3 ADJUSTING, CLEANING, AND PROTECTION

A. Adjust cabinet doors that do not swing or operate freely.

B. Refinish or replace cabinets and doors damaged during installation.

C. Provide final protection and maintain conditions that ensure that cabinets and doors are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 104413

213000 FIRE SPRINKLER SYSTEM

FIRE SUPPRESSION

division 21

SAA

SANDERS ASSOCIATES ARCHITECTS

SECTION 213000 - FIRE SPRINKLER SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of the contract apply to this section.
B. Technical sections which describe related work such as Division 26 apply to this section.
C. Other Division 23 specifications apply to this section.
D. Related Sections:

1. **Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.**

1.2 SUMMARY:

A. Furnish all materials, equipment and supplies and perform all work and operations to install a fire sprinkler system to serve all areas of the Airport space. Provide fire protection for all areas of the building. The design shall meet the requirements of NFPA 13 and be in accordance with the bid drawings and specifications. Reference to other specifications, codes, standards or manuals which are a part of these specifications, but are not included herein, shall be the latest adopted edition of these publications.

1.3 QUALITY ASSURANCE:

A. Materials, devices and equipment shall be Underwriters Laboratories listed and/or Factory Mutual approved for use in fire protection systems.

B. Installer: The sub-contractor for each of the fire protection systems shall be duly licensed by the state in which the project is being constructed. The sub-contractor must be engaged in the installation of the types of automatic fire protection systems required for this project and be fully familiar with all local conditions, specified codes and requirements.

C. Designer: The designer for the fire sprinkler system shall be a staff employee of the "Installer" and shall be a licensed fire protection engineer (Utah registration) or a Certified Engineering Technician in Fire Protection (NICET level III minimum). The Certification shall be active during the entire contract period. The designer shall certify that the drawings and installation are in accordance with the intent of NFPA 13, the plans and specifications. The designer shall make a complete and final inspection of the installation, including operating all alarms, control valves, checking all piping, seismic bracing, hangers, etc. After checking all components of the system, he shall provide a letter stating that the installation is complete, operational and in accordance with approved plans and specifications. If changes have been made in the installation since the plans were approved, the designer shall correct the shop drawings and provide as-built drawings to the Owner with the letter.

1.4 SUBMITTALS:

A. Shop Drawings: The fire sprinkler contractor shall prepare complete shop drawings for each sprinkler system. Shop drawings shall be coordinated with structure and with all other trades. Show new and existing piping, sprinklers, ceiling grid, lights, grilles, ducts, registers and diffusers, etc. Show heads symmetrically related to ceiling patterns and show heads centered in tiles in grid. The shop drawings shall contain, as a minimum, the information outlined and listed in NFPA 13 chapter 8. Submit fire sprinkler drawings and hydraulic calculations to each Authority Having Jurisdiction for review prior to starting work. Final design shall incorporate all requirements of the AHJ's. Work only from reviewed documents.

B. Hydraulic Calculations: Furnish complete hydraulic calculations for the hydraulically most remote area of each different occupancy classification of each fire sprinkler system.

C. Descriptive Data: Descriptive data shall be submitted on the following items of material and/or equipment. Such data shall consist of manufacturer's or supplier's catalog information in sufficient detail to allow verification that the material and/or equipment meets the specification requirements, or is equal to that specified.

1. Pipe, fittings, couplings, sprinklers.

D. Submittal Procedure: Prior to ordering or fabricating equipment, prepare shop drawings for submittal to Architect. Submit four sets of drawings and calculations to the Architect for review. After review and acceptance by the Architect, submit to all state and local jurisdictions for review. Any review comments, and associated drawing revisions, from state or local approving authorities that affect the system design shall be approved by the Architect prior to installation.

E. Upon completion of installation submit to Architect two copies each:

1. As-built shop drawings with designer's signature and certification number. As-Built drawings shall be submitted on Mylar.

1.5 WORK INCLUDED:

A. Design and installation of a new fire sprinkler system including risers, mains, branches and sprinklers to serve the remodeled Airport building. Work includes but is not limited to:

1. Design and installation drawings, including hydraulic calculations.
2. Pipe, fittings, hangers and concealed sprinklers throughout the entire building.
3. Spare sprinklers, earthquake bracing, sprinkler trim, testing and documentation.

1.6 SYSTEM DESCRIPTION:

A. New wet-pipe automatic fire sprinkler system to protect the new and remodeled spaces as indicated in these specifications and on the project drawings. Work includes but is not limited to the following:

1. Design, furnish and install new fire sprinklers in accordance with NFPA 13 to provide fire protection for all new and remodeled areas of the building.

1. 7 SYSTEM DESIGN:

A. Design densities and areas of application shall meet the minimum requirements of NFPA 13 as outlined below:

1. Ogden Airport.

a. Ordinary hazard, 0.15 gpm/sq. ft over 1,500 sq. ft. with 250 gpm hose allowance.

B. Maximum coverage per sprinkler head.

1. Ordinary Hazard: 200 sq. ft.

C. Maximum velocity in hydraulic calculations for fire sprinkler system shall not exceed 20 ft/sec.

1.8 WARRANTY:

A. Materials, equipment, and workmanship shall be free from defects for 12 months from the "Date Left in Service with All Control Valves Open," shown on "Contractor's Material and Test Certificate." If any Work is found to be defective, Contractor shall promptly, without cost to Owner, and in accordance with Owner's instructions, either correct such defective Work, or if it has been rejected by Owner, remove it from the site and replace it with non-defective Work. Submit two copies of Warranty Certificates to Architect.

1.9 REFERENCES:

A. NFPA (National Fire Protection Association) 13, "Installation of Sprinkler Systems," 2002.

B. NFPA 72, “National Fire Alarm Code”, 2002.

C. NFPA 20, “Standard for the Installation of Stationary Fire Pumps for Fire Protection”, 1999 edition.

D. IFC (International Fire Code), 2021.

E. IBC (International Building Code), 2021.

F. IBC Standards, 2021.

G. Underwriters Laboratories "Fire Protection Equipment Directory," current edition.

H. Factory Mutual Systems "Approval Guide," current edition.

PART 2 - PRODUCTS

2.1 Acceptable manufacturers of sprinkler equipment, heads and devices.

A. Gem.
B. Reliable.
C. Victaulic.

2.2 PIPE:

A. Above Ground Piping:

1. All piping shall be domestic steel schedule 40 piping conforming to ANSI/ASTM A53, ASTM A135 and ASTM A795.

2.3 FITTINGS:

A. Interior Piping:

1. Cast iron threaded, ANSI B16.4.

2. Cast iron flanged, ANSI B16.1.

3. Malleable iron threaded, ANSI B16.3.

4. Forged steel fittings, socket welded and threaded, ANSI B16.11.

5. Plain end couplings and fittings, saddle couplings, and clamp type couplings are not acceptable.

6. Other types of fittings may be used, but only those investigated and listed for this service **and** approved by the project engineer.

2.4 HANGERS:

A. Hangers shall conform to the minimum requirements of NFPA 13.

2.5 SEISMIC FITTINGS AND BRACES:

A. Earthquake bracing is required and shall conform to the minimum requirements of NFPA 13.

2.6 SPRINKLERS:

A. Areas with finished ceilings shall be small frame fully concealed type, white color, ordinary temperature. Sprinklers heads shall be located within 2” of the center of the ceiling tiles.

B. Areas without ceilings shall be chrome plated pendant type.

C. Sprinklers of intermediate and high temperature ratings shall be installed in specific locations as required by NFPA 13.

D. All sprinklers installed in areas designated as ordinary hazard shall be quick response type sprinkler heads.

E. Provide a minimum of one spare head of each type for spare head cabinet and one

head wrench for each type sprinkler. The minimum number of spare sprinklers provided shall be in accordance with NFPA 13.

PART 3 - EXECUTION

3.1 INSPECTION:

A. Inspect job site prior to fabricating materials. Coordinate and sequence installation with the progress of other mechanical and structural systems and components.

3.2 INSTALLATION:

A Install systems in compliance with methods detailed in NFPA 13 including seismic requirements for Area 3.

B. Offset as needed for other trades. Avoid conflict in areas of tight construction. Do not obstruct access to access doors, lights or other ceiling mounted equipment.

C. Submit piping and equipment data sheets for review by the Architect/Engineer prior to ordering or fabricating equipment.

D. Close pipe openings with caps or plugs during installation. Cover and protect components of the system against dirt and chemical or mechanical injury.

3.3 FIELD QUALITY CONTROL:

A. Obtain permits and post bonds as required by state and local AHJ's (Authorities Having Jurisdiction).

B. Inform AHJ's of job progress. Request presence of AHJ'S, perform tests, and document results using Contractor's Material and Test Certificates.

3.4 TESTING:

A. Hydrostatically test all system piping for two hours at 200 psi (or 50 psi higher than the maximum anticipated static pressure) with no loss in pressure and no visible leakage. Conduct the testing after all of the fire sprinklers and piping are installed. Have the tests witnessed by the AHJ's and Engineer. Submit a Contractor's Material and Test Certificate to the Architect upon successful completion of the testing.

3.5 CLEANING:

A. Remove oil, scale, debris, and foreign substances from interior and exterior of devices, equipment, and materials prior to installation.

B. Upon job completion, remove tools, surplus materials and equipment, leaving all areas broom clean.

3.6 ACCEPTANCE:

A. Acceptance of installation is subject to final inspection and approval by:

1. State of Utah Fire Marshal's Office
2. Architect or his representative.

END OF SECTION 213000

221000 VALVES
224100 WATER DISTRIBUTION PIPING EQUIPMENT
224200 DRAINAGE AND VENT SYSTEMS AND EQUIPMENT
224400 PLUMBING FIXTURES
224850 NATURAL GAS PIPING

PLUMBING

division 22

SAA

SANDERS ASSOCIATES ARCHITECTS

SECTION 221000 - VALVES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

B. This section is Division 22 Valves section, and is part of each Division 22 section making reference to valves specified herein.

C. Division 23 General Mechanical Requirements apply to work of this section.

D. Related Sections:

1. Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 SUMMARY:

A. Extent of valves required by this section is indicated on drawings and/or specified in other Division 22 sections.

B. Types of valves specified in this section include the following:

1. Drain Valves
2. Ball Valves
3. Plug Valves
4. Check Valves
5. Swing Check
6. Miscellaneous Valves

C. Valves furnished as part of factory-fabricated equipment, are specified as part of equipment assembly in other Division 22 sections.

1.3 QUALITY ASSURANCE:

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of valves, of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Valve Types: Provide valves of same type by same manufacturer.

C. Valve Identification: Provide valves with manufacturer's name (or trademark) and pressure rating clearly marked on valve body.

1.4 SUBMITTALS:

A. Product Data: Submit manufacturer's technical product data, including installation

instructions for each type of valve. Include pressure drop curve or chart for each type and size of valve. Submit valve schedule showing Manufacturer's figure number, size, location, and valve features for each required valve.

B. Shop Drawings: Submit manufacturer's assembly-type (exploded view) shop drawings for each type of valve, indicating dimensions, weights, materials, and methods of assembly of components.

C. Maintenance Data: Submit maintenance data and spare parts lists for each type of valve. Include this data, product data, and shop drawings in Maintenance Manual; in accordance with requirements of Division 01.

1.5 REFERENCES:

A. Codes and Standards:

1. MSS Compliance: Mark valves in accordance with MSS-25 "Standard Marking System for Valves, Fittings, Flanges and Unions".
2. ANSI Compliance: For face-to-face and end-to-end dimensions of flanged- or welded-end valve bodies, comply with ANSI B16.10 "Face-to-Face and End-to-End Dimensions of Ferrous Valves".
3. UL and FM Compliance: Provide valves used in fire protection piping, which are UL-listed and FM approved.
4. Buy America Act

PART 2 - PRODUCTS

2.1 VALVES:

A. General: Provide factory-fabricated valves recommended by manufacturer for use in service indicated. Provide valves of types and pressure ratings indicated; provide proper selection as determined by Installer to comply with installation requirements. Provide end connections which properly mate with pipe, tube, and equipment connections. Where more than one type is indicated, selection is Installer's option.

B. Sizes: Unless otherwise indicated, provide valves of same size as upstream pipe size.

C. Operators: Provide hand-wheels, fastened to valve stem, for valves other than quarter-turn. Provide lever handle for quarter-turn valves, 5" and smaller, other than plug valves. Provide one wrench for every 10 plug valves. Provide gear operators for quarter-turn valves 6" and larger.

D. Connections: Unless otherwise noted for a particular reason, any valve 2" and larger shall have flanges.

2.2 MANUFACTURERS: For all valves subject to compliance with requirements, provide valves of one of the following: Comply with specific manufacture requirements listed for specific valves.

A. Crane
B. Keystone
C. Powell
D. Nibco/Scott

E. Lunkenheimer
F. Stockham
G. Milwaukee
H. Bray
I. Apollo
J. Grinnell
K. Watts
L. Norris
M. Wallworth

All valves of a given type shall be of the same manufacturer.

2.3 DOMESTIC WATER:

A. Ball Valves:

1. Steel piping 3" and Smaller: 400 psig WOG @ 350°F, bronze construction, threaded ends, bubble tight mineral filled PTFE seat at 250 psig under water, hard, chrome plated brass or stainless steel full ported ball. Operate with flow in either direction. Lever or tee hand as required. Suitable for throttling and tight shut-off. Watts B-6000, B-6001 for domestic water, Apollo 70-100. Crane Hydro Gem 2190H Milwaukee, Jamesbury, Stockham. No other manufacturers approved.

B. Swing Check Valves:

1. 2" and Smaller: Crane No. 37 bronze, threaded, Y-pattern, 200# WOG at swing check valve.

2. 2-1/2" and Larger: Crane No. 373, iron body, flanged, 200# WOG swing check valve with bronze trim.

C. Balancing Cocks:

1. 2" and Smaller: 175 psig WOG, cast iron body, square head, screwed ends, wrench operated, lubricated.

2. 2-1/2" and Larger: 200 psig WOG, cast iron body, square head, flanged ends, wrench operated, lubricated.

2.5 MISCELLANEOUS VALVES AND SPECIALTIES:

A. Air Vent Valves: Stockham B-64, 300 psi working pressure, 3/8" bronze, Crane No. 88 or ball valve.

B. Gauge Valves; Ball valve with tee handle.

C. Install valves with bonnets at least 45 degrees above the horizontal to ensure debris does not collect in bonnet.

PART 3 - INSTALLATION

3.1 VALVE INSTALLATION:

A. Locate all valves in locations which will allow easy operation and facilitate maintenance.

B. Install valves with stems horizontal or above.

C. All branch lines which supply a specific area of the building (such as a toilet room) shall be valved near the main so that each area may be isolated from the system for repairs without having to shut down both men and women's restrooms, other areas, or the whole building.

END OF SECTION 221000

SECTION 224100 - WATER DISTRIBUTION PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

A. This Section specifies the water distribution piping system, including potable cold, hot, and recirculated hot water piping, fittings, and specialties within the building.

B. Water Supply Systems:

1. Domestic Water

D. Related Sections:

1. Separate sections in Division 22 apply to this section.
2. **Section 016001 “Buy American Preference Requirements” for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.**

1.3 QUALITY ASSURANCE:

A. Manufacturer's Qualifications:

1. Firms regularly engaged in the manufacture of plumbing piping products and equipment of types, materials and sizes required, whose products have been in service for no less than five years.

B. Installer's Qualifications:

1. Firm with at least three years history of successful experience on projects of similar nature.
2. Licensed as a firm in the State of Utah.
3. Have a publicly registered bonding capacity of sufficient amount to cover this work and all other work in progress by the Contractor.
4. All workmen employed on the project to carry state licenses as journeyman or apprentice pipe fitters with additional certification for welders.

1.4 SUBMITTALS:

A. Product Data: Submit manufacturers technical literature indicating source, brand, type, model, performance characteristics, installation instructions, etc. Color chart for finished surfaces and fixtures.

B. Record Drawings: See Section 230000 - General Mechanical Requirements.

C. Operation and Maintenance Information: Provide information for all equipment including a comprehensive system operating description. See Section 239950 - System Commissioning, Testing and Balancing.

1.5 REFERENCES:

A. Codes and Standards: Comply with applicable sections, follow recommended practices.

1. State Boiler and Pressure Vessel Regulations
2. ASME Codes for Boilers and Pressure Vessels
3. State and Local Plumbing Code
4. State and Local Mechanical Code
5. State and Local Building Code
6. ASHRAE/ASPE Handbooks
7. HI Compliance: Design, manufacture, and install plumbing pumps in accordance with HI "Hydraulic Institute Standards".
8. UL Compliance: Design, manufacture, and install plumbing pumps in accordance with UL 778 "Motor Operated Water Pumps".
9. UL and NEMA Compliance: Provide electric motors and components which are listed and labeled by Underwriters Laboratories and comply with NEMA standards.
10. Buy America Act

1.6 DELIVERY, STORAGE, AND HANDLING:

A. Store pipe in a manner to prevent sagging and bending.

1.7 SEQUENCING AND SCHEDULING:

A. Coordinate the installation of pipe sleeves for foundation wall and floor penetrations.

PART 2 – PRODUCTS

2.1 PIPE AND FITTINGS:

A. Domestic Water Pipe: (except below slab/grade)

1. Pipe Sizes 4" and Smaller: Copper tubing. Conform to ASTM B88, Type L, hard temper, copper tube; ASME B16.22 streamlined pattern wrought-copper fittings, with soldered joints using 95-5 tin antimony solder or non-lead bearing solders such at "Silvabrite."

2.2 VALVES:

A. Ball, check, and drain valves are specified in Section 221000 - Valves.

2.3 HOSE CONNECTIONS:

A. Non-Freeze Wall Hydrant:

1. (WH) Fixture:

   a. Bronze hydrant, exposed type removable key, vacuum breaker, automatic draining, stainless steel operating stem, rough brass finish.
   b. Approved Manufacturers:

      (1) Smith
      (2) Woodford No. 65
      (3) Zurn

PART 3 – EXECUTION

3.1 EXAMINATION:

A. Verify all dimensions by field measurements. Verify that all water distribution piping may be installed in accordance with pertinent codes and regulations, the original design, and the referenced standards.

B. Examine rough-in requirements for plumbing fixtures and other equipment having water connections to verify actual locations of piping connections prior to installation.

C. Do not proceed until the unsatisfactory conditions have been corrected.

3.2 JOINING PIPES AND FITTINGS:

A. Copper Tubing: Solder joints in accordance with the procedures specified in ANSI B9.1.

B. Galvanized Steel Threaded: Seal threaded joints with Teflon tape and pipe dope per manufacturers' installation techniques. Tighten to manufacturers specifications and test for leaks.

C. PVC Pipe: Joining and installation of PVC distribution pipe and fittings shall conform to ASTM D2855. Install in continuous "V" channel support system.

3.3 PIPING INSTALLATION:

A. Refer to the separate Division 22 section: General pipes and fittings, for general piping installation instructions.

B. General Locations and Arrangements: Drawings (plans, schematics, and diagrams) indicate the general location and arrangement of the piping systems. Location and arrangement of piping layout take into consideration pipe sizing and friction loss, expansion, pump sizing, and other design considerations. So far as practical, install piping as indicated.

C. Install piping level with no pitch.

D. Install incidental.

3.4 INSTALLATION OF VALVES:

A. Installation requirements for general duty valves are specified in Section 221000.

B. Valves: Install in locations shown on drawings. Provide isolation valves for branch lines and service to all equipment, shown or not.

C. Check Valves: Install swing check valves on discharge side of each pump, and elsewhere as indicated.

D. Hose Bibbs and Wall Hydrants: Install with vacuum breaker. Each and every hose bibb or wall hydrant shall have a ball valve located upstream of its individual hose bibb or wall hydrant. Locate ball valve in accessible work space.

3.5 EQUIPMENT CONNECTIONS:

A. Piping Runouts to Fixtures: Provide hot and cold water piping runouts to fixtures of sizes indicated, but in no case smaller than required by Plumbing Code.

B. Install pressure regulating valves with inlet and outlet shutoff valves, and ball valve bypass. Install pressure gage on valve outlet.

3.6 WATER SYSTEM SHOCK ABSORBERS:

A. Provide water system shock absorbers for hot and cold water at each fixture group as shown on drawings. Properly size for fixtures being served, reference sizing recommendations of manufacturer.

3.7 FIELD QUALITY CONTROL:

A. Inspections:

1. Do not enclose, cover, or put water distribution piping system into operation until it has been inspected and approved by the authority having jurisdiction.
2. During the progress of the installation, notify the plumbing official having jurisdiction, at least 24 hours prior to the time such inspection must be made. Perform tests specified below in the presence of the plumbing official.
3. Rough-in Inspection: Arrange for inspection of the piping system before concealed or closed-in after system is roughed-in, and prior to setting fixtures.
4. Final Inspection: Arrange for a final inspection by the plumbing official to observe the tests specified below and to insure compliance with the requirements of the plumbing code.
5. Re-inspection: Whenever the plumbing official finds that the piping system will not pass the test or inspection, make the required corrections and arrange for reinspection by the plumbing official.
6. Reports: Prepare inspection reports, signed by the plumbing official.

B. Test all water distribution piping systems for leaks and defects. If testing is performed in segments, submit a separate report for each test, complete with a diagram of the portion of the system tested.

C. Leave all water distribution piping uncovered and unconcealed until it has been tested and approved. Expose all such work for testing, that has been covered or concealed before it has been tested and approved.

D. Cap the piping system and subject to a static water pressure of 50 psig above the operating pressure without exceeding the pressure rating of the piping system materials.

Isolate the test source and allow to stand for a period of 4 hours. Leaks and loss in test pressure constitute defects which must be repaired.

E. Repair all leaks and defects using new materials and retest system or portion thereof until satisfactory results are obtained.

F. Prepare reports for all tests and required corrective action.

3.8 ADJUSTING AND CLEANING:

A. Cleaning and Disinfecting:

1. Purge all water distribution piping systems.
2. Follow AWWA guidelines. Thoroughly sterilize the entire domestic water system with a solution containing not more than 50 parts per million of available chlorine. Introduce the chlorinating materials into the system in a manner approved by the Owner's representative. Allow the sterilization solution to remain in the system for a period of 24 hours, during which time, open and close all valves and faucets several times. After sterilization, flush the solution from the system with clean water until the residual chlorine content is not greater than 0.2 parts per million. Water system will not be accepted until a negative bacteriological test is made on water taken from the system. Repeat dosing as necessary until such negative test is accomplished.

B. Reports:

1. Prepare reports for all purging and disinfecting activities.

3.9 INSTRUCTION OF OWNER'S PERSONNEL: Participate in specified instruction. See Section 230000 - General Mechanical Requirements.

END OF SECTION 224100

SECTION 224200 - DRAINAGE AND VENT SYSTEMS AND EQUIPMENT

PART 1 – GENERAL

1.1 RELATED DOCUMENTS:

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

B. Related Sections:

1. Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 SUMMARY:

A. This Section specifies building sanitary and vent, storm drainage, including drains and drainage specialties.

B. Related Sections:

1. Separate sections in Division 02 specify foundation drainage, under duct drainage, storm sewage systems, sanitary sewage systems and trenching and backfilling. Provide a complete transition between work components.
2. Separate sections in Division 07 specify flashing and sheet metal and joint sealers.
3. Division 23 General Mechanical Requirements section applies to the work of this section.
4. Separate sections of Division 22 apply to this section.

1.3 QUALITY ASSURANCE:

A. Manufacturer's Qualifications:

1. Firms regularly engaged in the manufacture of plumbing piping products and equipment of types, materials and sizes required, whose products have been in service for not less than five years.

B. Installer's Qualifications:

1. Firm with at least three years history of successful experience on projects of similar nature.
2. Licensed as a firm in State of Utah.
3. Have a publicly registered bonding capacity of sufficient amount to cover this work and all other work in progress by the Contractor.
4. Employ workmen on the project who carry state licenses as journeyman or apprentice pipe fitters with additional certification for welders.

1.4 SUBMITTALS:

A. Product Data: Submit manufacturers' technical literature indicating source, brand, type, model, performance characteristics, installation instructions, etc. Color chart for finished surfaces and fixtures.

B. Record Drawings: See Section 23.

C. Operation and Maintenance Information: Provide information for all equipment including a comprehensive system operating description. See Section 23.

1.5 REFERENCES:

A. Codes and Standards: Comply with applicable sections, follow recommended practices.

1. State Boiler and Pressure Vessel Regulations
2. ASME Codes for Boilers and Pressure Vessels
3. State and Local Plumbing Code
4. State and Local Mechanical Code
5. State and Local Building Code
6. ASHRAE/ASPE Handbooks
7. HI Compliance: Design, manufacture, and install plumbing pumps in accordance with HI "Hydraulic Institute Standards."
8. UL Compliance: Design, manufacture, and install plumbing pumps in accordance with UL 778 "Motor Operated Water Pumps."
9. UL and NEMA Compliance: Provide electric motors and components which are listed and labeled by Underwriters Laboratories and comply with NEMA standards.

1.6 SEQUENCING AND SCHEDULING:

A. Coordinate flashing materials installation of roofing, waterproofing, and adjoining substrate work.

B. Coordinate the installation of drains in poured-in-place concrete slabs, to include proper drain elevations, installation of flashing, and slope of slab to drains.

C. Coordinate with installation of sanitary and storm sewer systems as necessary to interface building drains with drainage piping systems.

PART 2 – PRODUCTS

2.1 WASTE, DRAIN AND VENT SYSTEMS:

A. Roof Drain, Waste and Vent Piping: (Below Grade)

1. Piping and Fittings: Schedule 40 PVC pipe and fittings conforming to the requirements of ASTM D 2665. Pipe and fittings shall be produced domestically as supplied by Spears, or Charlotte Pipe and Fittings.

B. Roof Drain, Waste and Vent Piping: (Above Grade Only)

1. Piping and Fittings: Schedule 40 PVC pipe and fittings conforming to the

requirements of ASTM D 2665. Pipe and fittings shall be produced domestically as supplied by Spears, or Charlotte Pipe and Fittings.

2.2 EQUIPMENT AND SYSTEM VENTS AND DRAINS:

A. Piping:

1. Piping on closed side of system to match primary system served.
2. Open vent and drain piping of Schedule 40 PVC or Type K or L copper.

B. Valves: Provide valves appropriate for duty.

1. Locate air vent valves accessibly mounted on wall, 5'-0" above floor, extended to drain.

C. Installation Notes:

1. Slope all drains at 1/4" per foot or more.
2. Provide complete condensate drain systems for all furnaces and cooling coils, etc., and for all equipment which has a need for such service. Terminate such drain systems near floor drains, floor sinks or other authorized point of discharge.

2.3 DRAINAGE PIPING SPECIALTIES:

A. Vent Flashing and Termination:

1. Vent pipes penetrating the roof shall be flashed and made watertight at the roof with sheet metal flashing. Vent pipes shall extend at least 12" above roof. Coordinate installation with detail on drawings and roofing contractor

B. Traps: Equip each fixture and piece of equipment connecting to the drainage system with a trap. Place each trap as near to the fixture as possible and no fixture shall be double trapped.

PART 3 – EXECUTION

3.1 EXAMINATION:

A. Verify all dimensions by field measurements. Verify that all drainage and vent piping and specialties may be installed in accordance with pertinent codes and regulations, the original design, and the referenced standards.

B. Verify all existing grades, inverts, utilities, obstacles, and topographical conditions prior to installations.

C. Examine rough-in requirements for plumbing fixtures and other equipment having drain connections to verify actual locations of piping connections prior to installation.

D. Examine walls, floors, roof, and plumbing chases for suitable conditions where piping and specialties are to be installed.

E. Do not proceed until unsatisfactory conditions have been corrected.

3.2 JOINING PIPES AND FITTINGS:

A. Copper Tubing: Solder joints in accordance with the procedures specified in ANSI B9.1.

B. PVC Piping: Make solvent weld joints utilizing ASTM approved primers and glues per the piping manufacturers recommendations.

3.3 INSTALLATION:

A. Refer to the separate Division 22 section for general piping installation instructions.

B. Install supports and anchors in accordance with Division 23 General Mechanical Materials and Methods section "Supports and Anchors."

C. General Locations and Arrangements: Drawings (plans, schematics, and diagrams) indicate the general location and arrangement of the piping systems. Location and arrangement of piping layout take into account many design considerations. So far as practical, install piping as indicated.

D. Make changes in direction for drainage and vent piping using appropriate 45-degree wyes, half-wyes, or long sweep quarter, sixth, eighth, or sixteenth bends. Sanitary tees or short quarter bends may be used on vertical stacks of drainage lines where the change in direction of flow is from horizontal to vertical, except use long-turn tees where two fixtures are installed back to back and have a common drain. Straight tees, elbows, and crosses may be used on vent lines. Do not make a change in direction of flow greater than 90 degrees. Where different sizes of drainage pipes and fittings are connected, use proper size, standard increasers and reducers. Reduction of the size of drainage piping in the direction of flow is prohibited.

E. Install underground building drains to conform with the plumbing code, and in accordance with the manufacturer's installation manuals. Lay underground building drains beginning at low point of systems, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Join pipe sections in accordance with manufacturer's recommendations for use of primers, cements, and other special installation requirements.

F. Install building drain pitched down at minimum slope of 1/4" per foot (2 percent), unless noted otherwise and approved by the authority having jurisdiction.

G. Extend building drain to connect to sanitary and storm sewer piping, of size and in location indicated for service entrance to building. Storm and sanitary sewer piping is specified in a separate section of Division 22.

3.4 INSTALLATION OF PIPING SPECIALTIES:

A. Above Ground Cleanouts: Install in above ground piping and building drain piping as indicated, and:

1. As required by plumbing code;
2. At each change in direction of piping greater than 45 degrees;
3. At minimum intervals of 50' for piping 4" and smaller and 100' for larger piping;
4. At the base of each vertical soil or waste stack.

B. Cleanout Covers: Install floor and wall cleanout cover for concealed piping, types as

indicated.

C. Vent Flashing Sleeves: Install on stacks passing through roof, secure over stack flashing in accordance with manufacturer's instructions.

D. Vent Cap: Install on all vents terminating through the sidewall. Secure to vent.

3.5 CONNECTIONS:

A. Piping Runouts to Fixtures: Provide drainage and vent piping runouts to plumbing fixtures and drains, with approved trap, of sizes indicated; but in no case smaller than required by the plumbing code.

B. Locate piping runouts as close as possible to bottom of floor slab supporting fixtures or drains.

3.6 FIELD QUALITY CONTROL:

A. Inspections:

1. Do not enclose or cover drainage and vent piping system or put into operation until it has been inspected and approved by the authority having jurisdiction.
2. During the progress of the installation, notify the plumbing official having jurisdiction, at least 24 hours prior to the time such inspection must be made. Perform tests specified below in the presence of the plumbing official.
3. Rough-in Inspection: Arrange for inspection of the piping system before concealed or closed-in after system is roughed-in, and prior to setting fixtures.
4. Final Inspection: Arrange for a final inspection by the plumbing official to observe the tests specified below and to insure compliance with the requirements of the plumbing code.
5. Re-inspections: Whenever the piping system fails to pass the test or inspection, make the required corrections, and arrange for re-inspection by the plumbing official.
6. Reports: Prepare inspection reports, signed by the plumbing official.

B. Piping System Test:

1. Test for leaks and defects all new drainage and vent piping systems. If testing is performed in segments, submit a separate report for each test, complete with a diagram of the portion of the system tested.
2. Leave uncovered and unconcealed all new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose all such work for testing, that has been covered or concealed before it has been tested and approved.
3. Repair all leaks and defects using new materials and retest system or portion thereof until satisfactory results are obtained.

4. Prepare reports for all tests and required corrective action.

C. Surface Drainage Test: Restroom floors, shower pans, and all other floors with floor drains where there will be water or where water may get on floor shall be tested with 2” of standing water with the drains cut in to make sure the floors and pans are watertight and there are no places where water stands.

3.8 ADJUSTING AND CLEANING:

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Clean drain strainers, domes, and traps. Remove dirt and debris.

3.9 PROTECTION:

A. Protect drains during remainder of construction period, to avoid clogging with dirt and debris, and to prevent damage from traffic and construction work.

B. Place plugs in ends of uncompleted piping at end of day or whenever work stops.

END OF SECTION 224200

SECTION 224850 - NATURAL GAS PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

B. Division 23 “General Mechanical Requirements” applies to work of the section.

C. Related Sections:

1. **Section 016001 “Buy American Preference Requirements” for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.**

1.2 DESCRIPTION OF WORK:

A. Extent of natural gas system work is indicated on drawings and schedules and by requirements of this section.

1.3 QUALITY ASSURANCE:

A. Manufacturer’s Qualifications: Firms regularly engaged in manufacture of natural gas systems products, of types, materials, and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Installer’s Qualifications: Firm with at least 3 years of successful installation experience on projects with natural gas systems work similar to that required for project.

C. Codes and Standards:

1. NFPA Compliance: Fabricate and install natural gas systems in accordance with NFPA 54 "National Fuel Gas Code".
2. Utility Compliance: Fabricate and install natural gas systems in accordance with Questar Gas regulations and recommended practice.
3. IMC Compliance: Fabricate and install natural gas systems in accordance with IAPMO "International Mechanical Code - 2021".
4. Buy America Act.

1.4 SUBMITTALS:

A. Product Data: Submit manufacturer's technical product data and installation instructions for natural gas systems materials and products.

B. Shop Drawings: Submit scaled layout drawings of natural gas pipe systems including, but not necessarily limited to, pipe and tube sizes, location, elevations, and slopes of horizontal runs, wall and floor penetrations, and connections. Include schematic diagrams of each gas train. Indicate interface and spatial relationship between piping and

proximate equipment.

C. Record Drawings: At project closeout, submit record drawings of installed natural gas systems piping and products, in accordance with requirements of Division 01.

D. Maintenance Data: Submit maintenance data and parts lists for natural gas systems materials and products. Include this data, product data, shop drawings, and record drawings in maintenance manual; in accordance with requirements of Division 01.

PART 2 – PRODUCTS

2.1 MATERIALS AND PRODUCTS:

A. General: Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, and capacities as indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide materials and products complying with NFPA 54, where applicable, and base pressure rating on natural gas piping system maximum design pressures. Provide sizes and types matching piping and equipment connections; provide fittings of materials which match pipe materials use in natural gas systems. Where more than one type of material or product are indicated selection is Installer's option.

2.2 BASIC IDENTIFICATION:

A. General: Provide identification complying with Division 23 "Mechanical Identification Accessories" in accordance with the following listing:

1. Building Distribution Piping: Plastic pipe markers.
2. Gas Service: Underground-type plastic line markers.
3. Gas Valves: Plastic valve tags.

2.3 BASIC PIPES AND PIPE FITTINGS:

A. General: Provide pipes and pipe fittings complying with Division 23 "General Pipes and Fittings", in accordance with the following listing:

B. Building Distribution Piping:

1. Pipe Size 3" and Smaller: Black steel pipe; Schedule 40; malleable-iron threaded fittings (exposed), welded fittings and joints (concealed).

2.4 BASIC PIPING SPECIALTIES:

A. General: Provide piping specialties complying with Division 23 "Hydronic Piping and Specialities" for each of the following:
1. Pipe escutcheons.
2. Vandal-proof vent caps.
3. Dielectric unions.
4. Pipe sleeves.
5. Sleeve seals.

2.5 BASIC SUPPORTS AND ANCHORS:

A. General: Provide supports and anchors of the following types as needed. See Division 23 "Mechanical Supporting Devices."

1. Adjustable swivel pipe rings for horizontal-piping hangers and supports.
2. Two-bolt riser for vertical piping supports.
3. Concrete inserts, C-clamps, and steel brackets for building attachments.

2.6 SPECIAL VALVES:

A. General: Special valves required for natural gas systems include the following types:

1. Gas Cocks:

a. Gas Cocks 2" and Smaller: 150 psi non-shock WOG, bronze straightway cock, flat or square head, threaded ends. Gas cocks to meet the requirements of ANSI Z21.15 and be labeled to that effect

2. Manufacturer: Subject to compliance with requirements, provide gas cocks of one of the following:

a. DeZurik Corp.
b. Jenkins Bros.
c. Lukenheimer Co.
d. NIBCO, Inc.
e. Powell (The Wm.) Co.
f. Rockwell International; Flow Control Div.
g. Stockham Valves and Fittings.
h. Walworth Co.

3. Earthquake Valve: As recommended by local gas utility. Secure valve body to building as required by valve manufacturer.

2.7 PRESSURE REGULATING VALVES:

A. General: Provide single stage, steel jacketed, corrosion- resistant gas pressure regulators with atmospheric vent, elevation compensator; with threaded ends for 2" and smaller, flanged ends for 2-1/2" and larger; for inlet and outlet gas pressures, specific gravity, and volume flow indicated.

PART 3 – EXECUTION

3.1 INSPECTION:

A. General: Examine areas and conditions under which natural gas systems materials and products are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 INSTALLATION OF BASIC IDENTIFICATION:

A. General: Install mechanical identification in accordance with Division 23 "Mechanical Identification Accessories."

3.3 INSTALLATION OF NATURAL GAS PIPING:

A. General: Install natural gas piping in accordance with Division 23 "General Pipes and Fittings".

B. Use sealants on metal gas piping threads which are chemically resistant to natural gas. Use sealants sparingly, and apply to only male threads of metal joints.

C. Remove cutting and threading burrs before assembling piping.

D. Do not install defective piping or fittings. Do not use pipe with threads which are chipped, stripped or damaged.

E. Plug each gas outlet, including valves, with threaded plug or cap immediately after installation and retain until continuing piping, or equipment connection are completed.

F. Install drip-legs in gas piping where indicated, and where required by code or regulation.

G. Install "Tee" fitting with bottom outlet plugged or capped, at bottom of pipe risers.

H. Install piping with 1/64" per foot (1/8%) downward slope in direction of flow.

3.4 INSTALLATION OF PIPING SPECIALTIES:

A. Install piping specialties in accordance with Division 23 "Hydronic Piping and Specialties."

3.5 INSTALLATION OF SUPPORTS AND ANCHORS:

A. Install supports and anchors in accordance with Division 23 "Mechanical Supporting Devices."

3.6 INSTALLATION OF VALVES:

A. Gas Cocks: Provide at connection to gas train for each gas-fired equipment item; and on risers and branches where indicated.

B. Locate gas cocks where easily accessible, and where they will be protected from possible injury.

C. Pressure Regulating Valves: Install as indicated; comply with Utility requirements. Pipe atmospheric vent to outdoors, full size of outlet. Install gas shutoff valve upstream of each pressure regulating valve.

3.7 EQUIPMENT CONNECTIONS:

A. General: Connect gas piping to each gas-fired equipment item, with drip leg and shutoff gas cock. Comply with equipment manufacturer's instructions.

3.8 FIELD QUALITY CONTROL:

A. Piping Tests: Inspect, test, and purge natural gas systems in accordance with NFPA 54, and local utility requirements.

3.9 ADJUSTING AND CLEANING:

A. Cleaning and Inspecting: Clean and inspect natural gas systems in accordance with requirements of Division 23 "General Pipes and Fittings."

3.10 SPARE PARTS:

A. Valve Wrenches: Furnish to Owner, with receipt, 2 valve wrenches for each type of gas valve installed, requiring same.

END OF SECTION 224850

230000 GENERAL MECHANICAL REQUIREMENTS
230005 DEMOLITION
230600 GENERAL PIPES AND FITTINGS
231400 MECHANICAL SUPPORTING DEVICES
231700 MOTORS, DRIVES AND ELECTRICAL REQUIREMENTS
232500 MECHANICAL INSULATION
236200 FUEL FIRED HEATERS
236500 REFRIGERATION PIPING AND EQUIPMENT
238850 AIR FILTERS
238900 DUCTWORK
239100 DUCTWORK ACCESSORIES
239400 AIR OUTLETS AND INLETS
239550 MECHANICAL CONTROL SYSTEMS
239950 SYSTEM COMMISSIONING, TESTING AND BALANCING

HEATING VENTILATING & AIR CONDITIONING

division 23

SAA

SANDERS ASSOCIATES ARCHITECTS

SECTION 230005 - DEMOLITION

PART I - GENERAL

1.1 SECTION INCLUDES:

A. Remove existing general, mechanical and plumbing installations in the remodel area which is no longer useful to the functions of the building.

B. Maintain existing installations which continue in service or are adapted to new service.

C. Adapt existing installation to new conditions, ie., remove and reinstall piping which must be offset or revised to accommodate new installation, layouts, etc.

1.2 REFERENCES:

A. Respond to General Conditions, Supplemental General Conditions, Division 1, etc.

1.3 PROJECT/SITE CONDITIONS:

Work areas are in the existing general building areas, mechanical rooms and chase spaces. Ductwork and piping exists throughout the building. The building's utilities are to be restored to service. Be familiar with site conditions and be careful in the work.

1.4 SCHEDULING AND SEQUENCING:

Program and schedule any required interruptions of primary utility service with the General Contractor.

PART 2 – PRODUCTS

NOT USED

PART 3 - EXECUTION

3.1 PLUMBING PIPING AND EQUIPMENT:

Remove all plumbing piping, related insulation, equipment and accessories in the remodeled areas rendered obsolete by this work. The contractor shall field coordinate existing work versus new and remove all piping, equipment, and accessories not required by new work to remain. Dispose of removed material offsite in an approved manner.

3.2 HVAC DUCTWORK AND EQUIPMENT:

Remove all HVAC ductwork, related insulation, equipment and accessories in the remodeled areas rendered obsolete by this work. The contractor shall field coordinate existing work versus new and remove all ductwork, equipment, and accessories not required by new work to remain. Dispose of removed material offsite in an approved manner.

3.2 CONTROLS:

Remove existing control system rendered obsolete by this work. Remove all control devices, and associated electrical wiring, control valves and dampers, cap or terminate wiring in existing junction boxes or at existing mains.

END OF SECTION 230005

SECTION 230600 - GENERAL PIPES AND FITTINGS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS:

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

B. This section is Division 23 General Pipes and Fittings section, and is part of each Division 23 section making reference to pipes and pipe fittings specified herein.

C. Division 23 General Mechanical Requirements applies to work of this section.

D. Related Sections:

1. Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 SUMMARY:

A. This section is generic in that it describes material and installation required by several other sections of this specification.

B. Types of pipes and pipe fittings specified in this section include the following:

1. Steel Piping
2. Galvanized Steel Piping
3. Copper Piping
4. Miscellaneous Piping Materials/Products.

C. Pipes and pipe fittings furnished as part of factory-fabricated equipment are specified as part of equipment assembly in other Division 23 sections.

1.3 QUALITY ASSURANCE:

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of pipes and pipe fittings of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Installer's Qualifications:

1. Firm with at least three years history of successful experience on projects of similar nature.
2. Licensed as a firm in the State of Utah.
3. Have a publicly registered bonding capacity of sufficient amount to cover this work and all other work in progress by the contractor.
4. All workmen employed on the project to carry state licenses as journeyman or apprentice pipe fitters with additional certification for welders.

1.4 SUBMITTALS:

A. Product Data: Submit manufacturer's technical product data, installation instructions, and dimensioned drawings for each type of pipe and pipe fitting. Submit piping schedule showing manufacturer, pipe or tube weight, fitting type, and joint type for each piping system.

B. Brazing Certifications: Submit reports as required for piping work.

C. Maintenance Data: Submit maintenance data and parts lists for each type of mechanical fitting. Include this data, product data, and certifications in maintenance manual; in accordance with requirements of Division 01.

1.5 REFERENCES:

A. Codes And Standards:

1. Welding: Qualify welding procedures, welders and operators in accordance with ASME B31.1, or ASME B31.9, as applicable, for shop and project site welding of piping work.
2. Brazing: Certify brazing procedures, brazers, and operators in accordance with ASME Boiler and Pressure Vessel Code, Section IX, for shop and job-site brazing of piping work.
3. NSF Labels: Where plastic piping is indicated to transport potable water, provide pipes and pipe fittings bearing approval label by National Sanitation Foundation (NSF).
4. Buy America Act.

1.6 DELIVERY, STORAGE, AND HANDLING:

A. Except for concrete, corrugated metal, hub-and-spigot, clay, and similar units of pipe, provide factory-applied plastic end-caps on each length of pipe and tube. Maintain end-caps through shipping, storage and handling, as required, to prevent pipe-end damage and eliminate dirt and moisture from inside of pipe and tube.

B. Where possible, store pipe and tube inside and protected from weather. When necessary to store outside, elevate above grade and enclose with durable, waterproof wrapping.

C. Protect flanges and fittings from moisture and dirt by inside storage and enclosure, or by packaging with durable, waterproof wrapping.

PART 2 - PRODUCTS

2.1 GENERAL:

A. Piping Materials: Provide pipe and tube of type, joint type, grade, size and weight (wall thickness or Class) indicated for each service. Where type, grade or class is not indicated, provide proper selection as determined by Installer for installation requirements, and comply with governing regulations and industry standards. Use United States (domestic) manufactured pipe only. Do not use foreign made pipe.

B. Pipe/Tube Fittings: Provide factory-fabricated fittings of type, materials, grade, class and

pressure rating indicated for each service and pipe size. Provide sizes and types matching pipe, tube, valve or equipment connection in each case. Where not otherwise indicated, comply with governing regulations and industry standards for selections, and with pipe manufacturer's recommendations where applicable. Use domestic manufactured fittings only. Do not use foreign manufactured fittings.

2.2 STEEL PIPES AND PIPE FITTINGS:

A. Black Steel Pipe: Seamless or ERW, ASTM A 53.

B. Electric-Resistance-Welded Steel Pipe: ASTM A 135.

C. Electric-Fusion-Welded Steel Pipe: ASTM A 671, A 672, or A 691.

D. Galvanized Steel Pipe: ASTM A 53.

E. Galvanized Seamless Steel Pipe: ASTM A 53.

F. Malleable-Iron Threaded Fittings: ANSI B16.3; plain or galvanized as indicated.

G. Unions: ANSI B16.39; 300 lb. ground joint malleable iron, hexagonal, selected by Installer for proper piping fabrication and service requirements, including style, end connections, and metal- to-metal seats (iron, bronze or brass); plain or galvanized as indicated.

H. Dielectric Unions: 175 psig WSP at 250^{o}F. Equal to Walter Vallet Company V-line insulating coupling.

I. Threaded Pipe Plugs: ANSI B16.14.

J. Steel Flanges/Fittings: ANSI B16.5, including bolting and gasketing of the following material group, end connection and facing, except as otherwise indicated.

1. Material Group: Group 1.1.
2. End Connections: Buttwelding.
3. Facings: Raised-face.
4. Steel Pipe Flanges For Waterworks Service: AWWA C207.

K. Forged-Steel and Threaded Fittings: ANSI B16.11, except MSS SP-79 for threaded reducer inserts; rated to match schedule of connected pipe.

L. Forged Branch-Connection Fittings: Except as otherwise indicated, provide type as determined by Installer to comply with installation requirements.

M. Pipe Nipples: Fabricated from same pipe as used for connected pipe; except do not use less than Schedule 80 pipe where length remaining unthreaded is less than 1-1/2", and where pipe size is less than 1-1/2", and do not thread nipples full length (no close-nipples).

2.3 COPPER TUBE AND FITTINGS:

A. Copper Tube: ASTM B 88; Type K, L (wall thickness) as indicated for each service; hard-

drawn temper, except as otherwise indicated. Do not use Type M for pressure piping.

B. DWV Copper Tube: ASTM B 306.

C. ACR Copper Tube: ASTM B 280.

D. Cast-Copper Solder-Joint Fittings: ANSI B16.18.

E. Wrought-Copper Solder-Joint Fittings: ANSI B16.22.

F. Cast-Copper Solder-Joint Drainage Fittings: ANSI B16.23.

G. Wrought-Copper Solder-Joint Drainage Fittings: ANSI B16.29.

H. Cast-Copper Flared Tube Fittings: ANSI B16.26.

I. Bronze Pipe Flanges/Fittings: ANSI B16.24.

J. Copper-Tube Unions: Provide standard products recommended by manufacturer for use in service indicated.

2.4 PLASTIC PIPE AND PIPE FITTINGS:

A. Polyvinyl Chloride Pipe (PVC): ASTM D 1785.

B. PVC Fittings:

1. Schedule 40 Socket: ASTM D 2466.
2. Schedule 80 Socket: ASTM D 2467.
3. Schedule 80 Threaded: ASTM D 2464.

2.5 MISCELLANEOUS PIPING MATERIALS/PRODUCTS:

A. Soldering Materials: Except as otherwise indicated, provide soldering materials as determined by Installer to comply with installation requirements. Use **no lead** bearing solders in domestic water applications.

1. Tin-Antimony Solder: ASTM B 32, Grade 95TA.
2. Silver-Lead Solder: ASTM B 32, Grade 96TS.

B. Brazing Materials: Except as otherwise indicated, provide brazing materials as determined by Installer to comply with installation requirements.

1. Comply with SFA-5.8, Section II, ASME Boiler and Pressure Vessel Code for brazing filler metal materials.

C. Gaskets for Flanged Joints: ANSI B16.21; full-faced for cast-iron flanges; raised-face for steel flanges, unless otherwise indicated.

D. Piping Connectors for Dissimilar Non-Pressure Pipe: Elastomeric annular ring insert, or elastomeric flexible coupling secured at each end with stainless steel clamps, sized for exact fit to pipe ends and subject to approval by plumbing code.

1. Manufacturer: Subject to compliance with requirements, provide piping

connectors of the following

a. Fernco, Inc.

E. Strainers:

1. Y pattern, self-cleaning, line size. Armstrong, Bailey, Crane, Fisher, Metraflex, Mueller, Sarco, Strong, or Yarway.

a. Iron Body, Screwed Ends 2" and Smaller: 250 psig at 425°F, screen mesh to suit service.
b. Flanged Iron Body 21/2" and Larger: 125 psig steam pressure rating, screen mesh to suit service.

PART 3 – EXECUTION

3.1 INSTALLATION:

A. General: Install pipes and pipe fittings in accordance with recognized industry practices which will achieve permanent leak-proof piping systems, capable of performing each indicated service without piping failure. Install each run with minimum joints and couplings, but with adequate and accessible union, flanges, etc., for disassembly and maintenance/replacement of valves and equipment. Reduce sizes (where indicated) by use of reducing fittings. Align piping accurately at connections, within 1/16" misalignment tolerance. Do not cold spring. Store filler weld materials in accordance with codes.

1. Comply with ANSI B31 Code for Pressure Piping.

B. Locate piping runs, except as otherwise indicated, vertically and horizontally (pitched to drain) and avoid diagonal runs wherever possible. Orient horizontal runs parallel with walls and column lines. Locate runs as shown or described by diagrams, details and notations or, if not otherwise indicated, run piping in shortest route which does not obstruct usable space or block access for servicing building and its equipment. Hold piping close to walls, overhead construction, columns and other clearance to 1/2" where furring is shown for enclosure or concealment of piping, but allow for insulation thickness, if any. Where possible, locate insulated piping for 1" clearance outside insulation. Wherever possible in finished and occupied spaces, conceal piping from view, by locating in column enclosures, in hollow wall construction or above suspended ceilings; do not encase horizontal runs in solid partitions, except as indicated. Provide high point vents, low point drains with valves and extension to drain for all piping.

C. All piping in mechanical rooms, fan rooms, etc., shall be exposed. Do not conceal or imbed piping in walls, floors or other structures.

D. Make changes in direction or size with manufactured fittings. Anchor and support piping for free expansion and movement without damage to piping, equipment or to building.

E. Arrange piping to maintain head room and keep passageways clear.

F. Provide unions at connections to equipment and elsewhere, as required, to facilitate maintenance.

G. Run full pipe size through shutoff valves, gas cocks, balancing valves, etc. Change pipe size within three pipe size diameters of final connection to equipment, coils, etc.

H. Erect all piping to insure proper draining. Domestic water, chilled water, and heating water shall slope down a minimum of 1" per 40 feet towards the drains. Pitch standpipes down to fire department connections a minimum of 1" per 40 feet. Slope soil, waste, vent, and roof drain lines in accordance with requirements of Uniform Plumbing Code.

I. On horizontal straight runs of pipe, use eccentric reducers with straight side on top for water piping.

J. Electrical Equipment Spaces: Do not run piping in or through transformer vaults and other electrical or electronic equipment spaces and enclosures or above electrical gear unless authorized and directed. Install drip pan under piping that must be run through electrical spaces.

K. Anytime lines are broken or disconnected they shall be capped immediately after flushing. If rocks or other foreign materials are found in the system after it has been closed, the Contractor shall stand the expense of their removal.

3.2 PIPING SYSTEM JOINTS:

A. General: Provide joints of type indicated in each piping system.

B. Threaded: Thread pipe in accordance with ANSI B2.1; cut threads full and clean using sharp dies. Ream threaded ends to remove burrs and restore full inside diameter. Apply pipe joint compound, or pipe joint tape (Teflon) where recommended by pipe/fitting manufacturer, on male threads at each joint and tighten joint to leave not more than 3 threads exposed.

C. Brazed: Braze copper tube-and-fitting joints where indicated, in accordance with ASME B31.

D. Soldered: Solder copper tube-and-fitting joints where indicated, in accordance with recognized industry practice. Cut tube ends squarely, ream to full inside diameter, and clean outside of tube ends and inside of fittings. Apply solder flux to joint areas of both tubes and fittings. Insert tube full depth into fitting, and solder in manner which will draw solder full depth and circumference of joint. Wipe excess solder from joint before it hardens.

E. Flanged Joints: Match flanges within piping system, and at connections with valves and equipment. Clean flange faces and install gaskets. Tighten bolts to provide uniform compression of gaskets.

3.3 CLEANING, FLUSHING, INSPECTING:

A. General: Clean exterior surfaces of installed piping systems of superfluous materials, and prepare for application of specified coatings (if any). Flush out piping systems with clean water before proceeding with required tests. Inspect each run of each system for completion of joints, supports and accessory items.

1. Inspect pressure piping in accordance with procedures of ASME B31.

B. Flush, treat and clean portions of the heating water system modified under this contract in

accordance with Sections chemical treatment. Certify by signature of Contractor and Owner's Representative.

3.4 PIPING TESTS:

A. General: Provide temporary equipment for testing, including pump and gages. Test piping system wherever feasible before insulation is installed and remove control devices before testing. Test each natural section of each piping system independently but do not use piping system valves to isolate sections where test pressure exceeds valve pressure rating. Fill each section with water and pressurize for indicated pressure and time.

1. Required test period is 2 hours.
2. Test long runs of Schedule 40 pipe at 150 psi, except where fittings are lower Class or pressure rating.
3. Test each piping system at 150% of operating pressure indicated, but not less than 25 psi test pressure.
4. Observe each test section for leakage at end of test period. Test fails if leakage is observed or if pressure drop exceeds 5% of test pressure.

B. Notifications: At least 10 days prior to commencement of required testing, notice shall be submitted for review. Tests shall be made prior to painting insulating or covering of any joints and shall be in accordance with ANSI Code for Pressure Piping.

C. Inspections: Contractor to visually inspect piping while under hydrostatic pressure. Copies of inspection shall be submitted for review.

D. Repair piping systems sections which fail required piping test, by disassembly and re-installation, using new materials to extent required to overcome leakage. Do not use chemicals, stop-leak compounds, mastics, or other temporary repair methods.

E. Drain test water from piping systems after testing and repair work has been completed.

F. Test pressure piping in accordance with ANSI B31.

G. If test procedures in other sections differ from the above, comply with more stringent requirements.

END OF SECTION 230600

SECTION 231400 – MECHANICAL SUPPORTING DEVICES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS:

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

B. This section is Division 23 Mechanical Supporting Devices section, and is part of each Division 23 section making reference to supports and anchors specified herein.

C. Division 23 General Mechanical Requirements apply to work of this section.

D. Related Sections:

1. **Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.**

1.2 SUMMARY:

A. Extent of supports and anchors required by this section is indicated on drawings and/or specified in other Division 23 sections.

B. Types of supports and anchors specified in this section include the following:

1. Horizontal-Piping Hangers and Supports.
2. Vertical-Piping Clamps.
3. Hanger-Rod Attachments.
4. Building Attachments and In-Beds.
5. Saddles and Shields.
6. Miscellaneous Materials.
7. Roof Equipment Supports.
8. Anchors.
9. Equipment Supports.

C. Supports and anchors furnished as part of factory-fabricated equipment are specified as part of equipment assembly in other Division 23 sections.

D. Relate this section to Section 232400 regarding seismic and vibration control.

1.3 QUALITY ASSURANCE:

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of supports and anchors, of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

1.4 SUBMITTALS:

A. Product Data: Submit manufacturer's technical product data, including installation

instructions for each type of support and anchor.

B. Shop Drawings:

1. Submit manufacturer's assembly-type shop drawings for each type of support and anchor, indicating dimensions, weights, required clearances, and methods of assembly of components.

C. Maintenance Data: Submit maintenance data and parts list for each type of support and anchor. Include this data, product data, and shop drawings in maintenance manual; in accordance with requirements of Division 01.

1.5 REFERENCES:

A. Codes and Standards:

1. Code Compliance: Comply with applicable building, mechanical and plumbing codes pertaining to product materials and installation of supports and anchors.
2. UL and FM Compliance: Provide products which are UL-listed and FM approved.
3. MSS Standard Compliance:

a. Provide pipe hangers and supports of which materials, design, and manufacture comply with MSS SP-58.
b. Select and apply pipe hangers and supports, complying with MSS SP-69.
c. Fabricate and install pipe hangers and supports, complying with MSS SP-89.
d. Terminology used in this section is defined in MSS SP-90.

4. Buy America Act.

PART 2 – PRODUCTS

2.1 HORIZONTAL-PIPING HANGERS AND SUPPORTS:

A. General: Except as otherwise indicated, provide factory- fabricated horizontal piping hangers and supports complying with MSS SP-58, of one of the following MSS types listed, selected by Installer to suit horizontal-piping systems, in accordance with MSS SP-69 and manufacturer's published product information. Use only one type by one manufacturer for each piping service. Select size of hangers and supports to exactly fit pipe size for bare piping, and to exactly fit around piping insulation with saddle or shield for insulated piping. Provide copper-plated hangers and supports for copper-piping systems.

B. Adjustable Steel Clevises Hangers: MSS Type 1. (For suspension of non-insulated or insulated stationary pipe lines; 1/2" to 30".

C. Steel Double Bolt Pipe Clamps: MSS Type 3. (For suspension of pipe requiring up to 4" of insulation and where flexibility of clamp is desirable; 3/4" to 24".

D. Steel Pipe Clamps: MSS Type 4. (For suspension of cold pipe lines or hot lines where little or no insulation is required; 1/2" to 24".

E. Pipe Hangers: MSS Type 5. (For suspension of piping when off-center closure allowing installation of hanger before erection of piping is desired; 1/2" to 4".

F. Adjustable Swivel Pipe Rings: MSS Type 6. (For suspension of non-insulated stationary pipe lines; 3/4" to 8".

G. Adjustable Steel Band Hangers: MSS Type 7. (For suspension of non-insulated stationary pipe lines; 3/4" to 8".

H. Adjustable Band Hangers: MSS Type 9. (For suspension of non-insulated stationary pipe liens; 1/2" to 8".

I. Adjustable Swivel Rings, Band Type: MSS Type 10. (For suspension of non-insulated stationary pipe lines; 3/8" to 8".

J. Split Pipe Rings: MSS Type 11. (For suspension of non-insulated stationary pipe lines; 3/8" to 3".

K. Extension Split Pipe Clamps: MSS Type 12. (For suspension of non-insulated stationary pipe lines; 3/8" to 3".

L. U-Bolts: MSS Type 24. (For support of heavy loads; 1/2" to 30".

M. Clips: MSS Type 26. (For support of uninsulated piping not subject to expansion or contraction.

N. Pipe Saddle Supports: MSS Type 36, including steel pipe base- support and cast-iron floor flange. (To support pipe from floor stanchion, using floor flange to secure stanchion to floor 4" to 36".

O. Pipe Stanchion Saddles: MSS Type 37, including steel pipe base support and cast-iron floor flange. (To Type 36 except U-bolt provided for retaining pipe.

2.2 VERTICAL-PIPING CLAMPS:

A. General: Except as otherwise indicated, provide factory- fabricated vertical-piping clamps complying with MSS SP-58, of one of the following types listed, selected by Installer to suit vertical piping systems, in accordance with MSS SP-69 and manufacturer's published product information. Select size of vertical piping clamps to exactly fit pipe size of bare pipe. Provide copper-plated clamps for copper-piping systems.

B. Two-Bolt Riser Clamps: MSS Type 8. (For support and steadying of pipe risers; 3/4" to 20". Also supports pipe covering or insulation.

C. Four-Bolt Riser Clamps: MSS Type 42. (When longer ends are required for riser clamps.

2.3 HANGER-ROD ATTACHMENTS:

A. General: Except as otherwise indicated, provide factory- fabricated hanger-rod attachments complying with MSS SP-58, of one of the following MSS types listed, selected by Installer to suit horizontal-piping hangers and building attachments, in accordance with MSS SP-69 and manufacturer's published product information. Use only one type by one manufacturer for each piping service. Select size of hanger-rod

attachments to suit hanger rods. Provide copper-plated hanger-rod attachments for copper-piping systems.

B. Steel Turnbuckles: MSS Type 13. (For adjustment up to 6" for heavy loads.

C. Steel Clevises: MSS Type 14. (For use on high temperature piping installations.

D. Swivel Turnbuckles: MSS Type 15. (For use with split pipe rings, MSS type 11.

E. Malleable Iron Sockets: MSS Type 16. (For attaching hanger rod to various types of building attachments.

2.4 BUILDING ATTACHMENTS AND IN-BEDS:

A. General: Except as otherwise indicated, provide factory- fabricated building attachments complying with MSS SP-58, of one of the following MSS types listed, selected by Installer to suit building substrate conditions, in accordance with MSS SP-69 and manufacturer's published product information. Select size of building attachments to suit hanger rods. Provide copper-plated building attachments for copper-piping systems.

B. Concrete Inserts: MSS Type 18. (For upper attachment for suspending pipe hangers from concrete ceiling.

C. Top Beam C-Clamp: MSS Type 19. (Use under roof installations with bar joist construction, for attachment to top flange of structural shape.

D. Side Beam or Channel Clamps: MSS Type 20. (For attachment to bottom flange of beams, channels, or angles.

E. Center Beam Clamps: MSS Type 21. (For attachment to center of bottom flange of beams.

F. Welded Beam Attachments: MSS Type 22. (For attachment to bottom of beams where loads are considerable and rod sizes are large.

G. C-Clamps: MS Type 23. (For attachment to structural shapes.

H. Top Beam Clamps: MSS Type 25. (For attachment to top of beams when hanger rod is required tangent to edge of flange.

I. Side Beam Clamps: MSS Type 27. (For attachment to bottom of steel I-beams.

J. Steel Beam Clamps with Eye Nut: MSS Type 28. (Same as Type 28 with link extensions.

K. Linked Steel Clamps with Eye Nut: MSS Type 29. (Same as Type 28 with link extensions.

L. Malleable Beam Clamps: MSS Type 30. (For attachment to structural steel.

M. Steel Brackets: One of the following for indicated loading:

1. Light Duty: MSS Type 31, to 570 pounds.
2. Medium Duty: MSS Type 32, to 1,500 pounds.

3. Heavy Duty: MSS Type 33, to 3,000 pounds.

N. Side Beam Brackets: MSS Type 34. (For use on sides of steel or wooden beams.

O. Plate Lugs: MSS Type 57. (For attachment to steel beams where flexibility at the beam is desired.

P. Horizontal Travelers: MSS Type 58. (For supporting piping systems subject to linear horizontal movements where head room is limited.

2.5 SADDLES AND SHIELDS:

A. General: Except as otherwise indicated, provide saddles or shields under piping hangers and supports, factory-fabricated, for all insulated piping. Size saddles and shields for exact fit to mate with pipe insulation.

B. Protection Saddles: MSS Type 39; see section Mechanical Insulation for void fill requirements. Use for roller supports and on all pipes 10" and larger.

C. Protection Shields: See section Mechanical Insulation.

D. Thermal Hanger Shields: See section Mechanical Insulation.

E. Manufacturer; Subject to compliance with requirements, provide thermal hanger shields of one of the following:

1. Elcen Metal Products Co.
2. Pipe Shields, Inc.

2.6 MANUFACTURERS OF HANGERS AND SUPPORTS:

A. Manufacturer: Subject to compliance with requirements, provide hangers and supports of one of the following:

1. Kin-Line, Inc.
2. Fee & Mason Mfg. Co.; Div. Figgie International
3. ITT Grinnel Corp.
4. B-line
5. Unistrut

2.7 HIGH HUMIDITY AREAS: Use cadmium plated or galvanized hangers, attachments, rods, nuts, bolts and other accessories in boiler rooms or other high humidity areas.

2.8 OUTSIDE AREAS: Use galvanized hangers, attachments, rods, nuts, bolts, and other accessories for all outside areas.

2.9 MISCELLANEOUS MATERIALS:

A. Metal Framing: Provide products complying with NEMA STD ML 1.

B. Steel Plates, Shapes and Bars: Provide products complying with ASTM A 36.

C. Cement Grout: Portland cement (ASTM C 150, Type I or Type III) and clean uniformly graded, natural sand (ASTM C 404, Size No. 2. Mix at a ratio of 1.0 part cement to 3.0

parts sand, by volume, with minimum amount of water required for placement and hydration. Use Embeco grout for non-shrink applications.

D. Heavy Duty Steel Trapezes: Fabricate from factory built channel (Unistrut) system and use factory fasteners for channel steel shapes, selected for loads required; weld steel in accordance with AWS standards.

E. Pipe Guides: Provide factory-fabricated guides, of cast semi- steel or heavy fabricated steel, consisting of bolted two- section outer cylinder and base with two-section guiding spider bolted tight to pipe. Size guide and spiders to clear pipe and insulation (if any), and cylinder. Provide guides of length recommended by manufacturer to allow indicated travel.

PART 3 – EXECUTION

3.1 INSPECTION:

A. Examine areas and conditions under which supports and anchors are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 PREPARATION:

A. Proceed with installation of hangers, supports and anchors only after required building structural work has been completed in areas where the work is to be installed. Correct inadequacies including (but not limited to) proper placement of inserts, anchors and other building structural attachments.

B. Prior to installation of hangers, supports, anchors and associated work, Installer shall meet at project site with Contractor. Installer of each component of associated work, inspection and testing agency representatives (if any), installers of other work requiring coordination with work of this section and Architect/Engineer for purpose of reviewing material selections and procedures to be followed in performing the work in compliance with requirements specified.

3.3 INSTALLATION OF BUILDING ATTACHMENTS:

A. Install building attachments at required locations within concrete or on structural steel for proper piping support. Space attachments within maximum piping span length indicated in MSS SP-69. Install additional concentrated loads, including valves, flanges, guides, strainers, expansion joints, and at changes in direction of piping. Install concrete inserts before concrete is placed and fasten insert securely to forms. Where concrete with compressive strength less than 2500 psi is indicated, install reinforcing bars through the openings at the tops of inserts.

3.4 INSTALLATION OF HANGERS AND SUPPORTS:

A. General: Install hangers, supports, clamps and attachments to rigidly support piping properly from building structure; comply with MSS SP-69. Arrange for grouping of parallel runs of horizontal piping to be supported together on trapeze type hangers where possible. Install supports with maximum spacings complying with MSS SP-69. Where piping of various sizes is to be supported together by trapeze hangers, space hangers for smallest pipe size or install intermediate supports for smaller diameter pipe. Do not use

wire or perforated metal to support piping, and do not support piping from other piping.

B. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers and other accessories. Except as otherwise indicated for exposed continuous pipe runs, install hangers and supports of same type and style as installed for adjacent similar piping.

C. Prevent electrolysis in support of copper tubing by the use of hangers and supports which are copper plated, or by isolating with foam rubber covering or 30 mil insulating tape.

D. Provisions for Movement:

1. Install hangers and supports to allow controlled movement of piping systems and to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends and similar units.
2. Install supports within 2 feet of non-vertical flex connectors.

E. Load Distribution: Install hangers and supports so that piping live and dead loading and stresses from movement will not be transmitted to connected equipment.

F. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes, and so that maximum pipe deflections allowed by ANSI B31 Pressure Piping Codes are not exceeded.

G. Insulated Piping: Do not allow hangers to come in contact with pipe where pipe is specified to be insulated.

H. Clamps: Attach clamps, including spacers (if any), to piping with clamps projecting through insulation; do not exceed pipe stresses allowed by ANSI B31.

I. Shields: Where low-compressive-strength insulation or vapor barriers are indicated on cold or chilled water piping, install galvanized steel protective shields. Install calcium silicate blocks (12" long minimum) at support points.

J. Saddles: Where insulation without vapor barrier is indicated, install protection saddles.

3.5 INSTALLATION OF ANCHORS:

A. Install anchors at proper locations to prevent stresses from exceeding those permitted by ANSI B31, and to prevent transfer for loading and stresses to connected equipment.

B. Fabricate and install anchor by welding steel shapes, plates and bars to piping and to structure. Comply with ANSI B31 and with AWS standards.

C. Where expansion compensators are indicated, install anchors in accordance with expansion unit manufacturer's written instructions, to limit movement of piping and forces to maximums recommended by manufacturer for each unit.

D. Anchor Spacings: Where not otherwise indicated, install anchors at ends of principal pipe-runs, at intermediate points in pipe-runs between expansion loops and bends. Make provisions for preset of anchors, as required, to accommodate expansion and contraction of piping.

3.6 EQUIPMENT SUPPORTS:

A. Provide concrete housekeeping bases for all floor mounted equipment furnished as part of the work of Division 23. Size bases to extend a minimum of 4" beyond equipment base in any direction; and 4" above finished floor elevation. Construct of reinforced concrete, roughen floor slab beneath base for bond, and provide steel rod anchors between floor and base. Locate anchor bolts using equipment manufacturer's templates. Chamfer top and edge corners.

B. Provide structural steel stands to support equipment not floor mounted or hung from structure. Construct of structural steel members or steel pipe and fittings. Provide factory-fabricated tank saddles for tanks mounted on steel stands.

3.7 ADJUSTING AND CLEANING:

A. Hanger Adjustment: Adjust hangers so as to distribute loads equally on attachments.

B. Support Adjustment: Provide grout under supports so as to bring piping and equipment to proper level and elevations.

C. Cleaning: Clean factory-finished surfaces. Repair any marred or scratched surfaces with manufacturer's touch-up paint.

END OF SECTION 231400

SECTION 231700 - MOTORS, DRIVES AND ELECTRICAL REQUIREMENTS FOR MECHANICAL WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

B. Related Sections:

1. Separate electrical components and materials required for field installation and electrical connections are specified in Division 26.

2. Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 SUMMARY:

A. This section specifies the basic requirements for motors and drives furnished by this Division and for electrical components which are an integral part of packaged mechanical equipment. Package components include, but are not limited to factory installed motors, starters, and disconnect switches, etc.

B. Specific electrical requirements (i.e. horsepower and electrical characteristics) for mechanical equipment are noted within these documents.

1.3 QUALITY ASSURANCE:

A. Provide electrical components and materials which are UL labeled.

B. Provide variable speed drives which conform to the latest standard of the following:

1. IEEE - Institute of Electrical and Electronic Engineers.
2. NEC - National Electrical Code.
3. NEMA - National Electrical Manufacturers Association.
4. Provide complete packaged unit(s) which are listed and carry the label of at least one of the following:

   a. UL - Underwriters Laboratory
   b. ETL - ETL Testing Laboratories, Inc.
   c. CSA - Canadian Standards Association

1.4 SUBMITTALS:

A. Submit complete product and application information for variable speed drives as follows:

1. Provide multiple sets of drawings of system (VFD) being supplied, in strict compliance with the specifications. Include, as a minimum:

a. General arrangement of each unit showing size and incoming and outgoing conduit locations.
b. Schematic.
c. Connection diagram, sufficient to install drive system.

2. Provide each unit with four owner/maintenance manuals which shall include:

a. Vendor information of equipment being supplied.
b. Connection information.
c. Start-up procedure.
d. Fault reset instruction.
e. Wiring diagrams (power and control).
f. Parts list.
g. Test results.
h. Harmonic voltage distortion on line with unit off.
i. Harmonic voltage distortion with unit on line.

B. Submit product data for motors, belts, drives, starters, and other electrical components with submittal data required for the equipment for which it serves, as required by the individual equipment specification sections. Verify project electrical characteristics with submittal. Confirm suitability for altitude, maintaining full nameplate rating plus service factor. Include this data in maintenance manual in accordance with Division 23195 "Operation and Maintenance Manuals".

1.5 REFERENCES:

A. NEMA Standards MG 1: Motors and Generators.

B. NEMA Standards ICS 2: Industrial Control Devices, Controllers, and Assemblies.

C. NEMA Standards 250: Enclosures for Electrical Equipment.

D. NEMA Standards KS 1: Enclosed Switches.

E. Comply with National Electrical Code (NFPA 70).

F. Buy America Act

1.6 WARRANTY:

A. General: Furnish a written warranty consisting of the following:

1. Warranty parts and labor for five years after substantial completion.

PART 2 – PRODUCTS

2.1 MOTORS:

A. The following are basic requirements for simple or common motors. For special motors, more detailed and specific requirements are specified in the individual equipment specifications.

1. Torque characteristics shall be sufficient to satisfactorily accelerate the driven loads.
2. Motor sizes large enough so that the driven load will not require the motor to operate in the service factor range.
3. Single speed motors of the permanent split capacitor type. (PSC)
4. Temperature Rating: Minimum rate for 40°C environment with maximum 90°C temperature rise for continuous duty at full load (Class H Insulation for altitude, Class B leads allowed).
5. Starting Capability: Frequency of starts as indicated by automatic control system, and not less than 5 evenly timed spaced starts per hour for manually controlled motors.
6. Service Factor: 1.15 for poly-phase motors and 1.35 for single phase motors, 1.0 for TEFC motors.
7. Motor Construction: NEMA Standard MG 1, general Purpose, continuous duty, design "B", except "C" where required for high starting torque.
8. Frames: NEMA Standard No. 48 or 54; T-frame, use driven equipment manufacturer's standards to suit specific application.
9. Bearings:
   a. Ball or roller bearings with inner and outer shaft seals;
   b. Re-greasable, except permanently sealed where motor is normally inaccessible for regular maintenance;
   c. Designed to resist thrust loading where belt drives or other drives produce lateral or axial thrust in motor;
   d. For fractional horsepower, light duty motors, sleeve type bearings are permitted;
10. Enclosure Type:
    a. Open drip-proof motors for indoor use where satisfactorily housed or remotely located during operation;
    b. Weather protected type I for outdoor use, Type II where not housed;
11. Overload Protection: built-in thermal overload protection and, where indicated, internal sensing device suitable for signaling and stopping motor at starter.
12. Noise Rating: "Quiet"
13. Efficiency: "Energy Efficient" motors shall have a minimum efficiency as scheduled in accordance with IEEE Standard 112, test method B. If efficiency not specified, motors shall have a higher efficiency than "average standard industry motors", in accordance with IEEE Standard 112.
14. Nameplate: indicate the full identification of manufacturer, ratings, characteristics, construction, special features and similar information.
15. Acceptable Manufacturers: Baldor, General Electric, Reliance, U.S. Motors, Siemens, Toshiba, Magnatek, Allen-Bradley, AD Smith.

2.2 MOTOR DRIVES:

A. Provide V-belt drives of fabric and rubber construction by Browning, Dodge, Woods. Match multiple belts and adjust to drive the apparatus properly and to prevent slippage and undue wear in starting. Design drives for 150 percent or more of the specified motor nameplate rating. Bush all drives. Belts shall be A, B or C section belts. Narrow gauge belts are not acceptable. Adjust drives or replace sheaves as needed to obtain required capacities.

B. Provide coupled drives by Browning, Dodge or Woods.

C. Provide a galvanized iron metal guard for each V-belt drive, coupled drive or rotating shaft which shall be constructed around an angle iron frame, securely bolted to the floor

or apparatus. Design the guard to completely enclose drives and pulleys and be constructed to comply with all safety requirements. Provide hinged access doors not less than 6" x 6" for access to motor and fan shaft for test purposes. For double inlet fans, construct the belt guard cover of 1/2" mesh expanded metal, arranged as not to restrict the air flow into the fan inlet.

END OF SECTION 231700

SECTION 232500 - MECHANICAL INSULATION

PART 1 – GENERAL

1.1 RELATED DOCUMENTS:

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

B. Division 23, Section 230000 - General Mechanical Requirements applies to work of this section.

C. Related Sections:

1. Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 SUMMARY:

A. Extent of mechanical insulation required by this section is indicated on drawings and schedules as required by the current Model Energy Code, and by requirements of this section. Use no asbestos in this work. Include restorations of insulations of damaged work including repair of damaged existing insulation due to new work.

B. Types of mechanical insulation specified in this section include the following:

1. Piping Systems Insulation:
   a. Fiberglass.
   b. Flexible Unicellular.
2. Ductwork System Insulation:
   a. Fiberglass.
   b. Rigid flexible wrap.

C. Refer to Division 23 section "Mechanical Supporting Devices" for protection saddles, protection shields, and thermal hanger shields.

D. Refer to Division 23 section "Ductwork" for duct linings.

E. Refer to Division 23 section "System Identification" for installation of identification devices for piping, ductwork, and equipment.

1.3 QUALITY ASSURANCE:

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of mechanical insulation products, of types and sizes required, whose products have been in satisfactory use in similar service for not less than 3 years.

B. Installer's Qualifications: Firm with at least 5 years successful installation experience on projects with mechanical insulations similar to that required for this project.

C. Flame/Smoke Ratings: Provide composite mechanical insulation (insulation, jackets,

coverings, sealers, mastics and adhesives) with flame-spread index of 25 or less, and smoke-developed index of 50 or less, as tested by ASTM E 84 (NFPA 255) method.

1.4 SUBMITTALS:

A. Product Data: Submit manufacturer's specifications and installation instructions for each type of mechanical insulation. Submit schedule showing manufacturer's product number, k-value, thickness, and furnished accessories for each mechanical system requiring insulation.

B. Maintenance Data: Submit maintenance data and replacement material lists for each type of mechanical insulation. Include this data and product data in maintenance manual.

1.5 DELIVERY, STORAGE AND HANDLING:

A. Deliver insulation, coverings, cements, adhesives and coatings to site in containers with manufacturer's stamp or label affixed showing fire hazard ratings of products.

B. Protect insulation against dirt, water and chemical and mechanical damage. Do not install damaged or wet insulation; remove from project site.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

A. Manufacturer: Subject to compliance with requirements, provide mechanical insulation materials of one of the following (except as noted):

1. Armstrong World Industries, Inc.
2. Babcock and Wilcox Co., Insulating Products Div.
3. CertainTeed Corp.
4. Knauf Fiber Glass GmbH.
5. Manville Products Corp.
6. Owens-Corning Fiberglass Corp.
7. Pittsburgh Corning Corp.

2.2 PIPING INSULATION MATERIALS:

A. Preformed Fiberglass Piping Insulation: ASTM C 547. Class 1 for use to 450ºF (230ºC); Class 2 for use to 650ºF (345ºC); Class 3 for use to 1200ºF (650ºC).

B. Jackets for Piping Insulation: All purpose (ASJ) fire retardant jacket, ASTM C 921, Type I for piping with temperatures below ambient, Type II for piping with temperatures above ambient. Type I may be used for all piping at Installers option.

C. Encase pipe fittings insulation with one-piece premolded PVC fitting covers, fastened as per manufacturer's recommendations.

D. Encase exterior fittings and insulation with aluminum jacket with weather-proof construction.

E. Encase suction diffusers in a removable/replaceable insulating box.

F. Staples, Bands, Wires, and Cement: As recommended by insulation manufacturer for applications indicated.

G. Adhesives, Sealers, and Protective Finishes: As recommended by insulation manufacturer for applications indicated.

H. Insulation Protection Shields: MSS Type 40; of length recommended by manufacturer to prevent crushing of insulation.

I. Thermal Hanger Shields: constructed of 360 degrees insert of high density, 100 psi, water-proofed calcium silicate, encased in 360 degrees sheet metal shield. Provide assembly of same thickness as adjoining insulation.

1. Manufacturer: Subject to compliance with requirements, provide thermal hanger shields of one of the following:

a. Elcen Metal Products Co.
b. Pipe Shields, Inc.

2.3 DUCTWORK INSULATION MATERIALS:

A. Rigid Fiberglass Ductwork Insulation: ASTM C 612, Class 1 - 400ºF (204ºC); Class 2 - 400ºF (204ºC); Class 3 - 850ºF (454ºC); Class 4 - 1000ºF (538ºC); Class 5 - 1800ºF (982ºC); Class 1 - 10 lbs/ft^3; Class 2, 3 and 4 - 12 lbs/ft^3; class 5 - 20 lbs/ft^3.

B. Flexible Fiberglass Ductwork Insulation: ASTM C 553, Type 1 - resilient, flexible; Class B-1 - 0.65 lbs/ft^3; Class B-2 - 0.75 lbs/ft^3; Class B-3 - 01.0 lbs/ft^3; Class B-4 - 1.5 lbs/ft^3; Class B-5 - 2.0 lbs/ft3; Class B-6 - 3.0 lbs/ft^3; Type II - flexible; Class F-1 - 4.5 lbs/ft^3; Type III - semirigid; Class F-2 - 4.5 lbs/ft^3.

C. Jackets for Ductwork Insulation: ASTM C 921, Type I for ductwork with temperatures below ambient; Type II for ductwork with temperatures above ambient.

D. Ductwork Insulation Accessories: Provide staples, bands, wires, tape, anchors, corner angles and similar accessories as recommended by insulation manufacturer for applications indicated.

E. Ductwork Insulation Compounds: Provide cements, adhesives, coatings, sealers, protective finishes and similar compounds as recommended by insulation manufacturer for applications indicated.

2.4 PIPING SEALANT THROUGH WALLS:

A. Sealant shall be a two-part foamed silicone elastomer equal to Dow Corning 3-6548 Silicone RTV foam or equivalent by 3M or “Spec Seal” by STI. Sealant shall be applied at any piping of pipe or duct penetration through fire or smoke walls to prevent air from passing through the opening.

B. Sealant cell structure, foamed in place, shall be U.L. classified and shall meet the smoke development and fuel contribution ratings specified. Sealant shall be stable at extreme temperatures, and shall effectively confine such hazards as fire, smoke and gases.

C. Sealant required at any fire/smoke wall penetration to be according to approved detail for each specific wall assembly. Contractor shall submit detail for engineer approval.

2.5 FIRE/SMOKE ENCASEMENT:

A. Any and all PVC, PVDF, polypropylene, acid waste and vent and any other plastic piping located in return air plenums shall be encased in rated flame and smoke system. The encasement shall be equal to Firemaster “Plastic Pipe Fire Protection System.” The enclosure shall meet all codes.

PART 3 – EXECUTION

3.1 GENERAL:

A. Piping insulation shall be fiberglass one-piece preformed pipe insulation, class related to temperature, with all purpose (ASJ) fire retardant jacket, additional jacketing as noted.

B. Fittings and valves shall be insulated and covered with preferred Zeston (PVC) covers.

C. All cold water, roof drains or any other lines upon which condensate moisture could form, shall have a vapor-proof jacket.

D. Fire and smoke hazard for a complete insulation system shall not exceed:

1. Flame spread - 25
2. Fuel contribution - 50
3. Smoke development - 50

E. Hangers shall not contact pipe where pipe is specified to be insulated. Insulation shall run continuous through the pipe hanger.

3.2 INSPECTION:

A. Examine areas and conditions under which mechanical insulation is to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.3 PLUMBING PIPING SYSTEM INSULATION:

A. Insulation Omitted: Omit insulation on chrome-plated exposed piping (except for handicapped fixtures), air chambers, unions strainers check valves, balance cocks, flow regulators, drain lines from water coolers, drainage piping located in crawl spaces or tunnels, fire protection piping, and pre-insulated equipment.

B. Cold Piping:

1. Application Requirements: Insulate the following cold plumbing piping systems:
   a. Potable cold water piping.
   b. Plumbing vents within 6 lineal feet of roof or wall outlet.
2. Insulate each piping system specified above with one of the following types and thicknesses of insulation:
   a. Fiberglass with all service jacket, self sealing lap:
   b. 1" thickness, taped and sealed joints.

C. Hot Piping:

1. Application Requirements: Insulate the following hot plumbing piping systems:
   a. Potable hot water piping.
   b. Potable hot water recirculation piping.

2. Insulate each piping system specified above with one of the following types and thicknesses of insulation:
   a. Fiberglass with all service jacket, self-sealing lap: 1" thick for pipe sizes up to and including 6", 1-1/2" thick for pipe sizes over 6".

3.4 HVAC PIPING SYSTEM INSULATION:

A. Refrigerant Piping:

1. Application Requirements: Insulate the following HVAC piping systems.
   a. Refrigerant piping.
2. Insulate each piping system specified above with one of the following types and thicknesses of insulation.
   a. 1-1/2” Closed cell elastomeric on suction piping.

3.5 DUCTWORK SYSTEM INSULATION:

A. Insulation Not Required: Do not insulate lined ductwork, except as noted, or exposed to weather.

B. Hot, Cold and Dual Temperature Ductwork:

1. Application Requirements: Insulate the following ductwork:
   a. HVAC supply ductwork between fan discharge, or HVAC unit discharge, and room terminal outlet. Insulate neck and bells of supply diffusers.
   b. HVAC return ductwork between room terminal inlet and return fan inlet, or HVAC unit inlet: except omit insulation on return ductwork located in return air ceiling plenums.
   c. HVAC exhaust ductwork between backdraft damper and insulation envelope.
   d. HVAC plenums and unit housings not pre-insulated at factory or lined.
   e. HVAC relief air plenums and ductwork.

2. Insulate each ductwork system specified above with one of the following types and thicknesses of insulation:
   a. Rigid fiberglass: Class 1, 1-1/2" thick, increase thickness to 2" in machine, fan and equipment rooms.
   b. Flexible Fiberglass: Type 1, Class B-4, 1-1/2" thick, application limited to concealed locations. Increase insulation to 2” for an areas where ductwork runs extend into attic space.

C. Duct Insulations:

1. Wrap insulation snugly on the ductwork such that maximum thickness is maintained. Butt all circumferential joints and overlap longitudinal joints a minimum of 2". Adhere insulation with 4" strips of Insulation Bonding Adhesive, at 8" on center.
2. On circumferential joints, staple the 2" flange of the facing with 9/16" flare-door staples on 6" centers and taped with minimum 3" wide foil reinforcing Kraft tape. Tape all pin penetrations or punctures in the facing.

3.6 INSTALLATION OF PIPING INSULATION:

A. General: Install insulation products in accordance with the manufacturer's written instructions, and in accordance with recognized industry practices to ensure that insulation serves its intended purpose.

B. Install insulation on pipe systems subsequent to installation of heat tracing, painting, testing and acceptance of tests.

C. Install insulation materials with smooth and even surfaces. Insulate each continuous run of piping with full-length units of insulation, with a single cut piece to complete the run. Do not use cut pieces or scraps abutting each other.

D. Clean and dry pipe surfaces prior to insulating. Butt insulation joints firmly together to ensure a complete and tight fit over surfaces to be covered.

E. Maintain integrity of vapor-barrier jackets on all pipe insulation, and protect to prevent puncture or other damage.

F. Cover valves, fittings and similar items in each piping system with equivalent thickness and composition of insulation as applied to adjoining pipe run. Install factory molded, precut or job fabricated units (at Installer's option) except where specific form or type is indicated.

G. Extend piping insulation without interruption through walls, floors and similar piping penetrations, except where otherwise indicated.

H. Provide neatly beveled edge at all terminations and interruptions of insulation.

I. Butt pipe insulation against pipe hanger insulation inserts. For hot pipes, apply 3" wide vapor barrier tape or band over the butt joints. For cold piping apply wet coat of vapor barrier lap cement on butt joints and seal joints with 3" wide vapor barrier tape or band.

J. Saddles and Shields:

1. General: Except as otherwise indicated, provide protection saddles or thermal hanger shields with protection shields under all piping hangers and supports, factory-fabricated, for all insulated piping. Size saddles and thermal shields for exact fit to mate with pipe insulation.
2. Protection Saddles: See section Supports and Anchors for saddle. Fill interior voids with segments of insulation matching adjoining insulation.
3. Protection Shields: MSS Type 40; of length recommended by manufacturer to prevent crushing of insulation. Use on pipes 1-1/4" and smaller. Use with thermal hanger shields for pipes 1-1/2" and larger.
4. Thermal Hanger Shields: High density calcium silicate encased in 360 degrees sheet metal shield. Provide assembly of same thickness as adjoining insulation. Use on pipes 1-1/2" to 8".

3.7 INSTALLATION OF DUCTWORK INSULATION:

A. General: Install insulation products in accordance with manufacturer's written instructions, and in accordance with recognized industry practices to ensure that insulation serves its intended purpose.

B. Install insulation materials with smooth and even surfaces.

C. Clean and dry ductwork prior to insulating. Butt insulation joints firmly together to ensure complete and tight fit over surfaces to be covered.

D. Maintain integrity of vapor-barrier on ductwork insulation, and protect it to prevent puncture and other damage.

E. Extend ductwork insulation without interruption through walls, floors and similar ductwork penetrations, except where otherwise indicated.

F. Lined Ductwork: Except as otherwise indicated, omit insulation on ductwork where internal insulation or sound absorbing linings have been installed.

G. Ductwork Exposed to Weather: Protect outdoor insulation from weather by installing outdoor protective finish or jacketing as recommended by manufacturer.

H. Corner Angles: Install corner angles on external corners of insulation on ductwork in exposed finished spaces before covering with jacketing.

3.8 PROTECTION AND REPLACEMENT:

A. Replace damaged insulation which cannot be repaired satisfactorily, including units with vapor barrier damage and moisture saturated units.

B. Protection: Insulation Installer shall advise Contractor of required protection for insulation work during construction period to avoid damage and deterioration.

END OF SECTION 232500

SECTION 236200 - FUEL FIRED HEATERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division-1 Specification sections apply to work of this section.

B. All pertinent sections of Section 230000 - General Mechanical Requirements are a part of the work described in this section.

C. Provisions of Section 231700 - Motors Drive and Electrical Requirements Work apply to this section of the specifications for requirements of wiring standards, motors controls, etc.

D. Refer to following sections for related work:
1. Section 234850 - Natural Gas Piping
2. Section 239550 - Mechanical Control Systems; not work of this section
3. **Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.**

1.2 SUMMARY:

A. New fuel fired heating systems required for this work include the following:
1. Heating/Cooling Rooftop Units

1.3 QUALITY ASSURANCE:

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of fuel fired heating systems of types and capacities required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Installer's Qualifications: A firm with at least three years of successful installation experience on projects with fuel fired heating systems similar to that required for this project. This Installer shall have a publicly registered bonding capacity of sufficient amount to cover this work and all other work in progress by the Contractor. All workmen on the project shall carry state licenses as journeymen or apprentice gas fired systems installers.

C. Codes and Standards:
1. ANSI Compliance: Construct and install gas-fired duct heaters in accordance with ANSI Z21.47 "Gas-Fired Central Furnaces".
2. NFPA Compliance: Install fuel gas piping and gas-fired heaters in accordance with NFPA 54 "National Fuel Gas Code".
3. Buy America Act.

1.4 SUBMITTALS:

A. Product Data: Submit manufacturer's technical product data, including rated capacities

of selected model clearly indicated, weights, furnished specialties and accessories; and installation and start-up instructions.

B. Shop Drawings: Submit manufacturer's assembly-type shop drawings indicating dimensions, weight loadings, required clearances, and methods of assembly of components.

C. Wiring Diagrams: Submit manufacturer's electrical requirements for power supply wiring for fuel-fired heaters. Submit manufacturer's ladder-type wiring diagrams for interlock and control wiring. Clearly differentiate between portions of wiring that are factory-installed and portions to be field-installed.

D. Maintenance Data: Submit maintenance data and parts lists for each type of gas fired heater, control, and accessory; including "trouble-shooting" maintenance guide. Include this data and product data in maintenance manual; in accordance with requirements of Division-1.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING:

A. Handle fuel fired heating systems and components carefully to prevent damage, breaking, denting and scoring. Do not install damaged gas-fired heaters or components; replace with new.

B. Store fuel fired heaters and components in clean dry place. Protect from weather, dirt, fumes, water, and construction debris, and physical damage.

C. Comply with Manufacturer's rigging and installation instructions for unloading fuel fired heaters, and moving them to final location.

PART 2 - PRODUCTS

2.1 HEATING / COOLING ROOFTOP UNIT

A. GENERAL:

1. Rooftop Unit: Each rooftop unit shall be a complete factory assembled, wired and tested, high efficiency unit consisting of a gas fired duct furnace, direct expansion cooling system utilizing R-410 refrigerant, full air side economizer with barometric relief and manual minimum outside air damper, and microprocessor based controls. Unit shall bear the label of the American Gas Association and adjusted for operation at job site elevation.

B. EQUIPMENT:

1. General: Each rooftop unit shall be complete with heat exchangers, burners, blowers, compressors, coils, airside economizer with barometric relief and manual minimum outside air damper, controls, filters, cabinets, etc.
2. Heat Exchanger: 20 gauge aluminized steel. Heat exchanger shall be tubular design with welded construction.
3. Burners: Burners shall be aluminized steel inshot type with self proportioning venturi and hot surface ignition system. Gas control valve shall be 24 V

redundant combination type featuring both on/off and pressure control in a single valve.

4. Supply Air Blower: Double inlet centrifugal type constructed of galvanized steel. Fan wheel shall be static and dynamically balanced. Fan shall be belt driven and housing shall slide out for easy access.
5. Supply Air Motor: Supply fan motor shall be permanently lubricated ball bearing type with belt drive and thermal overload protection with automatic reset.
6. Evaporator and Condenser Coils: Construct coils from copper tubes mechanically expanded into aluminum fins. Provide thermostatic expansion valve type control for evaporator coils.
7. Compressor: Compressors shall be hermetic scroll type with thermal protection and crankcase heater. Provide each refrigeration circuit with access ports, high and low pressure switches, and filter dryers.
8. Condenser Fans and motors: Condenser fans shall be propeller type with direct drive permanently lubricated direct drive motors.

    a. Controls: Shall be factory wired solid state microprocessor type with status and trouble LED's for easy diagnostics. Control circuit shall contain a primary transformer, and wiring junction box for both 120 V and 24 V power.

C. Filters: Throwaway fiberglass.

1. Pleated filters minimum average efficiency 30%, arrestance exceeds 90%.

    a. New filters to be installed at time of substantial completion.

D. Cabinet: Shall house all components and have removable doors and be constructed of heavy gauge cold rolled steel, lined with foil faced fiberglass liner, slide out blower, and combustion and flue vent connections. The entire cabinet shall be primer coated and finished with backed-on enamel.

E. MANUFACTURERS:

1. York
2. Carrier
3. Trane
4. Engineer Approved Equal

PART 3 - EXECUTION

3.1 INSPECTION:

A. Examine areas and conditions under which gas fired furnaces are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 INSTALLATION OF GAS FIRED HEATERS:

A. General: Install gas fired furnaces as indicated and in accordance with manufacturer's published installation instructions.

B. Mount furnaces either sealed to floor or on threaded rod with vibration isolators. Seal all ductwork attached to furnaces air tight.

C. Provide and install all low voltage (below 120 volt) control wiring and accessories complete, as specified.

D. Power wiring by electrical not work of this division.

E. Extend gas piping to units, provide drop with manual gas shutoff valve, 1/8" NPT plugged test connection, tee and drip pocket. Locate piping drop so as not to interfere with service of unit. Extend gas piping runout, full size of gas train inlet, from tee to gas train connection, provide union with sufficient clearance for unit removal and service.

3.3 START-UP:

A. Start-up, test and adjust gas fired furnaces in accordance with manufacturer's published start-up instructions. Verify proper line and manifold gas pressure. Check and calibrate controls, adjust burner for maximum efficiency.

3.4 OPERATION AND MAINTENANCE TRAINING:

A. Provide services of manufacturer's service representative to instruct Owner's personnel in operation and maintenance of gas fired furnaces. Training shall include start-up and shut-down servicing and preventative maintenance schedule and procedures, and troubleshooting procedures plus procedures for obtaining repair parts and technical assistance. Review operating and maintenance data contained in the Operating and Maintenance Manuals section.
   1. Schedule training with Owner, provide at least 7-day prior notice to the Architect/Engineer.
   2. Vendors for each piece of equipment controls, etc., shall participate along with the contractor(s).

END OF SECTION 236200

SECTION 236500 - REFRIGERATION PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 GENERAL MECHANICAL REQUIREMENTS

A. All pertinent sections of Section 230000 - General Mechanical Requirements are a part of the work described in this section.

B. All pertinent sections of Section 230600 - General Pipes and Fittings are a part of the work described in this section.

1.2 SUMMARY

A. This section specifies:
1. Refrigeration piping systems and equipment for split type air conditioning systems.
2. Piping, valves, specialties.

B. Related Sections:

1. Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 STANDARDS

A. International Building Code/International Mechanical Code
B. Local Codes and Ordinances
C. State Pressure Vessel Regulations
D. EPA Requirements.
E. Buy America Act.

1.3 SHOP DRAWINGS/SUBMITTALS

A. Submit a list of all materials to be used indicating brand or source, type and service.

B. Submit shop drawings for all equipment, valves and specialties, including shop drawing showing proposed pipe routing, sizing, valving, etc.

1.4 CONTRACTOR QUALIFICATION

A. The Piping Contractor for this work shall be licensed as a firm in the Contractor state of origin and in the state of Idaho.

B. The Contractor shall have a publicly registered bonding capacity of sufficient amount to cover this work and all other work in progress by the Contractor.

C. All workmen employed in the project shall carry state licenses as journeyman or

apprentice pipe fitters with additional certification for welders.

1.5 SCOPE OF THE WORK

A. Furnish and install all field fabricated refrigeration systems and related work to effect a complete installation.

B. Provide and install complete refrigeration piping systems and equipment for split air conditioning systems as indicated in the Contract Documents and as specified in this section. Make systems fully operational.

C. Piping, valves, specialties.

D. Other work indicated on the drawings.

1.6 INSTRUCTION OF OWNER'S PERSONNEL

A. Purpose is to provide a transition of the systems from the Contractor to the Owner, leaving the Owner's personnel familiar with and well qualified to operate and maintain the systems.

B. Instruction to cover purpose and function of each system and its components, to show proper operating technique, to show proper maintenance technique.

1.7 WARRANTIES See Section 15000.

PART 2 - MATERIALS AND METHODS

2.1 EQUIPMENT: All major items of refrigeration equipment shall be as specified in the equipment schedules on the drawings and shall be furnished complete with all accessories normally supplied with the catalog item listed and all other accessories necessary for a complete and satisfactory operating system.

2.2 PIPING MATERIALS: Piping materials shall be as follows unless otherwise indicated on the applicable contract drawing:

A. Pipe: "ACR" Type L, hard drawing, degreased, sealed at mill copper tubing, ASTM B88-62, cleaned and sealed at the mill. Pre-charged refrigerant lines shall not be used.

B. Fittings: Long radius, wrought copper type equal to Mueller Streamline, ASME B16.22.1963.

2.3 VALVES, SPECIALTIES, ETC.

A. Filter-Dryer: On lines smaller than 3/4" O.D. filter-dryer shall be a sealed type using male flare fittings. Size shall be full line size. Filter-dryer shall be Sporlan, Mueller or Alco.

B. Sight Glass: Shall be a combination moisture and liquid indicator with protection cap. Sight glass shall be Alco, Mueller, Sporlan or Henry. Size shall be full line size.

C. Flexible Connection: Corrugated bronze hose with single layer of stainless steel exterior braiding, minimum 9 inches long with copper tube ends; for system working pressure.

2.4 REFRIGERANT AND LUBRICATING OIL: The Contractor furnish and install all of the refrigerant required to develop the system to its full rating, and in addition to the initial charge, he shall be required to provide, without cost to the Owner, all required refrigerant for the proper operation of the refrigeration apparatus during the first year's operation. The contractor shall be required to provide the initial charge of lubricating oil for all refrigeration apparatus and related equipment. Loss of refrigerant and oil during the first year of operation shall be made good at the contractor's expense.

2.5 SPLIT HEAT PUMP / AC UNITS (FCU-1 thru 3 - HP-1)

A. Extent of Work Provide split type heat pump units, complete in all components as indicated on the drawings.

B. Outdoor Condensing Units: Outdoor mounted, air cooled unit with hermetic or rotary compressor (digital compressor as required), air cooled coil and propeller type cooling fan.

1. Cabinet: Cabinet shall be constructed of galvanized steel and finished with a baked enamel painting process. Unit access panels shall be removable and shall provide full access to all internal components.
2. Fans: Outdoor fans shall be direct-drive propeller type with totally enclosed single phase motors with class B insulation and permanently lubricated sleeve bearings. Motor shall be protected by internal thermal overload protection.
3. Compressor: Compressor shall be fully hermetic or scroll type compressor equipped with a complete oil system, operating oil charge and motor. Motor shall be equipped with internal overloads which protect the compressor from overtemperature and overcurrent. Scroll type compressors shall also be equipped with high discharge gas temperature protection.
4. Outdoor Coil: Coil shall be constructed of seamless copper tubes mechanically bonded to aluminum fins.
5. Refrigeration Circuit: Refrigerant circuit components shall include brass service valves and port connections, schrader type fittings with brass caps, accumulator, pressure relief, and a full charge of refrigerant.
6. Safeties: The condensing unit shall contain the following safety circuitry and components.

    a. Time delay restart to prevent short cycling.
    b. Auto restart on power failure.
    c. High and low pressure switches.
    d. High pressure relief.
    e. Outdoor fan failure protection.

7. Accessories: Provide the following accessories.

    a. Filter Dryer.
    b. Sight Glass.
    c. Support Feet.
    d. Low Ambient Kit

e. Flex connections by anaconda.

C. Indoor Fan Unit: Indoor ceiling mounted direct expansion unit with forward curved fan, cooling / heating coil, micro-processor based controls, and condensate pump in one cabinet.

1. Cabinet: Cabinet shall be heavy gauge galvanized steel with fan, coil, filter and control sections. Cabinet shall be thermally and acoustically insulated to improve performance.
2. Fans: Fans shall be fabricated of high impact polystyrene and shall be forward curved design for quiet operation. Fan motor shall be open drip proof permanently lubricated ball bearing type with inherent overload protection. Fan motors shall be 3 speed.
3. Coil: Coil shall be constructed of aluminum fins seamlessly bonded to copper tubes with galvanized steel tube sheets. A full length drip pan with manufacturers condensate pump shall be provided.
4. Controls: Controls shall be microprocessor based and shall control space temperature, determine optimal fan speed, and run self-diagnostics. The unit shall provide the following minimum control functions.

    a. Automatic reset function after power failure.
    b. 24-hour timer cycle for system auto start/stop.
    c. High discharge air temperature shutdown shall be provided.
    d. Indoor coil freeze protection.
    e. Wireless infrared remote control.
    f. Automatic air sweep control to provide equal air distribution to all areas.
    g. Dehumidification mode shall be provided.
    h. Fan only operation.
    i. A time delay shall prevent compressor short cycling.

D. Approved Manufacturers:
1. York
2. Carrier
3. Trane

PART 3 - EXECUTION

3.1 INSTALLATION OF CONDENSING UNITS / HEAT PUMPS (HP-1)

A. General: Use best practices of the trade in all installation. Installation shall conform to the American Standard Code for Pressure Piping, ASME B31.5-1962, Refrigeration Piping. Installed piping shall not interfere with the operation and accessibility of doors or windows; shall not encroach on aisles, passageways, and equipment; and shall not interfere with the servicing or maintenance of equipment. Pipe shall be cut accurately to measurements established at the construction site and shall be worked into place without springing or forcing, properly clearing all openings and equipment. Cutting or weakening of structural members to facilitate piping installation is not permitted. Pipes shall have burrs removed by reaming and shall be so installed as to permit free expansion and contraction without damage to joints or hangers. Piping shall be installed in a straight manner, free from traps, and shall be provided with capped or plugged ends, as it is

erected, to prevent dirt from entering the system. The piping system shall be provided with isolating cushions, Unistrut P2600 Uni-Cushion at all hangers to prevent vibration and sound from being carried to the building structure.

B. Slope of Refrigerant Lines: Slope suction lines down toward compressor 1" per 10 feet. Locate oil traps every 10 feet at all vertical rises against flow in suction lines. Suction line traps shall be standard one-piece traps.

C. Cleanliness: All refrigerant lines and fittings shall be absolutely clean to avoid system operating difficulties and contamination. Use a good cleaning agent.

D. Joints:
1. Brazed joints: Tubing shall be cut square and burrs removed. Both inside of fittings and outside of tubing shall be well cleaned with steel wool, wire brush, or fine emery cloth before sweating.
2. An inert gas (such as oil pumped dry nitrogen) shall be continuously passed through the copper piping when brazing joints to prevent formation of copper oxide. Care shall be taken to prevent annealing of fittings and tubing when making connections. Joints shall be made with silver bearing brazing material.

E. Vibration Isolation: Install condensing units on vibration isolation base noted on contract documents. Secure base securely to structure and secure condensing units securely to base. Install flexible connections just downstream of service valves and before sight glass and filter dryer.

3.2 TESTING OF REFRIGERATION PIPING SYSTEM: After the installation of the refrigeration piping system has been completed and before insulation is applied, all pipes shall be tested and proven tight for a period of 24 hours at a pressure of 300 pounds per square inch using oil pumped dry nitrogen.

3.3 EVACUATION AND CHARGING: After completion of the piping pressure test, the refrigeration systems shall be evacuated and dehydrated using a vacuum pump capable of producing at least 1 mm Hg absolute. The following procedure shall be followed unless otherwise noted:

A. Connect an accurate high vacuum gauge, such as Stokes or Zimmeril gauge to the system.

B. Connect the vacuum pump to both the high and low side of the system. Leave the compressor suction and discharge service valves closed. Start the vacuum pump.

C. Keep ambient air temperatures above 60° during the evacuation process.

D. Operate the vacuum pump until the system is evacuated to 2.5 mg Hg absolute.

E. Break the system vacuum with oil pumped dry nitrogen. Open the compressor suction and discharge service valves and re-evacuate the system to 2.5 mm Hg absolute.

F. After the system has been double evacuated to 2.5 mm Hg absolute, close the vacuum pump suction valve and stop the pump. Allow the system to stand under a vacuum a minimum of 12 hours. If no noticeable rise in pressure has taken place after 12 hours, the system may be charged. This test shall be made in the presence of the Owner's representative.

END OF SECTION 236500

SECTION 238850 - AIR FILTERS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS:

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

B. Division 23 General Mechanical Requirements sections apply to work of this section.

C. Related Sections:

1. Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 SUMMARY:

A. Extent of air cleaning work required by this section is indicated on drawings and schedules, and by requirements of this section.

B. Types of air cleaning equipment specified in this section include the following:

1. Air Filters
   a. Replaceable (throwaway)

C. Filter sections of packaged air handling units are work of this section.

D. Refer to Division 23 air handling units section for filter boxes and filters associated with air handling units; not work of this section.

E. Refer to Division 23 duct accessories section for duct access door work required in conjunction with air filters; not work of this section.

1.3 QUALITY ASSURANCE:

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of air cleaning equipment of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

1.4 SUBMITTALS:

A. Product Data: Submit manufacturer's technical product data including, dimensions, weights, required clearances and access, flow capacity including initial and final pressure drop at rated air flow, efficiency and test method, fire classification, and installation instructions.

B. Shop Drawings: Submit manufacturer's assembly-type shop drawings for filter rack assemblies indicating dimensions, materials, and methods of assembly of components.

C. Maintenance Data: Submit maintenance data and spare parts lists for each type of filter and rack required. Include this data, product data, shop drawings, and wiring diagrams in maintenance manual; in accordance with requirements of Division 15.

1.5 REFERENCES:

A. Codes and Standards:

1. UL Compliance: Comply with UL Standards pertaining to safety performance of air filter units.
2. ASHRAE Compliance: Comply with provisions of ASHRAE Standard 52 for method of testing, and for recording and calculating air flow rates.
3. ARI Compliance: Comply with provisions of ARI Standard 850 pertaining to test and performance of air filter units.
4. Buy America Act.

PART 2 – PRODUCTS

2.1 AIR FILTERS:

A. Manufacturers: Subject to compliance with requirements, replaceable filter media shall be a product of one of the following:

1. American Air Filter
2. Continental
3. Farr
4. Flanders
5. Eco Air

B. Type 1: Replaceable pleated media type filters (RTU'S).

1. Pleated, medium efficiency in a cardboard holding frame, 2" or 4" thick as scheduled, 0.32" s.p. maximum initial pressure drop at 500 feet/minute, to change out at 0.50". U.L. Class 2, 25-30% efficiency, 90-95% arrestance per ASHRAE Standard 52-76.
2. Equivalent to Farr 30/30.

C. Startup Set:

1. Install a set of Type 2 filters immediately upon fabrication of any filter bank. Install scheduled set of filters at completion of construction at the time of testing and balancing.

PART 3 – EXECUTION

3.1 INSPECTION:

A. Examine areas and conditions under which air filters and filter housings will be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 INSTALLATION:

A. General: Comply with installation requirements as specified elsewhere in these specifications pertaining to air filters housing/casings, and associated supporting devices.

B. Install air filters and holding devices of types indicated, and where shown; in accordance with air filter manufacturer's written instructions and with recognized industry practices; to ensure that filters comply with requirements and serve intended purposes.

C. Locate each filter unit accurately in position indicated, in relation to other work. Position unit with sufficient clearance for normal service and maintenance.

D. Coordinate with other work including ductwork and furnace work, as necessary to interface installation of filters properly with other work.

E. Install filters in proper position to prevent passage of unfiltered air.

3.3 FIELD QUALITY CONTROL:

A. Operate installed air filters to demonstrate compliance with requirements. Test for air leakage of unfiltered air while system is operating. Correct malfunctioning units at site, then retest to demonstrate compliance; otherwise remove and replace with new units, and proceed with retesting.

3.4 EXTRA STOCK:

A. Provide three sets of filters: one for start-up/balancing use; the second for replacement at the end of the job; the third set for Owner. Obtain receipt from Owner that new filters have been installed.

B. Provide one complete extra set of filters for each air handling system. Install new filters at completion of air handling system work, and prior to testing, adjusting, and balancing work. Obtain receipt from Owner that new filters have been installed.

END OF SECTION 238850

SECTION 238900 - DUCTWORK

PART 1 – GENERAL

1.1 RELATED DOCUMENTS:

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

B. Division 23 Basic Mechanical Materials and Methods Sections apply to work of this section.

C. Related Sections:

1. Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 SUMMARY:

A. Extent of metal ductwork is indicated on drawings and in schedules, and by requirements of this section.

B. Types of ductwork required for the project include the following:

1. Round
2. Rectangular
3. Spiral
4. Factory

C. Exterior Insulation of metal ductwork is specified in other Division 23 sections, and is included as work of this section.

D. Refer to other Division 23 sections for exterior insulation of metal ductwork; not work of this section.

E. Refer to other Division 23 sections for ductwork accessories; not work of this section.

F. Refer to other Division 23 sections for fans and rooftop units; not work of this section.

G. Refer to other Division 23 sections for mechanical controls; not work of this section.

H. Refer to other Division 23 sections for filters; not work of this section.

I. Refer to other Division 23 sections for grilles and diffusers; not work of this section.

J. Refer to other Division 23 sections for system commissioning, testing and balancing; not work of this section.

1.3 QUALITY ASSURANCE:

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of metal ductwork products of types, materials, and sizes required, whose products have been in

satisfactory use in similar service for not less than 5 years.

B. Installer's Qualifications: A firm with at least 3 years of successful installation experience on projects with metal ductwork systems work or similar to that required for project.

1. The installer shall have a publicly registered bonding capacity of sufficient amount to cover this work and all other work in progress by the Contractor.
2. All workmen on the project shall carry state licenses as journeymen or apprentice sheet metal workers with additional certification for welders.

1.4 SUBMITTALS:

A. Product Data: Submit manufacturer's technical product data and installation instructions for metal ductwork materials and products.

B. Shop Drawings: Submit scaled layout drawings of metal ductwork and fittings including, but not limited to, duct sizes, locations, elevations, and slopes of horizontal runs, wall and floor penetrations, and connections. Show interface and spacial relationship between ductwork and proximate equipment. Show modifications of indicated requirements, made to conform to local shop practice, and how those modifications ensure that free area, materials, and rigidity are not reduced.

C. Record Drawings: At project closeout, submit record drawings of installed metal ductwork and ductwork products, in accordance with requirements of Division 01.

D. Maintenance Data: Submit maintenance data and parts lists for metal ductwork materials and products. Include this data, product data, shop drawings, and record drawings in maintenance manual; in accordance with requirements of Division 01.

1.5 REFERENCES:

A. Codes and Standards:

1. SMACNA Standards: Comply with SMACNA "HVAC Duct Construction Standards, Metal and Flexible" for fabrication and installation of metal ductwork.
2. ASHRAE Standards: Comply with ASHRAE Handbook, Equipment Volume, Chapter 1 "Duct Construction", for fabrication and installation of metal ductwork.
3. NFPA Compliance: Comply with NFPA 90A "Standard for the Installation of Air-Conditioning and Ventilating Systems" and NFPA 90B "Standard for the Installation of Warm Air Heating and Air-Conditioning Systems".
4. International Building Code/ International Mechanical Code: Comply with all sections pertaining to mechanical work.

B. Field Reference Manual: Have available for reference at project field office, copy of SMACNA "HVAC Duct Construction Standards, Metal and Flexible".

1.6 DELIVERY, STORAGE, AND HANDLING:

A. Protection: Protect shop-fabricated and factory-fabricated ductwork, accessories and purchased products from damage during shipping, storage and handling. Prevent end damage and prevent dirt and moisture from entering ducts and fittings.

B. Storage: Where possible, store ductwork inside and protect from weather. Where necessary to store outside, store above grade and enclosed with waterproof wrapping.

PART 2 – PRODUCTS

2.1 DUCTWORK - GENERAL:

A. Standards: All duct fabrications shall comply with standards and techniques detailed by SMACNA "Duct Construction Manuals" for the appropriate pressure class, and with the ASHRAE Handbook, 1988 edition, Chapter 1, Duct Construction

B. Sheet Metal: Except as otherwise indicated, fabricate ductwork from galvanized sheet steel complying with ASTM A 527, lockforming quality, with G 90 zinc coating in accordance with ASTM A 525; mill phosphatized for exposed locations.

C. Exposed Ductwork Materials: Where ductwork is indicated to be exposed to view in occupied spaces, provide materials which are free from visual imperfections including pitting, seam marks, roller marks, stains and discolorations, and other imperfections, including those which would impair painting. Installation of exposed ductwork shall be laid out in advance and submitted for review. Ductwork shall be hung straight and uniform, points shall be true, seams shall show continuity.

D. Stainless Steel Assemblies: Fabricate of Type 304 SS or Type 316 SS stainless steel sheet complying with ASTM A-167 with all welded joints and seams. Provide polished No. 4 satin finish for all hoods and duct exposed to view, No. 1 finish elsewhere. Protect finished surfaces with mill applied adhesive protective paper through fabrication and installation.

2.2 FITTINGS AND FABRICATION:

A. Fittings: Provide radius type fittings fabricated of multiple sections with maximum 15º change of direction per section. Unless specifically detailed otherwise, use 45º lateral and 45º elbows for branch take-off connections. Where 90º branches are indicated, provide conical type tees.

B. Fittings: Fabricate duct fittings to match adjoining ducts, and to comply with duct requirements as applicable to fittings. Fabricate elbows utilizing inside and outside radiuses with a center-line radius equal to associated duct width; or where fully radiused elbows are not possible, fabricate elbows with an inside square and outside radius and include turning vanes in the first 1/3 of elbow. Maintain duct width throughout turn on inside square and outside radiused elbows. Limit angular tapers to 30º for contracting tapers and 20º for expanding tapers.

C. Fabricate ductwork with accessories installed during fabrication to the greatest extent possible. Refer to Division-15 section "Duct Accessories' for accessory requirements.

D. Fabricate ductwork with duct liner in each section of duct where indicated. Laminate liner to internal surfaces of duct in accordance with instructions by manufacturers of lining and adhesive, and fasten with mechanical fasteners.

E. Offset, transition, adapt ductwork to structural obstacles and work of other trades in a coordinated effort. Layout work to avoid conflict with piping, etc. With review of conditions, teardrop around conflicting piping, lights, etc., all at no added cost to the owner.

2.3 LOW PRESSURE ROUND DUCTWORK: (1" SMACNA Pressure Class)

A. Round type ductwork for use on low velocity supply systems (1200 fpm maximum), low pressure (0.75" maximum duct pressure), shall be fabricated on 26 gauge galvanized steel sheets with snap-lock longitudinal seams and crimped and beaded joins.

B. All end joints shall have at least three screw fasteners and shall be wrapped airtight. Transverse and longitudinal seams shall be taped with "Hardcast TA". Snap lock longitudinal seams shall be seal with water based duct sealer NO EXCEPTIONS. Elbows and fittings shall provide smooth air flow patterns and have a neat appearance.

C. Use factory fabricated elbows in lieu of the multi-sectional adjustable type.

2.4 LOW PRESSURE RECTANGULAR DUCTWORK: (3" SMACNA Pressure Class)

A. Rectangular ductwork for use on supply systems up to 2" maximum duct static pressure and 2000 fpm maximum duct velocity shall be constructed of galvanized steel using construction for nominal 3" SMACNA rated systems. Seal all transverse and longitudinal joints with water based duct sealer NO EXCEPTIONS.

B. Use radiused elbows, or square inside radiused outside elbows with single thickness turning vanes in the first 1/3 where space restrictions prohibit fully radiused elbows. Use 45º high efficiency tapping takeoffs with separate downstream balance dampers.

C. Duct dimensions are inside clear. Increase for acoustical lining.

D. For rectangular exhaust ducts, increase metal gauge by 2 (i.e. 20 to 18) for all sizes. Seal all joints.

2.5 FACTORY DUCT:

A. Extent of Work: Provide factory duct at connections to air terminal units, at runouts to grilles and diffusers, at points of round to round flexible connections (see also "Flexible Connections") and at other locations indicated or required.

B. Prohibited Material: Do not use single wire helix ducting with vinyl or plastic liner of any type.

C. Factory Duct Non-corrosive Environments: Woven fiberglass fabric impregnated with vinyl or neoprene clamped in a continual helix of aluminum or cold rolled steel. U.L. listed for Class 1 duct, compliant with NFPA 90A and 90B, pressure rated to 12" w.g., equivalent to:
1. Non-insulated: Wiremold 57; Flexmaster Type N145
2. Insulated: Flexmaster Type 4; Thermaflex M-KC

D. Installation: Follow manufacturer's instructions. Use stainless steel or nylon band clamping rings. In general, do not use lengths in excess of 1'-0". Do not make bends with factory duct, use hard elbows as indicated. Support duct to avoid droops and kinks. See details on the drawings.

2.6 MISCELLANEOUS DUCTWORK MATERIALS:

A. General: Provide miscellaneous materials and products of types and sizes indicated and, where not otherwise indicated, provide type and size required to comply with ductwork system requirements including proper connection of ductwork and equipment.

B. Runout Fittings: Runout fittings shall be used to make round to rectangular duct

connections. Use 45° time and a half square to round fittings. Provide with locking quadrant dampers where balance is involved. Provide with insulation guard where insulated duct is involved.

C. Duct Sealing Compound: Duct sealing compound shall be 3M brand number EC-750, Duro-Dyne S-2 or Mon-Eco Industries 44-52. This material shall be used in making up duct joints or in water proofing, caulking plenums, etc.

D. Acoustical Lining: Acoustical lining in ducts shall be 1" thick, 1-1/2 pound density, coated, flexible glass fiber type, set in adhesive and impaled on weld studs spaced not more than 12" on centers and secured with lock washers. Airstream surface faced with black coated matte. Acoustical lining shall completely line the ducts. Lining shall have a fire and smoke hazard rating not exceeding 20-50-50. Owens-Corning, Johns-Manville, Certainteed.

1. All joints, edges and/or surface breaks in the coating of the acoustical lining shall be pointed up to a smooth surface with adhesive.

E. Duct Liner Adhesive: Comply with ASTM C 916 "Specifications for Adhesives and Duct Thermal Insulation".

F. Duct Liner Fasteners: Comply with SMACNA HVAC Duct Construction Standards, Article S2.11.

G. Duct Cement: Non-hardening migrating mastic or liquid neoprene based cement (type applicable for fabrication/ installation detail) as compounded and recommended by manufacturer specifically for cementing fitting components, or longitudinal seams in ductwork.

H. Ductwork Support Materials: Except as otherwise indicated, provide hot-dipped galvanized steel fasteners, anchors, rods, straps, trim and angles for support of ductwork.

PART 3 – EXECUTION

3.1 INSPECTION:

A. General: Examine areas and conditions under which metal ductwork is to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

3.2 INSTALLATION OF METAL DUCTWORK:

A. General: Assemble and install ductwork in accordance with recognized industry practices which will achieve air tight (5% leakage for systems rated 3" and under; 1% for systems rated over 3") and noiseless (no objectionable noise) systems, capable of performing each indicated service. Install each run with minimum number of joints. Align ductwork accurately at connections, within 1/8" misalignment tolerance and with internal surfaces smooth. Support ducts rigidly with suitable ties, braces, hangers and anchors of type which will hold ducts true-to-shape and to prevent buckling. Support vertical ducts at every floor.

1. All necessary allowance and provisions shall be made in the installation of sheet metal ducts for the structural conditions of the building, and ducts shall be

transformed or divided as may be required. Whenever this is necessary, the required area shall be maintained. All of these changes, however, must be approved and installed as directed at project. During the installation, the open ends of ducts shall be protected to prevent debris and dirt from entering.

B. Field Fabrication: Complete fabrication of work at project as necessary to match shop-fabricated work and accommodate installation requirements.

C. Routing: Locate ductwork runs, except as otherwise indicated, vertically and horizontally and avoid diagonal runs wherever possible. Locate runs as indicated by diagrams, details and notations or, if not otherwise indicated, run ductwork in shortest route which does not obstruct usable space or block access for servicing building and its equipment. Hold ducts close to walls, overhead construction, columns, and other structural and permanent-enclosure elements of building. Limit clearance to 1/2" where furring is shown for enclosure or concealment of ducts, but allow for insulation thickness, if any. Where possible, locate insulated ductwork for 1" clearance outside of insulation. Wherever possible in finished and occupied spaces, conceal ductwork from view, by locating in mechanical shafts, hollow wall construction or above suspended ceilings. Do not encase horizontal runs in solid partitions, except as specifically shown. Coordinate layout with suspended ceiling and lighting layouts and similar finished work.

D. Electrical Equipment Spaces: Do not run ductwork through transformer vaults and other electrical equipment spaces and enclosures. Maintain clearances above of and in front of electrical panels.

E. Penetrations: Where ducts pass through interior partitions and exterior walls, and are exposed to view, conceal space between construction opening and duct or duct insulation with sheet metal flanges of same gage as duct. Overlap opening on 4 sides by at least 1-1/2". Fasten to duct and substrate.

1. Where ducts pass through fire-rated floors, walls, or partitions, provide firestopping between duct and substrate, in accordance with requirements of Section "Firestopping".

F. Ducts At Structural and Architectural Penetrations: Where ducts are shown connecting to or passing through concrete, gypsum board, masonry openings and along edges of all plenums at floors and walls, provide a continuous 2" x 2-1/8" galvanized angle iron which shall be bolted to the construction and made airtight to the same by applying caulking compound. Sheet metal in these locations shall be bolted to the angle iron. Round high velocity ducts in vertical chases shall be supported with rolled angle rings. Close openings between duct and structure.

G. Cross Breaking: Rectangular sheet metal ducts shall be cross broken on the four sides of each 4-foot panel. All vertical and horizontal sheet metal barriers, duct offsets, elbows, as well as 4-foot panels of straight sections of ducts shall be cross broken. Cross breaking shall be applied to the sheet metal between the standing seams or reinforcing angles; the center of cross break shall be of the required height to assure surfaces being rigid.

H. Coordination: Coordinate duct installations with installation of accessories, dampers, coil frames, equipment, controls and other associated work of ductwork system.

I. Installation: Install metal ductwork in accordance with SMACNA HVAC Duct Construction Standards.

1. Related to final installation cleanliness, damp wipe all ductwork on installation. Cap open duct ends, cover fan inlets, vacuum fan plenums and related installation before starting fans. Run fans only with filters in place.

3.3 INSTALLATION OF DUCT LINER:

A. General: Install duct liner in accordance with SMACNA HVAC Duct Construction Standards.

1. As indicated on the drawings, supply, return and exhaust air ductwork shall be lined with acoustical insulation.
2. In all cases outside air ductwork shall be lined with 2' thick 1-1/2 lb. density acoustical lining unless indicated differently on drawings, ie. requiring Type 2 plenum.

3.4 INSTALLATION OF FLEXIBLE DUCTS:

A. Maximum Length: For any duct run using flexible ductwork, do not exceed 1'-0" extended length. No elbows allowed.

B. Installation: Install in accordance with Section III of SMACNA's "HVAC Duct Construction Standards, Metal and Flexible".

3.5 HANGERS AND SUPPORTS:

A. It is essential that all ducts shall be rigidly supported. Hangers for low velocity ducts up to 18" in width shall be placed on not more than 10' centers.

1. Low velocity ducts 19" through 35" in width and greater shall be supported on not more than 5' centers. Where vertical ducts pass through floors or roofs, heavy supporting angles shall be attached to ducts, and to structure. Angles shall be of sufficient size to support the ductwork rigidly and shall be placed on at least two sides of the duct.

B. Construct hangers for rectangular ductwork from galvanized iron l" x 1/16". Hangers shall extend down the sides of rectangular ducts the full depth of the duct and shall be bent underneath the duct 2". Hangers shall be secured to the duct using sheet metal screws or rivets of appropriate sizes on 6" centers, but not less than two screws in the side and one in the bottom of each hanger.

C. For rectangular ducts 36" and greater in width construct hangers from galvanized iron 1-1/2" x 1/16". Hangers shall be installed and secured to duct as described in Paragraph B.

3.6 SUPPORTING DAMPERS: Parallel and opposed blade motor operated dampers shall be supported by reinforcing the ductwork or sheet metal walls at the damper locations to carry the weight of the dampers and the force exerted on the dampers due to air pressure, or shall be supported independent of ductwork from the ceiling or floor, as conditions at the site determine.

3.7 CONNECTIONS: Connections of high velocity supply and exhaust ducts, fittings, and high velocity mixing boxes shall be made airtight by coating joints with Minnesota Mining Co. Mastic, Type EC-800, Benjamin Foster, Sheet Metal Products Co., or approved equal, before joining, and then sealing the joint with one layer of "Glass-Fab" reinforcing tape set in a coating of the above

compound. Tape and sealant shall not exceed a flame spread of 25 or a smoke development of 50.

3.8 WELDED JOINTS: Welded ductwork shall have either an angle or a piece of 1/8" steel bar behind each weld to allow laying of a neat and continuous bead.

3.9 AESTHETIC LAYOUTS: Contractor shall locate all diffusers, grilles and other exposed items in such a manner as to fit symmetrically in any grid system or other aesthetic architectural or lighting pattern. Refer to reflected ceiling plans and electrical lighting layouts for additional information. Provide duct offsets or extensions as required to make a proper installation.

A. Close or cap all duct ends. Use auxiliary blower with air flow meter to establish a duct pressure equivalent to the duct pressure class. Inspect all joints in duct system and seal all identifiable leaks.

3.10 FIELD QUALITY CONTROL:

A. Leakage Tests: After each duct system which is constructed for duct classes over 3" is completed, test for duct leakage in accordance with SMACNA HVAC Air Duct Leakage Test Manual. Air leaks which are in excess of that required to bubble the soap suds (that is, actually blow the suds away) shall be sealed by additional taping and caulking to reduce the leakage to a rate not to exceed slow bubbles forming. Repair leaks and repeat tests until total leakage conforms with Chart of Figure 4-1, Seal Class A, Leakage Class 3 for round/oval, 6 for rectangular.

3.11 EQUIPMENT CONNECTION:

A. General: Connect metal ductwork to equipment as indicated, provide flexible connection for each ductwork connection to equipment mounted on vibration isolators, and/or equipment containing rotating machinery. Provide access doors as indicated.

3.12 ADJUSTING AND CLEANING:

A. Clean ductwork internally of dust and debris, as follows: Before the ceilings are installed, with filters in place, operate the fans at full capacity to blow out dirt and debris from ducts. If it is not practical to use the main supply blower for this test, the ducts may be blown out in sections by a portable fan.

B. Clean external surfaces of foreign substances which might cause corrosive deterioration of metal or, where ductwork is to be painted, might interfere with painting or cause paint deterioration.

C. Balancing:

1. Refer to Division 23 section "Testing, Adjusting, and Balancing" for air distribution balancing of metal ductwork; not work of this section. However, the Sheet Metal Contractor shall participate fully in this work. Seal any leaks in ductwork that become apparent in balancing process.
2. If specified conditions cannot be obtained due to deficiencies in equipment performance or improper installation or workmanship, the Mechanical Contractor and his subcontractors shall make any changes necessary to obtain the specified conditions.

END OF SECTION 238900

SECTION 239100 - DUCTWORK ACCESSORIES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS:

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

B. Division 23 Basic Mechanical Materials and Methods sections apply to work of this section.

C. Related Sections:

1. Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 SUMMARY:

A. Extent of ductwork accessories work is indicated on drawings and in schedules, and by requirements of this section.

B. Types of ductwork accessories required for project include the following:

1. Dampers.
   a. Low pressure manual dampers.
2. Turning vanes.
3. Duct hardware.
4. Flexible connections.

C. Refer to other Division 23 sections for testing, adjusting, and balancing of ductwork accessories; not work of this section.

1.3 QUALITY ASSURANCE:

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of ductwork accessories, of types and sizes required, whose products have been in satisfactory use in similar service for not less than 3 years.

1.4 SUBMITTALS:

A. Product Data: Submit manufacturer's technical product data for each type of ductwork accessory, including dimensions, capacities, and materials of construction; and installation instructions.

B. Shop Drawings: Submit manufacturer's assembly-type shop drawings for each type of ductwork accessory showing interfacing requirements with ductwork, method of fastening or support, and methods of assembly of components.

C. Maintenance Data: Submit manufacturer's maintenance data including parts lists for each type of duct accessory. Include this data, product data, and shop drawings in

maintenance manual; in accordance with requirements of Division 01.

1.5 REFERENCES:

A. Codes and Standards:

1. SMACNA Compliance: Comply with applicable portions of SMACNA "HVAC Duct Construction Standards, Metal and Flexible".
2. Industry Standards: Comply with ASHRAE recommendations pertaining to construction of ductwork accessories, except as otherwise indicated.
3. UL Compliance: Construct, test, and label fire dampers in accordance with UL Standard 555 "Fire Dampers and Ceiling Dampers".
4. NFPA Compliance: Comply with applicable provisions of NFPA 90A "Air Conditioning and Ventilating Systems", pertaining to installation of ductwork accessories.

1.6 DELIVERY, STORAGE AND HANDLING:

A. Protection: Protect shop-fabricated and factory-fabricated accessories and purchased products from damage during shipping, storage and handling. Prevent end damage and prevent dirt and moisture from entering ducts and fittings.

B. Storage: Where possible, store accessories inside and protect from weather. Where necessary to store outside, store above grade and enclosed with waterproof wrapping.

PART 2 – PRODUCTS

2.1 MANUAL DAMPERS:

A. Dampers for balance only where tight shutoff is not critical are to be furnished and installed by this Section.

1. Exposed locations:
   a. Honeywell D-640 (Rectangular), Honeywell D-690 (Round).
   b. Ruskin CD-35 (Rectangular), Ruskin CDRS-25 (Round)
   c. Johnson.
2. Concealed locations:
   a. United Enertech – Power Balance line. Provide actuators, interconnecting Cat. 5 cable and mechanical room mounted punchdown blocks for all locations. Provide laminated damper legend per contract documents.

2.3 TURNING VANES: Turning vanes shall be single thickness blades with ¾" trailing edge. Blade spacing shall be per SMACNA and contract document details. Install turning vanes in the first 1/3 of all inside square elbows and extend vane runner past last blade and secure to duct

2.4 DUCT HARDWARE:

A. General: Provide duct hardware, manufactured by one manufacturer for all items on project, for the following:

1. Test Holes: Provide in ductwork at fan inlet and outlet, and elsewhere as indicated, duct test holes, cover, for instrument tests. Ventlok No. 699 closures shall be provided and installed for each test hole, with sufficient neck length to

penetrate the insulation.

2. Quadrant Locks: Provide for each damper, quadrant lock device on one end of shaft; and end bearing plate on other end for damper lengths over 12". Provide extended quadrant locks and end extended bearing plates for externally insulated ductwork. (Bare duct - Ventlok 620, 635; Insulated duct - Ventlok 627, 628, 637, 638, 629.)

B. Manufacturer: Subject to compliance with requirements, provide duct hardware of one of the following:

1. Ventfabrics, Inc.
2. Young Regulator Co.

2.7 FLEXIBLE CONNECTIONS:

A. Extent of Work: Provide flexible connections between ductwork or plenums and equipment, such as at fan inlets and discharges, and at other places indicated on the drawings or called for by note or specification.

B. Non-Corrosive Environment or Airstream: Provide material of heavy waterproof woven glass fabric double coated with neoprene or hypalon equivalent to “Ventglas” for interior locations and “Ventlon” for exterior locations, fabric not less than 3-1/4" wide clamped between strips of 24 gauge galvanized iron. Material by Ventfabrics, Inc., Chicago, Ill.

PART 3 – EXECUTION

3.1 INSPECTION:

A. Examine areas and conditions under which ductwork accessories will be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 INSTALLATION OF DUCTWORK ACCESSORIES:

A. Install ductwork accessories in accordance with manufacturer's installation instructions, with applicable portions of details of construction as shown in SMACNA standards, and in accordance with recognized industry practices to ensure that products serve intended function.

B. Install hand operated volume and splitter dampers at locations and of sizes shown. Volume dampers shall be controlled by heavy duty locking quadrants mounted on the outside of the duct. Where ducts are insulated, the damper rod shall be extended and the operator shall be mounted on the outside of the insulation. Where volume dampers are installed in ducts over 12" deep, the dampers shall be at least 1-1/2 times as long as the narrowest adjacent split, except where otherwise detailed. Splitter adjustment, accessible at fact of finishing ceiling, or equal units by Young Regulator. Splitter dampers and butterfly dampers may be constructed by the Sheet Metal Contractor. All multi-blade hand dampers shall be the product of one of the manufacturers listed in the Contract Documents. All operator fittings shall be heavy duty commercial grade. . Test all hand dampers for operability immediately after installation. Dampers shall actuate from fully closed to fully open position with no binding or interference. Dampers found non-operable during Test and Balance will be repaired at the contractor’s expense.

C. Install turning vanes in the first 1/3 of all inside square outside radiused elbows in supply,

return, and exhaust air systems, and elsewhere as indicated.

D. Install access doors to open against system air pressure, with latches operable from either side, except outside only where duct is to small for person to enter.

E. Coordinate with other work, including ductwork, as necessary to interface installation of ductwork accessories properly with other work.

3.3 FIELD QUALITY CONTROL:

A. Operate installed ductwork accessories to demonstrate compliance with requirements. Test for air leakage while system is operating. Repair or replace faulty accessories, as required to obtain proper operation and leakproof performance.

3.4 ADJUSTING AND CLEANING:

A. Adjusting: Adjust ductwork accessories for proper settings, install fusible links in fire dampers and adjust for proper action.
   1. Final positioning of manual dampers is specified in Division 23 section "Testing, Adjusting, and Balancing".
   2. Cleaning: Clean factory-finished surfaces. Repair any marred or scratched surfaces with manufacturer's touch-up paint.

END OF SECTION 239100

SECTION 239400 - AIR OUTLETS AND INLETS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

A. Extent of air outlets and inlets work is indicated by drawings and schedules, and by requirements of this section.

B. Types of outlets and inlets required for project include the following:

1. Ceiling air diffusers and grilles
2. Outside air hoods

C. Refer to other Division 23 sections for ductwork and duct accessories required in conjunction with air outlets and inlets; not work of this section.

D. Refer to other Division 23 sections for balancing of air outlets and inlets; not work of this section.

E. Related Sections:

1. Section 016001 “Buy American Preference Requirements” for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.3 QUALITY ASSURANCE:

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of air outlets and inlets of types and capacities required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Installer's Qualifications: A firm with at least 3 years of successful installation experience on projects with metal ductwork systems or similar to that required for project.

1. The Installer shall have a publicly registered bonding capacity of sufficient amount to cover this work and all other work in progress by the Contractor.
2. All workmen on the project shall carry state licenses as journeymen or apprentice sheet metal workers with additional certification for welders.

1.4 SUBMITTALS:

A. Product Data: Submit manufacturer's technical product data for air outlets and inlets including the following:

1. Schedule of air outlets and inlets indicating drawing designation, room location, number furnished, model number, size, and accessories furnished.

2. Data sheet for each type of air outlet and inlet, and accessory furnished; indicating construction, finish, and mounting details.
3. Performance data for each type of air outlet and inlet furnished, including aspiration ability, temperature and velocity traverses; throw and drop; and noise criteria ratings. Indicate selections on data.

B. Samples: 3 samples of each type of finish furnished.

C. Shop Drawings: Submit manufacturer's assembly-type shop drawing for each type of air outlet and inlet, indicating materials and methods of assembly of components.

D. Maintenance Data: Submit maintenance data, including cleaning instructions for finishes, and spare parts lists. Include this data, product data, and shop drawings in maintenance manuals; in accordance with requirements of Division 01.

1.5 REFERENCES:

A. Codes and Standards:

1. ARI Compliance: Test and rate air outlets and inlets in accordance with ARI 650 "Standard for Air Outlets and Inlets".
2. ASHRAE Compliance: Test and rate air outlets and inlets in accordance with ASHRAE 70 "Method of Testing for Rating the Air Flow Performance of Outlets and Inlets".
3. AMCA Compliance: Test and rate louvers in accordance with AMCA 500 "Test Method for Louvers, Dampers and Shutters".
4. AMCA Seal: Provide louvers bearing AMCA Certified Rating Seal.
5. NFPA Compliance: Install air outlets and inlets in accordance with NFPA 90A "Standard for the Installation of Air Conditioning and Ventilating Systems".

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING:

A. Deliver air outlets and inlets wrapped in factory-fabricated fiber-board type containers. Identify on outside of container type of outlet or inlet and location to be installed. Avoid crushing or bending and prevent dirt and debris from entering and settling in devices.

B. Store air outlets and inlets in original cartons and protect from weather and construction work traffic. Where possible, store indoors; when necessary to store outdoors, store above grade and enclose with waterproof wrapping.

PART 2 – PRODUCTS

2.1 GRILLES AND DIFFUSERS:

A. General: Except as otherwise indicated, provide manufacturer's standard ceiling air diffusers where shown; of size, shape, capacity and type indicated; constructed of materials and components as indicated, and as required for complete installation.

B. Performance: Provide ceiling air diffusers that have, as minimum, temperature and velocity traverses, throw and drop, and noise criteria ratings for each size device as listed in manufacturer's current data.

C. Ceiling Compatibility: Provide diffusers with border styles that are compatible with

adjacent ceiling systems, and that are specifically manufactured to fit into ceiling module with accurate fit and adequate support. Refer to general construction drawings and specifications for types of ceiling systems which will contain each type of ceiling air diffuser.

D. Adjust all grilles and diffusers to fit neatly in the room ceiling pattern. Set final locations per architectural reflected ceiling plans.

E. Volume Control Dampers: Provide duct mounted dampers of the externally adjustable opposed blade type where more than one grille or register is on a common duct. Provide access to each damper adjustment.

F. Sound Level: The diffuser or grille generated noise shall not exceed the following sound power level curve at a point five feet away from the diffuser or grille.
Meeting Rooms: NC 25-30
Office Areas: NC 25-30

G. Fire Dampers: Install fire dampers or smoke/fire dampers at the diffusers, registers and grilles as indicated on drawings or required by code.

H. Manufacturers: Subject to compliance with requirements, provide grilles and diffusers of one of the following:

1. Hart & Cooley
2. Krueger
3. J and J
4. Carnes
5. Titus
6. EH Price
7. Tuttle & Bailey
8. Anemostat/Waterloo
9. Agitair
10. Environmental Air Products
11. Nailor

I. Types: Provide grilles and diffusers of type, capacity, and with accessories and finishes as listed on grille and diffuser schedule and as specified herein.

J. Grilles and Diffusers:

1. Ceiling Supply Diffuser (S-1): Krueger Series 1400 with adjustable tabs for directional air flow control, square face, round neck, four-way deflection, anti-smudge design, all steel construction, lay-in tile mounting frame, white baked enamel finish, size as indicated on drawings.
2. Ceiling Supply Diffuser (S-2): Krueger series DMGDR, heavy duty steel construction, double deflection blades, optional damper/extractor, duct mounted with sponge rubber gasket, anti-smudge design, white baked enamel finish, size as indicated on drawings.
3. Perforated Return Grille (R-1): Krueger series 6490. Concealed hinge frame, sponge rubber gasket, white baked-on enamel, color as selected by architect, size as indicated on drawing.
5. Sidewall Return Register (R-2): Krueger series S85H. Heavy duty steel construction, horizontal blades at 35º deflection with 1/2" spacing, mounting frame with concealed fasteners, sponge rubber gasket, white baked enamel finish, size as indicated on drawings.

2.2 ROOF CAPS:

A. Spun aluminum gravity roof ventilators shall be manufactured of heavy gauge aluminum utilizing spinning techniques to prevent warping inherent with drawing processes. The

hood of the unit shall be easily removable for access to components beneath the ventilator. The base shall incorporate an integral spun inlet and shall be fully welded at the corners to ensure a weather-tight installation. Provide with birdscreen, roof curb, and gravity backdraft damper.

B. Manufacturers: Subject to compliance with requirements, provide exhaust roof caps of one of the following:

1. Cook (Type PR)
2. Greenheck
3. Penn

PART 3 – EXECUTION

3.1 INSPECTION:

A. Examine areas and conditions under which air outlets and inlets are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

3.2 INSTALLATION:

A. General: Install air outlets and inlets in accordance with manufacturer's written instructions and in accordance with recognized industry practices to insure that products serve intended function.

B. Coordinate with other work, including ductwork and duct accessories, as necessary to interface installation of air outlets and inlets with other work.

C. Locate ceiling air diffusers, registers, and grilles, as indicated on general construction "Reflected Ceiling Plans". Unless otherwise indicated, locate units in center of acoustical ceiling module.

END OF SECTION 239400

SECTION 239550 - MECHANICAL CONTROL SYSTEMS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS:

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

B. Division 23 General Mechanical Requirements sections apply to work of this section.

C. Related Sections:

1. Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 DESCRIPTION OF WORK:

A. Extent of control systems work required by this section is indicated on drawings and schedules, and by requirements of this section.

1. See following sections for types of Control Systems included as a part of this section. See electrical, etc.
2. Control sequences are specified in this section under: "Sequence of Operation".

B. Refer to other Division 23 sections for installation of dampers in mechanical systems.

C. Refer to Division 26 sections for the following work.

1. Power supply wiring from power source to power connection on controls and/or unit control panels. Includes starters, disconnects, and required electrical devices, except where specified as furnished, or factory-installed, by manufacturer.
2. Interlock wiring between electrically-operated equipment units; and between equipment and field-installed control devices.
   a. Interlock wiring specified as factory-installed is work of this section.

D. Provide the following electrical work as work of this section, complying with requirements of Division 26 sections:

1. Control wiring between field-installed equipment, controls, indicating devices, and unit control panels. All control wiring shall be in conduit.
2. 120 volt service required by control systems.

E. Participate in "System Commissioning, Testing and Balancing".

1.3 QUALITY ASSURANCE:

A. Manufacturer's Qualifications: The HVAC controls shall be electric/electronic type

B. Installer's Qualifications: Firms and workmen specializing and experienced in electric control system installations for not less than 5 years.

C. Codes and Standards:

1. Electrical Standards: Provide electrical products which have been tested, listed and labeled by UL and comply with NEMA standards.
2. NEMA Compliance: Comply with NEMA standards pertaining to components and devices for electric control systems.
3. NFPA Compliance: Comply with NFPA 90A "Standard for the Installation of Air Conditioning and Ventilating Systems" where applicable to controls and control sequences.
4. Comply with NEPA 70, "National Electric Code" for all electrical installation.

1.4 SUBMITTALS:

A. Product Data: Submit manufacturer's technical product data for each control device furnished, indicating dimensions, capacities, performance characteristics, electrical characteristics, finishes of materials, and including installation instructions and start-up instructions.

B. Shop Drawings: Submit shop drawings for each control system, containing the following information:

1. Schematic flow diagram of system showing furnace, condensing unit, roof top unit, dampers, and control devices.
2. Label each control device with setting or adjustable range of control.
3. Indicate all required electrical wiring. Clearly differentiate between portions of work that are factory-installed and portions to be field-installed. Note contract responsibility to provide complete system regardless of delegation. Completely interface with and show existing installation in the Administration building.
4. Provide details of faces of control panels, including controls, instruments, and labeling.
5. Include verbal written description of sequence of operation. Confirm correct function of proposed sequences.

C. Samples: Submit sample of each type of proposed thermostat cover to ensure they match existing.

D. Maintenance Data: Submit maintenance instructions and spare parts lists. Include this data, product data, and shop drawings in maintenance manuals; in accordance with requirements of Section 231950

1.5 DELIVERY, STORAGE, AND HANDLING: 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, and to eliminate dirt and moisture from equipment. Store equipment and materials inside and protected from weather.

1.6 INSTRUCTION OF OWNER'S PERSONNEL: (See Section 230000)

A. Purpose is to provide a transition of the systems from the Contractor to the Owner, leaving the Owner's personnel familiar with and well qualified to operate and maintain the systems.

B. Instruction to cover purpose and function of each system and its components, to show proper operating technique, to show proper maintenance technique.

C. Prepare an outline of information to be conveyed, list materials available for reference. Submit to Architect along with a proposed schedule of instruction. Schedule to allow individual time for each trade and each system.

D. Convey information in formal classroom session. Teachers to include qualified contractor personnel and sales representatives for each major piece of equipment. Go from the classroom to the actual location to graphically illustrate concepts discussed.

E. Each and every session shall be video-taped by the Contractor and given to the Owner.

1.7 WARRANTIES:

A. As part of the overall project warranty, furnish individual manufacturer warranties for each piece of equipment for a period of not less than one year from date of Owner's beneficial use (substantial completion).

B. Warrant the overall assembly of equipment, materials and labor comprising these systems.

1.8 CLEANING AND LUBRICATION: All instruments, and control panels shall be thoroughly cleaned before final acceptance.

1.9 TESTING AND ADJUSTING OF SYSTEM:

A. During the system commissioning, testing and balancing of the various building systems, have a controls representative(s) present and available to interpret and adjust controls as needed. Demonstrate and report the integrity and accuracy of each function and control point.

B. At the termination of the testing period, the Controls representative shall spend a minimum of 4 hours instructing the Owner's operating personnel in the control system operation, and checking each system for day-night and manual override with the Owner's operating personnel on each furnace system. A complete operating booklet shall be provided and used during the training period. Schedule this training with the Owner and Mechanical Contractor.

1. Since system performance is partly a function of climatic conditions, the Controls contractor shall be available during the changing seasons of the warranty period to make further adjustments and modifications if required. A final complete check of all systems shall be made at the conclusion of the one year warranty period.

PART 2 – PRODUCTS

2.1 CONTROL CABINETS: Furnish stamped steel with hinged door and locking latch control cabinets to protect and conceal all control devices. Arrange components neatly to provide adequate maintenance opportunity and proper device function. Label all components, numerically code all piping and wiring. Terminate all wiring at terminal blocks. Provide engraved plastic labels

for all panel face devices.

A. Provide with fuse - quantity as required.

B. Provide with transformer 120/24 VAC quantity as required.

2.2 CONTROL DAMPERS:

A. In supplying dampers, instruct the sheet metal workers in the proper installation of the dampers. Ductwork shall be reinforced and the damper properly supported without strain.

B. Protect all dampers mounted in a duct system which requires special treatment.

C. Provide damper operators with motors of proper size, so that the motors will operate against the static pressure of the systems. Provide each damper motor with a bracket for attaching to ductwork, building structure or equivalent. Damper motors in plenums shall be mounted on damper frames. Do not install motors in ducts. Modulating motors where indicated shall be provided with integral steps for both minimum and maximum stop.

D. Control dampers for outside air, relief air, exhaust air, ventilating air and other dampers exposed to weather temperatures in built-up systems. Low leakage type with spring loaded side seals, inflatable butyl or neoprene fabric edge seals, bronze or teflon bearings, reinforced galvanized steel blades. Parallel action. Air leakage not to exceed 10 CFM per square foot at 4" upstream static pressure.

1. Johnson "Proportion-Aire" D-1200/D-1300.
2. Ruskin CD50
3. Greenheck VCD-43

2.3 THERMOSTAT:

A. Approved Manufacturer & Model

1. Honeywell TH8320R1003

2.4 TRANSFORMER:

A. 120/24 volt, 38VA Honeywell AT72D1188, cover mount

B. 120/24 volt, 50VA Honeywell AT87A1106, foot mount

2.5 DAMPER ACTUATORS:

A. Electric type equipped for Class I wiring.

B. Shall not consume power during UNOCCUPIED cycle or use chemicals or expandable media.

C. Have built in spring return.

D. Approved Manufacturer & Model –

1. Honeywell ML6175C1009
2. Belimo

2.6 CONDUCTORS:

A. Color coded and No. 16 and No. 12 AWG Type TWN, TFN, or THHN, stranded.

B. Thermostat Cable - 12 conductor or 8 conductor, 18AWG solid copper wire, insulated with high density polyethylene. Conductors parallel enclosed in brown PVC jacket (No 22 AWG cable allowed).

2.7 AUXILIARY RELAYS:

A. Light Duty - as required.

B. Heavy Duty - Square D, Class 8501, Type X.

C. Time Delay – Square D

PART 3 - CONTROL SEQUENCES

3.1 GENERAL

A. Provide control systems to manage and manipulate mechanical equipment in a functional and energy conserving way.

B. Locate control panels in the storage rooms with terminal block connections for interface of furnace/rooftop system, etc.

3.2 FURNACE (F-1)

A. The furnace fans shall be set to run whenever the building is occupied based on a schedule dictated by the owner. Upon a drop in space temperature below setpoint (70ºF) the thermostat shall energize the furnace burner section and deliver heat to the space. Upon a rise in space temperature above setpoint (73ºF) the thermostat shall energize the condensing unit and deliver cooling to the space. As the space temperature meets setpoint the thermostat shall de-energize either the burner section or condensing unit. The rooftop unit shall be equipped with a full function airside economizer which shall be set to provide free cooling whenever the outside air temperature is below (65ºF).

3.3 ROOFTOP UNIT (RTU- 1 THRU 5)

A. The rooftop fans shall be set to run whenever the building is occupied based on a schedule dictated by the owner. Upon a drop in space temperature below setpoint (70ºF) the thermostat shall energize the rooftop burner section and deliver heat to the space. Upon a rise in space temperature above setpoint (73ºF) the thermostat shall energize the condensing sections and deliver cooling to the space. As the space temperature meets setpoint the thermostat shall de-energize either the burner section or condensing section. The rooftop unit shall be equipped with a full function airside economizer which shall be set to provide free cooling whenever the outside air temperature is below (65ºF).

3.4 CEILING EXHAUST FAN (CEF-1 and 3 thru 8):

A. The ceiling exhaust fans shall be energized by the light switch in the room being served.

3.5 CEILING EXHAUST FAN (CEF-2):

A. The ceioing exhaust fan shall be energized once commissioned and shall run continuously baring mechanical failure.

3.6 ENERGY RECOVERY VENTILATOR (ERV-1):

A. The energy recovery ventilator shall be energized whenever the space is occupied. Provide auxiliary contact from furnace system serving the space.

3.7 ROOFTOP EXHAUST FAN (REF-1 & 2):

A. The rooftop exhaust fans shall be energized by the time clock based on a schedule dictated by the owner.

END OF SECTION 239550

SECTION 239950 - SYSTEM COMMISSIONING, TESTING AND BALANCING

PART 1 – GENERAL

1.1 GENERAL CONDITIONS:

A. Work of this section shall be subject to the requirements of the General Conditions of this contract, the General Mechanical Requirements, General Electrical Requirements and other sections where this work shares a responsibility.

B. System commissioning and startup of the mechanical systems shall be the responsibility of the Mechanical Contractor and his subcontractors with the participation of the Electrical Contractor related to electrical work and the General Contractor related to general construction items.

C. Testing and Balancing shall be the responsibility of the Mechanical Contractor under the direction of the General Contractor with the full participation of all of the mechanical and electrical trades employed on the project and shall include the participation of an independent testing and balance contractor to coordinate all elements of the work and to perform special technical services outlined herein.

1.2 SYSTEM COMMISSIONING - EXTENT OF WORK:

A. The work required by this section includes but is not necessarily limited to the following:

1. The pre-startup inspection of all systems and subsequent correction of any incorrect items.
2. The initial first run inspections.
3. System operations inspection.

B. The intent of this work is to provide for proper installation, startup, service and operation of the mechanical systems in preparation for system balancing.

C. Repair, replacement or adjustment of each item shall be performed by the installing contractor.

D. Involves all new construction and those elements of existing construction which are affected by this project.

1.3 TESTING AND BALANCING - EXTENT OF WORK:

A. This work incorporates a confirming checkout of construction work, individual component activation, and overall system activation into one work program which shall serve as the transition period from the Contractor's job to Owner's facility.

B. The TAB Contractor shall be skilled in the operation and manipulation of systems and in the direction of parties involved in the work.

C. Conduct and participate in the startup and shakedown of all mechanical systems installed and modified in this contract; test adjust and balance these systems to obtain optimum performance at a level which minimizes the required energy input, prepare and submit a complete report of work done and the final system condition obtained, participate in the

instruction of Owner's personnel in the proper operation of systems and equipment.

D. Involves all new construction and those elements of existing construction which are affected by this project.

1.4 QUALIFICATIONS OF SYSTEM COMMISSIONING AND TAB TEAM:

A. Representatives of the General Contractor, Mechanical Contractor, etc., and Electrical Contractor shall be available on a daily basis through the commissioning and adjustment period. These men shall be experienced journeymen with prior experience in system operation and with specific experience on the construction of this project.

B. Balancing shall be done by an independent firm specializing in this work. A definition of independent shall mean the firm is not associated with any engineering, contracting, or manufacturing firm and derives its income solely from testing, adjusting and balancing mechanical systems. Approved firms to do this work are R & S Balancing, Salt Lake City, Utah or Barnett, Inc., Payson, Utah, or BTC Services, Salt Lake City, Utah or Certified Testing and Balancing, Inc., Riverton, Utah.

C. The balancing work including air and hydronic portions shall be performed by the same firm having total responsibility for the final testing, adjusting and balancing of the entire system. A principal of the firm shall be directly involved in the project.

D. The independent testing and balancing firm shall furnish all necessary tools, scaffolding and ladders that are required and shall provide all required instruments, take all readings and make all necessary adjustments.

E. After all tests and adjustments are made a detailed written report shall be prepared and submitted for review, and shall bear the signature of the professional supervising the work. Final acceptance of this project will not be made until a complete and satisfactory report is received. Furnish four copies of the report.

PART 2 - EXECUTION, SYSTEM COMMISSIONING

2.1 PRE-STARTUP INSPECTION:

A. The pre-startup inspection of all systems shall provide for verifying that each piece of equipment is properly installed and prepared for startup.

B. All pertinent items shall be checked, including but not necessarily limited to the following:

1. Removal of shipping stops.
2. Vibration isolators properly aligned and adjusted.
3. Flexible connections properly aligned.
4. Belts properly adjusted.
5. Belt guards and safety shields in place.
6. Safety controls, safety valves and high or low limits in operation.
7. All systems properly filled.
8. Filters in place and seal provided around edges.
9. Fire dampers and smoke dampers properly installed and linked. Access doors provided for every damper.
10. Pressure and temperature gauges installed.

11. All test stations and measuring devices installed.
12. Initial lubrication of equipment is complete.
13. Filters and strainers are clean.
14. Motor rotations are correct.
15. Voltages match nameplate.
16. Control system is in operation.
17. All interlocks are wired and verified.
18. All controls have been connected and verified.
19. All valves, dampers and operators are properly installed and operating.
20. All ductwork is installed and connected.
21. All other items necessary to provide for proper startup.

2.2 FIRST RUN INSPECTION:

A. Recheck all items outlined in pre-startup inspection to insure proper operation.

B. Check the following items:

1. Excessive vibration or noise.
2. Loose components.
3. Initial control settings.
4. Motor amperages.
5. Heat buildup in motors, bearings, etc.
6. Control system is properly calibrated and functioning as required.

C. Correct all items which are not operating properly.

2.3 SYSTEM OPERATION INSPECTION:

A. Observe mechanical systems under operating conditions for sufficient time to insure proper operation under varying conditions, such as day-night and heating-cooling.

B. Periodically check the following items:

1. Strainers and filters.
2. Visual checks of air flow for "best guess" settings for preparation for system air balancing under section applying.
3. Control operation, on-off sequences, system cycling, etc.
4. Visual checks of water flow, seals, packings, safety valves, operation pressures and temperature.
5. Dampers close tightly.
6. Valves close tightly.
7. System leaks.
8. All other items pertaining to the proper operation of the mechanical system whether specifically listed or not.
9. Proper combustion of fuels.
10. Cleaning of excessive oil or grease.

PART 3 - EXECUTION - TESTING AND BALANCING

3.1 TOTAL MECHANICAL SYSTEM BALANCE:

A. The mechanical systems balance involves elements of the work of the General

Contractor, the Electrical Contractor, the Mechanical Contractor, the Sheet Metal Contractor and the Controls Contractor. Total system balance requires that all elements be not only individually correct, but also correct as a composite system. Therefore, participation of all parties shall be required in the test and balance procedure.

B. Prior to beginning work, a written description of the anticipated sequence of action shall be submitted to the Architect/Owner for review and comment.

C. The testing and balance specialist shall review the contract drawings during the bid period and shall advise the Architect of any modifications to the layout which may be needed to facilitate the balance procedure. Modifications will be incorporated into the contract by Addendum during the bidding period.

D. The test and balance specialist shall visit the project from time to time during the rough installation making a thorough inspection of those items which will affect his subsequent work. He shall advise the Contractor in writing with a copy to the Architect of any work required by the contract which is not being performed adequately. This is in addition to the regular inspection efforts of the Architect and Engineer. Particularly note needed valves, dampers, access doors, thermometers, pressure gauges, belts and drives, diffuser styles, strainers and filters, etc.

3.2 AIR SYSTEMS BALANCE:

A. Before any adjustments are made, check the systems for such items as dirty filters, duct leakage, filter leakage, damper leakage, equipment vibrations, correct damper operations, etc. Adjust all fan systems, major duct sections, registers, diffusers, etc., to deliver design air quantities within +5%. Individual air outlets, when one of three or more serve a space may have a tolerance of 10 percent from the average. Design static pressure is based on filters approximately 50% loaded with dirt. Pressure drop across filters during balancing shall be simulated to that condition. After balancing is completed check motor amperage with the filters clean.

B. Adjust supply, and recirculation air systems towards air quantities shown on drawings. Establish a proper relationship between supply and exhaust. Follow proportional balance procedures outlined by AABC and/or SMACNA for such work.

C. Distribution system shall be further adjusted to obtain uniform space temperatures free from objectionable drafts and noise within the capabilities of the system.

3.3 MAJOR EQUIPMENT: The Testing and Balancing Contractor shall work with the Controls Contractor and Electrician in placing chiller, boilers, pumps, fans and other major equipment in operation. The factory representative of the equipment manufacturer shall also participate in a team effort to place the system(s) in operation, adapt to all anticipated operating modes and make adjustments as required to obtain correct operation. The Design Engineer and the Owner's Representative shall witness the final operating sequences.

A. Use proportional balance techniques so that in every case, at least one terminal valve is set for full flow at wide open, and at least one branch valve is wide open at full flow, others equivalent.

3.4 CONTROL SYSTEMS: The Testing and Balancing Contractor shall go through the entire control system with the Controls Contractor verifying proper operation of each and every device and the proper function of each system. Certify such effort in the report.

3.5 MISCELLANEOUS:

A. Observe and note all furnished thermal overload protection in the data sheets. If thermal overload protection is incorrect, the trade which furnished the overload devices shall furnish and install the correct size overload protection devices. It shall be the responsibility of the balancing firm to confirm that proper overload protection has been installed at the completion of the job.

B. Measure and set any special conditions such as minimum air quantities; coordinate outside air, return air and relief air damper operation; check and adjust outside and return air intakes so that the system will deliver substantially the same volume on either; make tests and record data as required in "REPORT" below.

C. All balancing devices, i.e. dampers and valves, shall be clearly marked as to the final balanced position. Plug all test holes, replace access doors and belt guards.

D. Upon request, based on perceived need, make 24-hour space temperature recordings. Any required rebalance of the system shall be performed without additional cost.

E. Upon request, a representative of the balancing firm performing the work shall demonstrate fluid flow quantities shown in the report by reading back outlets or terminals selected specifically or at random by the Design Engineer. It is understood that the operating mode of the system shall be the same for read-back as it was during balancing.

3.6 REPORT:

A. Provide a bound report in four copies containing a general information sheet listing instruments used, method of balancing, altitude correction, and manufacturer's grille, register and diffuser data.

B. Provide equipment data sheets listing make, size, serial number, rating, etc. of all mechanical equipment including fans, air controllers, pumps, motors, starters and drives. Operating data shall include rotational speed, inlet an outlet pressures, pressure drop across filters, coils, and other system components, pump heads, and measured motor current and voltage.

C. Balancing data sheets shall indicate the required and actual CFM of all supply, return and exhaust outlets or inlets, and be totaled and summarized by systems.

D. Include a reduced set of contract drawings with outlets marked for easy identification of the signation used in the data sheets.

E. Note any abnormal or notable conditions not covered in the above.

G. Keep a daily log of all work performed, with a list of work scheduled for each day and the workers on the job.

END OF SECTION 239950

260500 ELECTRICAL GENERAL PROVISIONS
260502 ELECTRICAL SUBMITTALS AND SPARE PARTS
260507 ELECTRICAL CONNECTIONS FOR EQUIPMENT
260519 CONDUCTORS AND CABLES (600V AND BELOW)
260526 GROUNDING
260529 SUPPORTING DEVICES
260532 CONDUIT RACEWAYS
260533 ELECTRICAL BOXES AND FITTINGS
260548 ELECTRICAL SEISMIC CONTROL
260553 ELECTRICAL IDENTIFICATION
260573 PROTECTIVE DEVICE STUDY
260923 OCCUPANCY SENSORS
260943 LIGHTING CONTROL EQUIPMENT
262413 SWITCHGEAR AND SWITCHBOARDS
262416 PANELBOARDS
262713 SERVICE ENTRANCE
262726 WIRING DEVICES
262815 OVERCURRENT PROTECTIVE DEVICES
262816 MOTOR AND CURCUIT DISCONNECTS
262913 MOTOR STARTERS
263213 EMERGENCY ELECTRICAL SYSTEMS
264313 SURGE PROTECTIVE DEVICES (SPD)
265100 INTERIOR AND EXTERIOR BUILDING LIGHTING
265600 EXTERIOR AREA LIGHTING

ELECTRICAL

division 26

SAA

SANDERS ASSOCIATES ARCHITECTS

SECTION 26 0500 - ELECTRICAL GENERAL PROVISIONS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

B. Architectural, Structural, Mechanical and other applicable documents are considered a part of the electrical documents insofar as they apply as if referred to in full. Contractor must review the entire set of plans and specifications. Reviewing only the electrical set is not acceptable.

C. RELATED SECTIONS: See Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 DESCRIPTION OF WORK:

A. The extent of electrical work is indicated on drawings and/or specified in Divisions 26, 27 and 28 sections of the specification. Provide all labor, materials, equipment, supervision and service necessary for a complete electrical system. Work includes, but is not necessarily limited to, the following items.

	ITEM	SECTION
1.	Electrical General Provisions	26 0500
2.	Electrical Submittals and Spare Parts	26 0502
3.	Electrical Connections for Equipment	26 0507
4.	Elevator Electrical Requirements	26 0510
5.	Conductors and Cables	26 0519
6.	Grounding	26 0526
7.	Supporting Devices	26 0529
8.	Conduit Raceway	26 0532
9.	Electrical Boxes and Fittings	26 0533
10.	Electrical Seismic Control	26 0548
11.	Electrical Identification	26 0553
12.	Protective Device Study	26 0573
13.	Occupancy Sensors	26 0923
14.	Lighting Control Equipment	26 0943
15.	Switchgear and Switchboards	26 2413
16.	Panelboards	26 2416
17.	Service Entrance	26 2713
18.	Wiring Devices	26 2726
19.	Overcurrent Protective Devices	26 2815
20.	Motor and Circuit Disconnects	26 2816
21.	Motor Starters	26 2913
22.	Emergency Electrical Systems	26 3213
23.	Surge Protective Devices (SPD)	26 4313
24.	Interior and Exterior Building Lighting	26 5100
25.	Exterior Area Lighting	26 5600

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26.	Telephone/Data Systems	27 1500
27.	Two-Way Communication	27 3244
28.	Fire Alarm and Detection System	28 3111

B. Use of standard industry symbols together with the special symbols, notes, and instructions indicated on the drawings describe the work, materials, apparatus and systems required as a portion of this work.

C. Visit the site during the bidding period to determine existing conditions affecting electrical and other work. All costs arising from site conditions and/or preparation shall be included in the base bid. No additional charges will be allowed due to inadequate site inspection.

1.3 DEFINITION OF TERMS

A. The following terms used in Divisions 26, 27 and 28 documents are defined as follows:

1. "Provide": Means furnish, install and connect, unless otherwise indicated.
2. "Furnish": Means purchase and deliver to project site.
3. "Install": Means to physically install the items in-place.
4. "Connect": Means make final electrical connections for a complete operating piece of equipment.

1.4 RELATED SECTIONS:

A. Consult all other sections, determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete installation.

B. General and Supplementary Conditions: Drawings and general provisions of contract and Division 1 of the Specifications, apply to all Division 26, 27 and 28 sections.

C. Section 016001 “Buy American Preference Requirements” for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

D. Earthwork:

1. Provide trenching, backfilling, boring and soil compaction as required for the installation of underground conduit, buried cable, in-grade pull boxes, manholes, lighting pole foundations, etc. See Division 31, Sitework, and other portions of Divisions 26, 27 and 28, for material and installation requirements.

E. Concrete Work:

1. Provide forming, steel bar reinforcing, cast-in-place concrete, finishing and grouting as required for underground conduit encasement, light pole foundations, pull box slabs, vaults, equipment pads, etc. See Division 3, Concrete for material and installation requirements.

F. Miscellaneous Metal Work:

1. Provide fittings, brackets, backing, supports, rods, welding and pipe as required for support and bracing of raceways, lighting fixtures, panelboards, distribution boards, switchboards, motor controls centers, etc. See Division 5, Metals for material and installation requirements.

G. Miscellaneous Lumber and Framing Work:

1. Provide wood grounds, nailers, blocking, fasteners, and anchorage for support of electrical materials and equipment. See Division 6, Rough Carpentry for material and installation requirements.

H. Moisture Protection:

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1. Provide membrane clamps, sheet metal flashing, counter flashing, caulking and sealants as required for waterproofing of conduit penetrations and sealing penetrations in or through fire walls, floors and ceiling slabs and foundation walls. All penetrations through vapor barriers at slabs on grade shall be taped and made vapor tight. See Division 7, Thermal and Moisture Protection for material and installation requirements.

I. Access panels and doors:

1. Provide in walls, ceiling, and floors for access to electrical devices and equipment. See Division 8, Doors and Windows for material and installation requirements.

J. Painting:

1. Provide surface preparation, priming and finish coating as required for electrical cabinets, exposed conduit, pull and junction boxes, poles, surface metal raceways, etc. See Division 9, Finishes for material and installation requirements.

1.5 WORK FURNISHED AND INSTALLED UNDER ANOTHER SECTION REQUIRING CONNECTIONS UNDER THIS SECTION:

A. Provide electrical service, make requisite connections and perform operational test. Items furnished and installed under other sections and connected under this section, include but are not limited to the following:

1. Electric motors.
2. Package mechanical equipment: fans, fan coil units, pumps, boilers, duplex compressors, etc.
3. Flow switches and valve monitors.
4. Motorized dampers.
5. Fire and smoke dampers
6. Duct mounted smoke detectors.
7. Elevator/Escalator Controllers.
8. Irrigation controllers.
9. Door hold-open/release devices.
10. Roll down doors.
11. Electric hardware.
12. Temperature control panels.
13. Variable frequency controllers.
14. Water coolers.
15. Kitchen equipment including ovens, fryers, mixers, disposers, dishwashers, etc.
16. Fire sprinkler alarm bells.
17. Electric heat trace cable for domestic and industrial hot water piping systems.
18. Electric heat trace cable for guttering, drain lines, etc.
19. Hand dryers, hair dryers.
20. Systems/Open Office Furniture

1.6 ITEMS FURNISHED UNDER ANOTHER DIVISION, BUT INSTALLED AND CONNECTED UNDER THIS DIVISION:

A. Items furnished under other Divisions, but turned over to Division 26 for installation and final connection include, but are not necessarily limited to, the following:

1. Wall mounted control stations for motorized roll-up doors/grills.

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1.7 INTERPRETATION OF DRAWINGS AND SPECIFICATIONS:

A. Before bidding, Contractor shall familiarize himself with the drawings, specifications and project site. Submit requests for clarification to Architect/Engineer in writing prior to issuance of final addendum. After signing the contract, the Contractor shall meet the intent, purpose, and function of the Contract Documents. Any costs of materials, labor and equipment arising therefrom, to make each system complete and operable, is the responsibility of the Contractor.

1.8 QUALITY ASSURANCE:

A. Reference to codes, standards, specifications and recommendations of technical societies, trade organizations and governmental agencies refers to the latest edition of such publications adopted and published prior to submittal of the bid proposed, unless noted otherwise herein. Such codes or standards are considered a part of this specification as though fully repeated herein.

B. When codes, standards, regulations, etc. allow work of lesser quality or extent than is specified under this Division, nothing in said codes shall be construed or inferred as reducing the quality, requirements or extent of the Drawings and Specifications. Perform work in accordance with applicable requirements of all governing codes, rules and regulations including the following minimum standards, whether statutory or not:

1. National Electric Code (NEC).
2. International Building Code (IBC).
3. International Fire Code (IFC).
4. International Mechanical Code (IMC).

C. Standards: Comply with the following standards where applicable for equipment and materials specified under this Division.

1.	UL	Underwriters' Laboratories
2.	ASTM	American Society for Testing Materials
3.	CBN	Certified Ballast Manufacturers
4.	IPCEA	Insulated Power Cable Engineers Association
5.	NEMA	National Electrical Manufacturer's Association
6.	ANSI	American National Standards Institute
7.	ETL	Electrical Testing Laboratories

D. All electrical apparatus furnished under this Section shall conform to (NEMA) standards and the NEC and bear the Underwriters' Laboratories (UL) label where such label is applicable.

E. Comply with requirements of State and Local Ordinances. If a conflict occurs between these requirements and the Contract Documents, the most stringent requirements shall govern. The Contractor accepts this responsibility upon submitting his bid, and no extra charge will be allowed after the contract is awarded. This shall not be construed as relieving the Contractor from complying with any requirements of the Contract Documents that may be in excess of the aforementioned requirements, and not contrary to same.

F. Obtain all permits, inspections, etc. required by authority having jurisdiction. Include all fees in bid. Furnish a certificate of approval to the Owner's Representative from the Inspection Authority at completion of the work.

G. Employ only qualified craftsmen with at least three years of experience. Workmanship shall be neat, have a good mechanical appearance and conform to best electrical construction practices. Provide a competent superintendent to direct the work at all times. Any person

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found incompetent shall be discharged from the project and replaced by satisfactory personnel.

H. Contractor shall have a current state contracting license applicable to type of work to be performed under this contract.

1.9 CONSTRUCTION CHANGE ORDER PROPOSALS

A. In the event that a submission of a change order is issued by the contractor, the following information will be required to be submitted by the contractor, prior to any consideration by the owner/architect.
   a. Where project manager or project engineer work is required, the labor cost shall not exceed 2% of the electrical portion of the change order.
   b. All equipment, including conduit and wire, shall be itemized, identifying unit costs and quantities of equipment. Distributor quotes shall accompany all change order requests. The distributor quotes shall include costs for all equipment including conduit and wire. Lot pricing for equipment is not acceptable.
   c. The general contractor shall review and confirm that the quantity and costs of materials submitted appear reasonable for the scope proposed.
   d. Labor units shall not exceed base NECA # 1 standards. No adjustment factors shall be approved.
   e. Any research and labeling time, shall be the responsibility of the electrical contractor and shall not be included in the change order request.
   f. Any costs associated with the purchase of tools or transportation shall be fully itemized for review by architect/owner.
   g. Overtime rates shall only be approved where additional manpower cannot achieve the same result.
   h. Change order form shall follow the following format:
      i. PCO number
      ii. Detailed description of work being performed
      iii. Location on project where work is performed
      iv. Chosen NECA column
      v. Identified material:
         1. QTY
         2. Unit cost
         3. Mark up
         4. Material total
      vi. Identified labor:
         1. QTY
         2. Unit cost
         3. Composite labor rate
         4. Labor total

1.10 RECORD DRAWINGS:

A. Maintain, on a daily basis, a complete set of “Record Drawings”, reflecting an accurate record of work in accordance with the following:

   1. Show the complete routing and location of all feeders rated 100 amps and larger. Locate work buried below grade or under slab, work concealed above ceilings, and work in concealed spaces, dimensionally from fixed structural elements (not partition walls, etc.)
   2. Show the complete routing and location of all telecommunications conduits, systems raceways, and empty raceways, 1-1/4" and larger. Locate work buried

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below grade or under slab, work concealed above ceilings, and work in concealed spaces, dimensionally from fixed structural elements (not partition walls, etc.).

3. Show all changes, deviations, addendum items, change orders, job instructions, etc., that change the work from that shown on the contract documents, including wall relocations, fixtures and device changes, branch circuiting changes, etc. Where locations of boxes, raceways, equipment, etc. are adjusted in the field to fit conditions, but such new locations may not be obvious by referring to the contract document, show new locations on the record drawings.

B. At the discretion of the Architect/Engineer, the drawings will be reviewed on a periodic basis and used as a pre-requisite for progress payments. This requirement shall not be construed as authorization for the Contractor to make changes in the layout, or work without written authorization for such changes. The “Record Drawings” for daily recording shall consist of a set of blue line prints of the Contract Drawings.

C. Upon completion of the work, purchase a complete set of electronic drawings. Transfer all “Record” information from the blue line prints to the drawings via the current CAD program that it was written. The Architect/Engineer shall review the drawings and the Contractor shall incorporate the resulting comments into the final record drawings. The Contractor shall make two complete copies of the drawings electronically and forward this to the Engineer.

D. Certify the “Record Drawings” for correctness by placing and signing the following certifications of the first sheet of the drawings:

"CERTIFIED CORRECT (3/8" high letters)

(Name of General Contractor)

By: _____ Date: _____

(Name of Electrical Contractor)

By: _____ Date: _____

1.11 GUARANTEE:

A. Ensure that electrical system installed under this contract is in proper working order and in compliance with drawings, specifications, and/or authorized changes. Without additional charge, replace any work or materials that develop defect, except from ordinary wear and tear, within one year from the date of substantial completion. Exception: Incandescent and fluorescent lamps shall be guaranteed for a period of two months from the date of substantial completion.

1.12 OTHER:

A. Right to Hire. “Client” agrees that during the project and for a period of twenty four (24) months following substantial completion that it will not, directly or indirectly, employ or solicit to employ BNA Personnel.

PART 2 – PRODUCTS

2.1 GENERAL:

A. Products are specified by manufacturer name, description, and/or catalog number. Discrepancies between equipment specified and the intended function of equipment shall be brought to the attention of the Architect/Engineer in writing prior to bidding. Failure to

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report any conflict, including catalog numbers, discontinued products, etc., does not relieve the Contractor from meeting the intent of the contract documents nor shall it change the contract cost. If the Contractor is unable to interpret any part of the plans and/or specifications, or should he find discrepancies therein, he shall bring this to the attention of the Architect/Engineer who will issue interpretation and/or additional instructions to Bidders before the project is bid.

2.2 MANUFACTURERS:

A. Provide products of manufacturers specified. Manufacturers catalog numbers and descriptions establish the quality of product required. Substitutions will be considered if a duplicate written application (2-copies) is at the office of the Architect/Engineer eight (8) working days prior to the day of the bidding. The application shall include the following: 1) A statement certifying that the equipment proposed is equal to that specified; that it has the same electrical and physical characteristics, compatible dimensions, and meets the functional intent of the contract documents; 2) The specified and submittal catalog numbers of the equipment under consideration; 3) A pictorial and specification brochure.

B. Any conflict arising from the use of substituted equipment shall be the responsibility of the Contractor, who shall bear all costs required to make the equipment comply with the intent of the contract documents.

C. Samples may be required for non-standard or substituted items before installation during construction. Provide all samples as required.

D. No materials or apparatus may be substituted after the bid opening except where the equipment specified has been discontinued.

E. Provide only equipment specified in the Contract Documents or approved by addendum.

2.3 SPARE PARTS:

A. Provide spare parts (fuses, diffusers, lamps, etc.) as specified. Transmit all spare parts to Owner's Representative prior to substantial completion.

PART 3 – EXECUTION

3.1 INSTALLATION:

A. Layout electrical work in advance of construction to eliminate unnecessary cutting, drilling, channeling, etc. Where such cutting, drilling, or channeling becomes necessary for proper installation; perform with care. Use skilled mechanics of the trades involved. Repair damage to building and equipment at no additional cost to the contract. Cutting work of other Contractors shall be done only with the consent of that Contractor. Cutting structural members shall not be permitted.

B. Provide equipment enclosures appropriate to the environment to which they are installed. For example, provide NEMA 3R for exterior enclosures and NEMA 1 for interior enclosures unless otherwise noted.

C. Since the drawings of floor, wall, and ceiling installation are made at small scale; outlets, devices, equipment, etc., are indicated only in their approximate location unless dimensioned. Locate outlets and apparatus symmetrically on floors, walls and ceilings where not dimensioned, and coordinate such locations with work of other trades to prevent interferences. Verify all dimensions on the job. Do not scale the electrical drawings, but refer to the architectural and mechanical shop drawings and project drawings for dimensions as applicable.

D. Perform for other trades, the electrical wiring and connection for all devices, equipment or

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apparatus. Consult Architectural, Mechanical, and other applicable drawings, and all applicable shop drawings to avoid switches, outlets, and other equipment from being hidden behind doors, cabinets, counters, heating equipment, etc., or from being located in chalkboards, tackboards, glass panels, etc. Relocate buried electrical devices and/or connections as directed at no additional cost.

E. Coordinate the location of outlets, devices, connections, and equipment with the supplier of the systems furniture prior to rough-in.

F. Where conduit, outlets or apparatus are to be encased in concrete, it must be located and secured by a journeyman or foreman present at the point of installation. Check locations of the electrical items before and after concrete and/or masonry installation and relocate displaced items.

G. Provide block-outs, sleeves, demolition work, etc., required for installation of work specified in this division.

3.2 CLEAN:

A. Clean up all equipment, conduit, fittings, packing cartons and other debris that is a direct result of the installation of the work of this Division.

B. Clean fixtures, interiors and exteriors of all equipment, and raceways. Replace all filters in electrical equipment upon request for Substantial Completion.

3.3 POWER OUTAGES:

A. All power outages required for execution of this work shall occur during non-standard working hours and at the convenience of the Owner. Include all costs for overtime work in bid.

B. Submit written request at least 7 days in advance of scheduled outage and proceed with outage only after receiving authorization from the Owner's Representative.

C. Keep all outages to an absolute minimum.

3.4 STORAGE AND PROTECTION OF MATERIALS:

A. Provide storage space for storage of materials and apparatus and assume complete responsibility for all losses due to any cause whatsoever. In no case shall storage interfere with traffic conditions in any public thoroughfare or constitute a hazard to persons in the vicinity. Protect completed work, work underway, and apparatus against loss or damage.

3.5 EXCAVATING FOR ELECTRICAL WORK:

A. General: Locate and protect existing utilities and other underground work in manner that will ensure that no damage or service interruption will result from excavating and backfilling. Perform excavation in a manner that protects walls, footings, and other structural members from being disturbed or damaged in any way. Burial depths must comply with NEC Section 300-5 (or State of Utah requirement, whichever is more stringent), unless noted otherwise on drawings.

B. Protect persons from injury at excavations, by barricades, warnings and illumination.

C. Coordinate excavations with weather conditions, to minimize possibility of washouts, settlements and other damages and hazards.

D. Provide temporary covering or enclosure and temporary heat as necessary to protect bottoms of excavations from freezing and frost action. Do not install electrical work on frozen excavation bases or sub-bases.

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E. Do not excavate for electrical work until the work is ready to proceed without delay, so that total time lapse from excavation to completion of backfilling will be minimum. See other sections of specification for additional requirements for excavating.

F. Store excavated material (temporarily) near excavation, in a manner that will not interfere with or damage excavation or other work. Do not store under trees (within drip line).

G. Retain excavated material that complies with requirements for backfill material. Dispose of excavated material that is either in excess of quantity needed for backfilling or does not comply with requirements for backfill material. Remove unused material from project site, and dispose of in lawful manner.

3.6 BACKFILL MATERIALS:

A. For buried conduit or cable (other than below slab-on-grade, or concrete encased) - 2" thickness of well graded sand on all side of conduit or cable.

B. For trench backfill to within 6" of final grade - soil material suitable for compacting to required densities.

C. For top 6" of excavation - Top soil.

D. Backfill excavations in 8" high courses of backfill material, uniformly compacted to the following densities (percent of maximum density, ASTM D 1557), using power-driven hand-operated compaction equipment.

1. Lawn/Landscaped Areas: 85 percent for cohesive soils, 95 percent for cohesionless soils.
2. Paved Areas, Other than Roadways (90 percent for cohesive soils, 95 percent for cohesionless soils).

E. Subsidence: Where subsidence is measurable or observable at electrical work excavations during general project warranty period, remove surface (pavement, lawn or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality and condition of the surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.7 CONCRETE BASES:

A. Unless otherwise noted, provide 4" high reinforced concrete bases for all floor mounted or floor standing electrical equipment, including generators, transformers, switchgear, battery racks, motor control centers, etc. Extend bases 6" beyond equipment or mounting rails on all sides or as shown on the drawings. Notwithstanding this requirement, coordinate with equipment manufacturer, shop drawings, and height of base to ensure compliance with NEC 404.8.

B. Concrete bases shall be provided under Divisions 26, 27 and 28. Coordinate size and location of all bases and furnish all required anchor bolts, sleeves, reinforcing and templates as required to obtain a proper installation.

C. Provide and locate properly sized concrete pads for power company furnished pad mounted transformers in accordance with power company clearance requirements. Where the serving utility is Rocky Mountain Power, the electrical contractor shall conform to the requirements of Electrical Service Requirements, Section 6.4.

3.8 ROOF PENETRATIONS:

A. Where raceways penetrate roofing or similar structural area, provide appropriate roof jack coordinate with the roofing contractor and the Architect in order to match the vent with the roof construction. The jack shall be sized to fit tightly to raceway for weather-tight seal, and

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with flange extending a minimum of 9" under roofing in all sides or as required by the roof type of construction. Completely seal opening between inside diameter of roof flashing and outside diameter of penetrating raceways. Coordinate all work with work required under roofing section of specifications.

3.9 FIRE PENETRATION SEALS:

A. Seal all penetrations for work of this section through fire rated floors, walls and ceilings to prevent the spread of smoke, fire, toxic gas or water through the penetration either before, during or after fire. The fire rating of the penetration seal shall be at least that of the floor, wall or ceiling that it is installed, so that the original fire rating of the floor or wall is maintained as required by Article 300-21 of the National Electrical Code. Where applicable, provide OZ Type CFSF/I and CAFSF/I fire seal fittings for conduit and cable penetrations through concrete and masonry walls, floors, slabs, and similar structures. Where applicable, provide 3M CID cast-in device for floor slabs. Where applicable, provide 3M fire barrier sealing penetration system, and/or IPC Flame Safe Fire Stop System, and/or Chase Foam fire stop system, including wall wrap, partitions, caps, and other accessories as required. All materials to comply with UL 1479 (ASTM E-814). Comply with manufacturer's instructions and recommendations for installation of sealing fittings and barrier sealing systems.

3.10 PROJECT FINALIZATION AND START-UP:

A. Upon completion of equipment and system installation, assemble all equipment Factory Representatives and Subcontractors for system start-up.

B. Each Representative and Subcontractor shall assist in start-up and check out their respective system and remain at the site until the total system operation is accepted by the Owner's representative.

C. The Factory Representative and/or System Subcontractor shall give personal instruction on operating and maintenance of their equipment to the Owner's maintenance and/or operation personnel. To certify acceptance of operation and instruction by the Owner's Representative, the contractor shall prepare a written statement as follows:

1. This is to certify that the Factory Representative and System Subcontractor for each of the systems listed below have performed start-up and final check out of their respective systems.
2. The Owner's Representative has received complete and thorough instruction in the operation and maintenance of each system.

SYSTEM	FACTORY REPRESENTATIVE
(List systems included)	(List name and address of Factory Representative)

_____	_____
Owner's Representative	Contractor

D. Send copy of acceptance to Architect/Engineer.

3.11 FINAL REVIEW:

A. At the time of final review, the project foreman shall accompany the reviewing party, and remove coverplates, panel covers and other access panels as requested, to allow review of the entire electrical system.

END OF SECTION 26 0500

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SECTION 26 0502 - ELECTRICAL SUBMITTALS, O & M MANUALS AND SPARE PARTS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to all Division 26, 27 and 28 sections.

B. Architectural, Structural, Mechanical and other applicable documents are considered a part of the electrical documents insofar as they apply as if referred to in full. Contractor must review the entire set of plans and specifications. Reviewing only the electrical set is not acceptable.

C. Consult all other sections, determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete installation.

D. **RELATED SECTIONS: See Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.**

1.2 SUBMITTAL REQUIREMENTS:

A. GENERAL:

1. After the Contract is awarded but prior to ordering, manufacture, or installation of any equipment, prepare complete Submittals including shop drawings, product data, brochures, etc. for materials and equipment as required by each section of the specification.
2. Review of Submittals shall not relieve the Contractor of responsibility for dimensions and/or errors that may be contained therein, or deviations from the Contract Document's requirements. It shall be clearly understood that the noting of some errors but overlooking others does not grant the Contractor permission to proceed in error. Regardless of any information contained in the Shop Drawings and Brochures, the requirements of the Contract Document's shall govern and are not waived, or superseded in any way by the review of the Shop Drawings and Brochures.
3. Submittals are reviewed, not approved. Comments made within submittals do not alter the contract documents in any way. The contractor is still responsible, regardless of comments (if any) made within submittals, for complying with drawings and specifications.
4. Notify engineer in writing if any of the comments noted in the submittals alter the contract cost. A comment within the submittal process which increases/decreases cost of product is not an authorization to the contractor under any circumstances to proceed.
5. Notify engineer of any modifications between contract documents and submittals. It is the responsibility of the contractor to ensure compliance.
6. ELECTRONIC SUBMITTAL REQUIREMENTS:
    a. Provide submittals in Portable Document Format (PDF).
    b. Documents must be electronically bookmarked by Division e.g. 26, 27 and 28, Specification section e.g. 26 0510 and individually for each item submitted for light fixtures, switchgear, transformer, panelboard etc. and keyword searchable using Adobe Acrobat

(http://www.adobe.com/acrobat) or Bluebeam Revu (http://www.bluebeam.com) for each relevant section.

c. Electronically highlight all options for light fixtures, electrical equipment, etc. Manual highlighting and scanning of the documents is NOT acceptable and will NOT be reviewed.

d. Provide only completed cutsheets for all fixture and equipment types. Blank cutsheets submitted with a schedule are NOT acceptable and will NOT be reviewed.

e. At the time of submission, the electrical contractor shall provide a complete and comprehensive submission of all required specification sections/shop drawings at the same time. Exceptions may be given, with prior approval, for time-sensitive equipment.

f. A maximum of one submittal per specification section is allowed. It is NOT acceptable to provide a product by product submittal. Single product by product submittals will NOT be reviewed.

B. SCHEDULING

1. GENERAL

a. A minimum period of two weeks, exclusive of transmittal time, will be required each time Submittals are submitted or resubmitted for review. This time period shall be considered by the Contractor when scheduling submittal data.

b. If the shop drawings are rejected twice, the contractor shall reimburse the engineering firm the sum of $1,200.00 for the third review and any additional reviews required prior to the commencement of additional review.

C. QUALITY ASSURANCE

1. PRE-SUBMITTAL PREPARATION

a. Prior to submission of the Shop Drawings and Project Data, review and certify that they are in compliance with the Contract Documents. Verify all dimensional information to ensure proper clearance for installation of equipment.

b. Shop drawings requiring the use of electronic documents (floor plans, Lighting plans, fire alarm plans, etc.) shall be requested via a request for information (RFI) through the general contractor. Electronic documents will be provided to the Architect for distribution. No direct vendor requests will be accepted.

c. Contractor is completely responsible for the content of the submittal

2. SUBMITTAL REQUIREMENTS

a. Provide a stamp or statement on each submittal as follows:

i. I hereby certify that this Shop Drawing and/or Brochure has been checked prior to submittal and that it complies in all respects with the requirements of the Contract Drawings and Specifications for this Project.

(Name of Electrical Subcontractor)

Name_____.

Position_____Date_____

i. Failure to provide certification will result in submittals being rejected and returned without review.

b. Brochures to be submitted as supplementary information shall be published by the Manufacturers and shall contain complete and detailed engineering and dimensional information. Brochures submitted shall contain only information relevant to the particular equipment or materials to be furnished. The Contractor shall not submit catalogs that describe several different items in addition to those items to be used, unless all irrelevant information is marked out, or unless relevant information is clearly marked. Brochures from each manufacturer shall be identified and submitted separately.

c. Shop Drawings shall be done in an easily legible scale and shall contain sufficient plans, elevations, sections, and isometrics to clearly describe the equipment or apparatus, and its location. Drawings shall be prepared by an Engineer/Draftsmen skilled in this type of work. Shop Drawings shall be drawn to at least 1/4" = 1'0" scale.

d. Observe the following rules when submitting the Shop Drawings and Brochures.

i. Each Shop Drawing shall indicate in the lower right hand corner, and each Brochure shall indicate on the front cover the following: Title of the sheet or brochure, name and location of the building; names of the Architect and Electrical Engineer, Contractor, Subcontractors, Manufacturer, Supplier/Vendor, etc., date of submittal, and the date of correction and revision. Unless the above information is included the submittal will be rejected and returned without being reviewed.

1. Submittal Identification shall include the following:

a. A unique number, sequentially assigned, shall be noted on the transmittal form accompanying each item submitted.

b. Original submittal numbers shall have the following format: “XXX-Y;” where “XXX” is the originally assigned submittal number and “Y” is a sequential letter assigned for resubmittals (for example, A, B, or C being the first, second, and third resubmittals, respectively). Submittal 25B, for example, is the second resubmittal of Submittal 25.

D. POST-SUBMITTAL

1. Check all materials and equipment after arrival on the job site and verify compliance with the Contract Documents.

1.3 PROVIDE SUBMITTALS AS REQUESTED FOR EACH OF THE SECTIONS LISTED BELOW:

A. 26 0510 Elevator Electrical Requirements

1. Submit manufacturer’s data for all power module switches and other disconnects specified in this section.

B. 26 0513 Medium Voltage Cable Splices, Terminators and Connectors

1. Submit manufacturer's data on each type and class of splice, terminator, and connector. Include details of all parts, components, fittings, and accessories.

2. Submit medium voltage cable splicer/terminator certification of competency and experience 20 days before splices or terminations are to be made in medium voltage cables. Utilize only workers with immediate experience in past three years with splicing and terminating cables of the type and classification being provided as part of this work.

C. 26 0519 Conductors and Cables

1. (600V and Below)

a. Submit megohmmeter test data for circuits under 600 volts. Megger all circuits of 100 amp and greater rating.

D. 26 0526 Grounding

1. Submit the name of test agency to be used for testing specified in this section. Submit results of tests specified in this section. Also include test results in Operation and Maintenance Manuals as specified.

E. 26 0532 Conduit Raceway

1. Submit manufacturer’s data on MC-PCS Power & Control/Signal Cable.

F. 26 0533 Electrical Boxes and Fittings

1. Submit manufacturer’s data including specifications, installation instruction and general recommendations for each type of floor box used on project.

G. 26 0548 Electrical Seismic Control

1. A single submittal shall be provided for all seismic anchorage and restraints for all Division 26 equipment and systems provided as part of this project. Individual submittals for specific systems will not be accepted.

2. Submit shop drawings, calculations, and printed data for the following items under provisions of the General Conditions of the Contract:

a. Complete engineering calculations and shop drawings for all seismic requirements for all equipment to be restrained as outlined in Section 26 0548 Specification, and as detailed on drawings.

b. The professional seal of the engineer who is responsible for the design of the Seismic Restraint System.

c. Details for all seismic bracing.

d. Details for steel frames, concrete inertia bases, and housekeeping pads. Include dimensions, embed depths, dowelling details, and concrete reinforcing requirements.

e. Clearly outlined procedures for installing and adjusting the isolators, seismic bracing anchors, snubbers, cables, and bolt connections.

f. Floor plan noting the locations, size, and type of anchorage and restraint to be used.

g. Include confirmation that all calculations are based on the design criteria listed in appropriate Section.

h. Certificate of Compliance.

i. Where equipment is exempt per this specification provide a written certificate of compliance for each of the systems noted with the professional seal of engineer who has reviewed the electrical system.

H. 26 0553 Electrical Identification

1. Submit manufacturer's data on each type of electrical identification products

a. Submit one sample of each component of the electrical identification system as follows: Wire/cable tape marker, Tags, Engraved, plastic laminate labels, Arc-flash hazard labels

I. 26 0573 Protective Device Study

1. Submit partial study that includes the calculated values for short circuit current availability and arc flash levels for each switchgear bus, medium voltage controller, switchboard, low voltage motor control center, distribution panelboard, automatic transfer switch, and branch circuit panelboard. This data shall be submitted prior to, or at the same time as, submitting the entire electrical gear package. If partial study is not received prior to other submittals, the associated submittal will be rejected and not reviewed. Contractor shall utilize construction drawings to estimate approximate feeder lengths for this preliminary submittal. Submitted data shall include equipment/panel designations, feeder conductor sizes, feeder lengths, and calculated short circuit values and arc flash levels. Include the utility transformer ratings and transformer impedances used for the preparation of the short circuit calculations.

a. Partial study shall be submitted prior to switchboards, switchgear, panelboards, transformers, etc.

2. Construction Period Submittal: During the construction period but prior to application of utility power to the electrical distribution system, submit an indexed copy of the complete protective device study based on actual field values. Include the following:

a. Introductory section with basic formulas, pertinent data, and rationale employed in the study.

b. One-line diagram for that portion of the system included in the study.

c. Calculations section showing tabulated calculations.

d. Results, recommendations, settings, etc.

3. Provide one revision to study based on engineering review comments for the completed study to allow for minor modifications to adjustable circuit breakers to minimize arc flash levels.

J. 26 0923 Occupancy Sensors

1. Submit manufacturer's data on occupancy sensors, control modules, wiring diagrams, instructions for installation, interconnection diagrams and any related accessories.

2. Submit scaled drawings with lighting fixtures shown and sensor equipment/devices clearly marked by manufacturer showing proper product, location, coverage pattern and orientation of each sensor.

K. 26 0943 Lighting Control Equipment

1. Submit manufacturer's data on lighting control equipment including, but not limited

to published catalog data sheets, rough-in diagrams and instructions for installation, operating and maintenance, suitable for inclusion in maintenance manuals.

2. Submit detailed drawings and documentation of lighting control components and interconnection including, but not necessarily limited to:

   a. Electronic controllers

   b. Control stations

   c. Photo sensors

   d. Occupancy sensors

   e. Network wiring details

   f. Input and output wiring details

   g. Lighting control panel load schedules

   h. Accurately scaled equipment layouts, wire/cable routing and connections to control wiring and electrical power feeders.

   i. Submit scaled drawings/floor plans with locations of all equipment and devices clearly shown for installation purposes.

L. 26 1010 Advanced Energy & Power Metering System

1. Submit manufacturer's data on all components.

2. Submit riser diagrams and interconnection diagrams, wiring layouts etc. for advanced metering system including low voltage wiring interconnections; and communications and data line interconnections to system components and to the BAS/BMS (Building Automation System/Building Management System) equipment and the University EIS system (Energy Information System).

3. The external wiring interconnections required by the electrical contractor shall be clearly identified on the shop drawings.

M. 26 2413 Switchgear and Switchboards

1. Submit manufacturer’s data and shop drawings only after completion of the preliminary protective device study (see Section 26 0573 as applicable). Any Section 26 2413 submittals received prior to submission of the preliminary protective device study will be REJECTED.

2. Submit manufacturer's data on switchgear and switchboards.

3. Submit dimensioned drawings of switchgear and switchboards showing accurately scaled basic sections including, but not necessarily limited to, auxiliary compartments, section components, and combination sections. Show plan view of equipment with dimensioned clearances to proximate equipment. Failure to submit said plan view shall not relieve contractor of responsibility to verify required clearances before release of equipment for fabrication.

N. 26 2416 Panelboards

1. Submit manufacturer’s data and shop drawings only after completion of the preliminary protective device study (see Section 26 0573 as applicable). Any Section 26 2416 submittals received prior to submission of the preliminary protective device study will be REJECTED.

2. Submit dimensioned drawings of panelboards and enclosures showing accurately scaled layouts of enclosures and required individual panelboard devices, including

but not necessarily limited to, circuit breakers, fusible switches, fuses, ground-fault circuit interrupters, and accessories.

3. Submit manufacturer data including specifications, installation instructions and general recommendations, for each type of panelboard required.

O. 26 2713 Service Entrance

1. Submit manufacturer's data on service-entrance equipment and accessories.

2. Submit dimensioned layouts of service-entrance equipment and spatial relationships to proximate equipment. Failure to submit said layouts shall not relieve contractor of responsibility to verify required clearances before release of equipment to fabrication.

3. Submit manufacturer's data and shop drawings only after completion of the preliminary protective device study (see Section 26 0573 as applicable). Any Section 26 2713 submittals received prior to submission of the preliminary protective device study will be REJECTED.

P. 26 2726 Wiring Devices

1. Submit manufacturer's data on electrical wiring devices.

Q. 26 2815 Overcurrent Protective Devices

1. Submit manufacturer's data and shop drawings only after completion of the preliminary protective device study (see Section 26 0573 as applicable). Any Section 26 2815 submittals received prior to submission of the preliminary protective device study will be REJECTED.

2. Submit manufacturer's data on overcurrent protective devices, including catalog cuts, time-current trip characteristic curves, and mounting requirements.

3. Submit layout drawings of overcurrent protective devices, with layouts of circuit breakers, including spatial relationships to proximate equipment. Failure to submit said spatial layouts does not relieve contractor of responsibility to verify all required clearances before release of equipment for fabrication.

4. Submit time-current trip curves (in log-log format) and trip setting parameter/range information (for each trip function) for all solid-state circuit breakers.

5. Manufacturer shall also provide recommended trip settings with the shop drawing submittal (including ground fault settings) for coordination with downstream overcurrent devices. Manufacturer shall base recommendations on the AIC rating of the electrical equipment.

6. Where the Protective Device Study specification section 260573 is included in the project, the time-current curves and recommended trip settings for all solid-state circuit breakers shall be submitted as part of the protective device study.

R. 26 2816 Motor and Circuit Disconnects

1. Submit manufacturer's data including specifications, installation and general recommendations, for each type of motor and circuit disconnect switch required.

2. Submit dimensioned drawings of electrical motor and circuit disconnect switches that have rating of 100 amperes and larger.

S. 26 2913 Motor Starters

1. Submit manufacturer's data on motor starters.

2. Submit dimensioned drawings of motor starters showing accurately scaled

equipment layouts.

T. 26 2923 Variable Frequency Drives

1. Submit manufacturer's data on variable frequency drives.

2. Submit dimensioned drawings of variable frequency drive systems including, but not necessarily limited to, the following:

   a. Complete data sheet.

   b. Set of outline drawings giving complete mounting information, conduit entry and exit dimensions, over all unit dimensions, weights, physical characteristics, etc.

   c. Set of complete electrical drawings for power and control wiring.

   d. Manufacturer's literature giving detailed information of equipment being supplied including parts numbers, model numbers and ratings.

   e. Harmonic Distortion Limits: The VFD systems shall produce no more than 12% current THD and no more than 3% voltage THD throughout the normal operating range as measured at the input terminals of each VFD system, on motors 10 HP and larger, provide harmonic filters. For motors less than 10 HP provide AC line reactors with a minimum of 3% impedance. VFD supplier shall submit with the approval shop drawings their harmonic control scheme and actual test results for the proposed scheme on at least three of their existing installations. Data shall clearly identify what equipment is proposed and demonstrate that it routinely meets harmonic limits above for the applications similar to this project. Prior approvals also require this data.

   f. Shop drawings shall include interior view of VFD system enclosures with all components identified and located.

U. 26 3213 Emergency Electrical Systems

1. Dimensioned drawings of emergency electrical system components and accessories including, but not necessarily limited to generator sets, isolation/by-pass switches, day tanks, transfer switches, instruments and accessories, (and) annunciator panels, (and fuel line and exhaust piping). Show accurately scaled layouts of system components; indicate their spatial relationship to associated equipment; show connections to normal and emergency power feeders. Failure to submit said scaled lay-outs does not relieve contractor of responsibility to verify all required clearances before release of equipment for fabrication.

2. Manufacturer’s standard catalog data describing and depicting each engine-generator set, batteries, charger, tanks, and all ancillary equipment in sufficient detail to demonstrate complete specification compliance.

3. Manufacturer’s standard catalog data describing and depicting each transfer and by-pass isolation switch along with all ancillary equipment in sufficient detail to demonstrate complete specification compliance. In addition provide the following:

   a. One-line diagram of each switch assembly and wiring diagram of each unit.

   b. A complete list of equipment and material to be provided, containing an adequate description of each separate item of equipment.

V. 26 4313 Surge Protective Devices (SPD)

1. Submit manufacturer's data on SPD’s listing all performance ratings specified or

required herein.

2. Submit dimensioned drawings of SPD's including, but not necessarily limited to, the following.

   a. Complete data sheet.

   b. Set of outline drawings giving complete mounting information, conduit entry and exit locations and dimensions, overall unit dimensions, weights, physical characteristics, etc.

   c. Set of complete electrical drawings for power and control wiring.

   d. Manufacturer's literature giving detailed information of equipment including parts numbers, model numbers and ratings.

   e. UL 1449 suppressed voltage rating documentation.

W. 26 5100 Interior and Exterior Building Lighting

1. Submit manufacturer's data on interior and exterior building lighting fixtures.

2. Submit dimensioned drawings of lighting fixtures. Submit fixture shop drawings in PDF format with separate sheet for each fixture, assembled in luminaire "type" alphabetical order, with each "type" individually bookmarked, with proposed fixture catalog number and accessories clearly indicated on each sheet.

3. When applicable submit standard color samples with the shop drawings. If standard colors are not acceptable, a color sample will be provided to the fixture manufacturer. Return of the shop drawings will be delayed until color samples are provided.

4. Submit ballast and/or driver manufacturer cut sheets.

5. Submit a list of all lamps used on projects.

X. 26 5600 Exterior Area Lighting

1. Submit manufacturer's data on lighting units, including certified dimension drawings of components including, but not necessarily limited to, poles and standards, mast arms, brackets, hardware and fixtures.

Y. 27 1500 Telephone Data Systems

1. Provide proof of RCDD certification and connectivity manufacturer certification.

2. Provide submittals for all racks/cabinets; patch panels, devices, cabling, firestopping solutions, tray, non-continuous cable support devices, grounding equipment, and miscellaneous equipment to be used on project. Where multiple part numbers are listed on a datasheet/cutsheet, highlight or circle applicable part.

3. Provide submittals showing complete racking layout in plan and elevation view to scale. Coordinate exact rack layout with Owner Information Technology Representative prior to submittal.

4. Provide color samples of all available standard color faceplates to architect.

5. Provide proposed labeling scheme for approval by owner/engineer.

6. Provide catalog cutsheets of all test equipment that will be used.

Z. 27 3244 Two-Way Communication

1. Data sheets on all equipment being provided as well as recommended cable types. Internal control cabinet drawings showing internal block diagram connections shall be provided. Wiring diagrams showing typical field wiring connections as well as

single line floor plan indicating equipment locations as well as cable routings and quantities.

2. Submit product data, including manufacturer's (Specifications Data) product sheet, for specified products.

3. Submit shop drawings showing layout, profiles, and product components, including anchorage and accessories. Include cabling diagrams, wiring diagrams, station installation details, and equipment cabinet details.

AA. 28 3111 Fire Alarm and Detection System

1. Submit manufacturer's data on fire alarm and detection systems including, but not limited to, roughing-in diagrams and instructions for installation, operating and maintenance, suitable for inclusion in maintenance manuals.

2. Provide shop drawings showing equipment/device locations and connecting wiring of entire fire alarm and detection system. Include wiring diagrams and riser diagrams of panel. Provide dimensioned drawing of Fire Alarm Control Panel and Building Graphic. Shop drawings shall be prepared by an individual with a minimum NICET III (Fire Protection Engineering Technology/Fire Alarm Systems) certification. The individual’s name and certification number shall be shown on the submittal design drawings.

3. Submit a written statement to the Architect and the state and local Fire Marshal's Office that each device of the fire alarm system will be installed, inspected and tested in accordance with applicable requirements of NFPA Standard 72.

4. A complete set of shop drawings indicating:

   a. Location of all alarm-initiating and alarm-signaling devices.

   b. Point-to-point wiring diagrams for all alarm-initiating and alarm-signaling devices.

   c. Standby battery calculations, including voltage drop calculation.

5. Wiring diagrams for:

   a. Alarm control panels.

   b. Auxiliary function relays and solenoids.

   c. Remote signaling equipment.

6. A complete equipment list identifying:

   a. Type

   b. Model

   c. Manufacturer

   d. Manufacturer catalog data sheets

   e. UL Listing and/or FM approval showing compatibility of device with Fire Alarm Control Panel (FACP)

7. A complete zone list identifying all:

   a. Alarm-initiating and alarm-signaling devices.

   b. Remote signaling and auxiliary function zones.

   c. Specific devices associated with each zone.

8. Submit to State and Local Fire Marshall, a complete Certificate of Compliance

1.4 OPERATION & MAINTENANCE MANUALS

A. Provide operating instruction and maintenance data books for all equipment and materials furnished under this Division.

B. Submit four copies of operating and maintenance data books for review at least four weeks before final review of the project. Assemble all data in a completely indexed volume or volumes and identify the size, model, and features indicated for each item. The binder (sized to the material) shall be a 2" slide lock unit (Wilson-Jones WLJ36544B). The cover shall be engraved with the job title in 1/2" high letters and the name and address of the Contractor in 1/4" high letters. Provide the same information in 1/8" letters on the spine.

C. Include complete cleaning and servicing data compiled in clearly and easily understandable form. Show serial numbers of each piece of equipment, complete lists of replacement parts, motor ratings, etc. Each unit shall have its own individual sheet. (Example: If two items of equipment A and D appear on the same sheet, an individual sheet shall be provided for each unit specified).

D. Include the following information where applicable.

1. Identifying name and mark number.
2. Certified outline Drawings and Shop Drawings.
3. Parts lists.
4. Performance curves and data.
5. Wiring diagrams.
6. Light fixture schedule with the lamps and ballast data used on the project for all fixtures
7. Manufacturer's recommended operating and maintenance instructions.
8. Vendor's name and address for each item.

E. The engineer shall review the manuals and when approved, will forward the manuals on to the architect. If the manuals are rejected twice, the contractor shall reimburse the engineer the sum of $1,200.00 for each review afterwards.

F. Provide Operation and Maintenance Manual information for each section listed below in addition to the general requirements listed above.

1. 26 0526 Grounding
   a. Test Results of measured resistance values
2. 26 0548 Electrical Seismic Control
   a. Certificate of Compliance from Final Inspection
3. 26 0923 Occupancy Sensors
   a. Record Drawings
      i. A complete set of ‘as-builts’ drawings showing installed wiring, specific interconnections between all equipment, and internal wiring of this equipment shall be included in the operating and maintenance manuals upon complete of the system.
      ii. Provide a CD to the owner containing the information specified below. The CD shall include all information required to allow the Owner to change the schedules themselves. The CD shall contain a minimum of following:

1. CAD drawing files of 'as-built' lighting control components and point to point connections.
2. General configuration programming.
3. Job specific configuration programming to include schedule.
4. Tutorial file on complete programming of lighting control system.

4. 26 0943 Lighting Control Equipment

a. Record Drawings

i. A complete set of 'as-builts' drawings showing installed wiring, specific interconnections between all equipment, and internal wiring of this equipment shall be included in the operating and maintenance manuals upon complete of the system.

ii. Provide a CD to the owner containing the information specified below. The CD shall include all information required to allow the Owner to change the schedules themselves. The CD shall contain a minimum of following:

1. CAD drawing files of 'as-built' lighting control components and point to point connections.
2. General configuration programming.
3. Job specific configuration programming to include schedule.
4. Tutorial file on complete programming of lighting control system.

5. 26 2913 Motor Starters

a. After installation is complete, including water and air balancing, measure voltage (L-L and L-N) and full load current of each phase of each motor. Submit report showing field readings of voltage, amperage, service factor, and thermal heater size installed for each motor.

6. 26 2923 Variable Frequency Drivers

a. The vendor shall supply two complete manuals consisting of, as a minimum, general system arrangement, power wiring diagram, control wiring diagram, schematic of VFD System components and options, factory test reports, trouble shooting data, parts lists, and preventative maintenance information.

b. Prior to final acceptance, provide the engineer with two (2) copies of the harmonic distortion report. If the harmonics exceed the specified limits, VFD system will be rejected. The VFD vendor shall then have thirty (30) days to revise the harmonic control scheme and resubmit new shop drawings and new harmonic verification test reports for final acceptance. All costs resulting from non-compliance rejection, including additional engineer and contractor review time, will be paid by the VFD supplier.

7. 26 3213 Emergency Electrical System

a. Manual Requirements

i. Submit four complete sets of operating manuals for each item of equipment and/or component outlining the step-by-step procedure required for system start up, operation, and shutdown. Include the manufacturer's name, model number, and a description of all equipment, complete with basic operating features. Describe in detail all maintenance procedures and a troubleshooting guide listing possible breakdowns and repairs for each piece of equipment. Include all factory service manuals, complete parts lists, simplified schematic diagrams of each system as installed, and the original. Include complete rest reports specified in Section 26 3213.

b. Test Results as outlines in Section 26 3213

8. 27 1500 Telephone/Data System

a. Test Results as outlined in Section 27 1500

b. Manual shall include all service, installation, programming and warranty, including test results for each cable.

c. Provide laminated plans (minimum size 11 x 17) of all telecommunications record drawings (including riser diagrams) in each and every EF, ER and TR.

d. Record Drawings

i. The Owner shall provide electronic (DWG) format of telephone/data system drawings that as-built construction information can be added. These documents will be modified accordingly by the telecommunications contractor to denote as-built information as defined above and returned to the Owner.

ii. Provide a complete set of "as built" drawings in paper and electronic (DWG and PDF) formats showing cabinets, racks, patch panels, wiring, specific interconnections between all equipment and internal wiring of equipment within 30 working days of completion. Drawings are to include all labeling information used in denoting equipment used in the installation. Labeling, icons, and drawing conventions used shall be consistent throughout all documentation provided.

9. 27 3244 Two-Way Communication system

a. Record Drawings

i. Provide As-Built drawings that include changes to wiring, wiring designations, junction box labeling, and other pertinent information.

10. 28 3113 Fire Alarm and Detection System

a. Manual Requirements

i. Operating and maintenance manuals shall be submitted prior to testing of the system. Manuals shall include all service, installation, and programming information.

b. Record Drawings

i. A complete set of CAD "as-built" drawings showing installed wiring, color coding, specific interconnections between all equipment, and internal wiring of the equipment shall be delivered to the owner upon completion of the system. Vendor shall not request drawings from the Engineer. Vendor shall request current architectural drawings from the Architect and include all cost with bid.

ii. A building map shall be supplied to the owner indicating the exact location of all devices along with the addresses of the individual devices. Install building fire alarm map adjacent to the fire alarm panel and all remote operating panels. Provide high quality plastic sign (map holder) with two layers. The back layer shall be painted black. The front layer shall be a clear center for viewing the CAD fire alarm drawing. Edges of the sign shall be colored to match the building interior. The building map shall indicate the various devices and wiring by the use of different colors (minimum of five colors).

iii. Provide a CD to the Owner containing the information specified below. The CD shall include all information required to allow the Owner to change the fire alarm program themselves. The CD shall contain a minimum of the following:

1. CAD drawing files of building fire alarm map.
2. CAD drawing files of as-built fire alarm components and point to point connections.
3. General configuration programming.
4. Job specific configuration programming.
5. Tutorial file on complete programming of fire alarm system

1.5 SPARE PARTS:

A. Provide spare parts (fuses, diffusers, lamps, etc.) as specified. Stock of all spare items shall be delivered as directed to Owner's storage space prior to substantial completion. All components shall be labeled to match construction document nomenclature.

Section	Section Name	Description	Qty. Required	Qty. Received	Fulfilled?
26 0532	Conduit Raceway	Provide 1000 feet of ¾" conduit with 3 #12 conductors and 1000 feet of ¾" conduit with 3 #10 conductors. Provide all supports, fittings, boxes, terminations, etc. as required for installation. Install only as directed by engineer. Credit back all unused material and labor to Owner.	Per description		
26 0923	Occupancy Sensors	Spare sensors for each type used on project.	5 per type		
26 2815	Overcurrent Protective Devices	For types and ratings required, furnish additional fuses, amounting to one unit for every 5 installed units, but not less than two units of each size and type, unless specified otherwise in another section of these specifications.	Per description		

26 2816	Motor and Circuit Disconnects	Spare fuses amounting to one spare fuse for each 10 installed but not less than three of any one type and size.	Per description		
26 2913	Motor Starters	Maintenance Stock Fuses: For types and ratings required, furnish additional fuses, amounting to one unit for every 10 installed, but not less than 5 units of each, for both power and control circuit fuses.	Per description		
26 5100	Interior and Exterior Building Lighting	Spare diffusers (acrylic and/or glass only) for each fixture type. One set shall be provided per fixture type and one additional per every (10) fixtures of each type; quantity shall not exceed (10) spares for any single fixture type.	Per description		
		Furnish stock of replacement LED drivers for each type and size provided on the project. A minimum quantity of 15% but no less than two (2) shall be furnished.	Per description		
		Provide a complete spare parts list in lighting shop drawing review			
26 5600	Exterior Area Lighting	Provide (3) spare fuses for each type and size used.	Per description		
28 3111	Fire Alarm and Detection	Smoke detectors with base	10		
		Thermal detectors with base	10		
		Strobe/horns	10		
		Manual pull stations with addressable modules	5		
		Duct smoke detectors	4		
		20 feet of conduit with wiring (completely installed and wired) for each spare device	Per description		

END OF SECTION 26 0502

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SECTION 260507 - ELECTRICAL CONNECTIONS FOR EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

B. This section is a Division-26 Basic Materials and Methods section, and is part of each Division-23 section making reference to electrical connections.

C. RELATED SECTIONS: See Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 DESCRIPTION OF WORK:

A. Extent of electrical connection for equipment includes final electrical connection of all equipment having electrical requirements. Make final connections for all owner furnished equipment. See other applicable portions of specification for building temperature control wiring requirements.

B. Refer to Division-23 sections for motor starters and controls furnished integrally with equipment; not work of this section.

C. Refer to Division-23 section for control system wiring; not work of this section.

D. Refer to sections of other Divisions for specific individual equipment power requirements.

1.3 QUALITY ASSURANCE:

A. NEC COMPLIANCE: Comply with applicable portions of NEC as to type products used and installation of electrical power connections.

B. UL LABELS: Provide electrical connection products and materials that have been UL-listed and labeled.

PART 2 - PRODUCTS

2.1 GENERAL:

A. For each electrical connection indicated, provide complete assembly of materials, including but not necessarily limited to, raceways, conductors, cords, cord caps, wiring devices, pressure connectors, terminals (lugs), electrical insulating tape, heat-shrinkable insulating tubing, cable ties, solderless wire nuts, and other items and accessories as needed to complete splices, terminations, and connections as required. Crimp on or slip-on type splicing materials (insulation displacement type) designed to be used without wire stripping are not acceptable. See Section 26 0532, Conduit Raceways; Section 26 2726 Wiring Devices: and Section 26 0519 Conductors and Cables for additional requirements. Provide final connections for equipment consistent with the following:

1. Permanently installed fixed equipment - flexible seal-tite conduit from branch circuit terminal equipment, or raceway; to equipment, control cabinet, terminal junction box or wiring terminals. Totally enclose all wiring in raceway.

2. Movable and/or portable equipment - wiring device, cord cap, and multi-conductor cord suitable for the equipment and in accordance with NEC requirements (Article 400).

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3. Other methods as required by the National Electrical Code and/or as required by special equipment or field conditions.

PART 3 - EXECUTION

3.1 INSTALLATION OF ELECTRICAL CONNECTIONS:

A. Make electrical connections in accordance with connector manufacturer's written instructions and with recognized industry practices, and complying with requirements of NEC and NECA's "Standard of Installation" to ensure that products fulfill requirements.

B. Connect electrical power supply conductors to equipment conductors in accordance with equipment manufacturer's written instructions and wiring diagrams.

C. Coordinate installation of electrical connections for equipment with equipment installation work.

D. Verify all electrical loads (voltage, phase, horse power, full load amperes, number and point of connections, minimum circuit ampacity, etc.) for equipment furnished under other Divisions of this specification, by reviewing respective shop drawings furnished under each division. Meet with each subcontractor furnishing equipment requiring electrical service and review equipment electrical characteristics. Report any variances from electrical characteristics noted on the electrical drawings to Architect before proceeding with rough-work. In summary it is not in the Electrical Engineers scope to review the shop drawings from other trades/divisions.

E. Obtain and review the equipment shop drawings to determine particular final connection requirements before rough-in begins for each equipment item.

F. Refer to basic materials and methods Section 26 0553 Electrical Identification, Conductors, for identification of electrical power supply conductor terminations.

END OF SECTION 26 0507

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SECTION 26 0519 - CONDUCTORS AND CABLES (600V AND BELOW)

PART 1 – GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

B. This section is a Division-26 Basic Materials and Methods section, and is part of each Division-26 section making reference to conductors and cables specified herein.

C. RELATED SECTIONS: See Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 DESCRIPTION OF WORK:

A. Extent of electrical conductor and electrical cable work is indicated by drawings and schedules.

B. Types of conductors and cables in this section include the following:

1. Copper Conductors (600V)
2. Aluminum Conductor (600V)

C. Applications for conductors and cables required for project include:

1. Power Distribution
2. Feeders
3. Branch Circuits

1.3 RECORDS SUBMITTAL: Refer to Section 26 0502 for requirements.

1.4 QUALITY ASSURANCE:

A. Comply with NEC as applicable to construction and installation of electrical conductors and cable. Comply with UL standards and provide electrical conductors and cables that have been UL-listed and labeled.

B. Comply with applicable portions of NEMA/Insulated Cable Engineers Association standards pertaining to materials, construction and testing of conductors and cable.

C. Comply with applicable portions of ANSI/ASTM and IEEE standards pertaining to construction of conductors and cable.

1.5 SUBMITTALS: Refer to Section 26 0502 for requirements.

PART 2 - PRODUCTS

2.1 COPPER AND ALUMINUM CONDUCTORS (600V):

A. Provide factory-fabricated conductors of sizes, ratings, materials, and types indicated for each service. Where not indicated provide proper selection to comply with project's installation requirements and NEC standards. Provide conductors in accordance with the following:

1. Service Entrance Conductors – Aluminum conductor; see drawings for insulation type.

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2. Distribution and Panelboard Feeders; and Other Conductors, #2 AWG and Larger – Aluminum]conductor; see drawings for insulation type.
3. Branch Circuit Conductors and All Conductors #3 AWG and Smaller - Copper conductor, with THHN/THWN insulation. Size all conductors in accordance with NEC; minimum size to be #12 AWG. Provide solid conductors for #10 AWG and smaller. Provide stranded conductors for #8 AWG and larger.
4. Aluminum Conductors. Where aluminum conductors are specified for use, provide compact stranded Aluminum Association 8000- series alloy conductor material.
    a. Stabiloy - Alcan Cable
    b. Triple E - Southwire

B. Provide a maximum of three phase conductors in any one conduit or as approved by electrical engineer. Where phase conductors share a common neutral they must have a means to simultaneously disconnect all ungrounded conductors at the point where the branch circuits originate. The ungrounded and neutral conductors of a multi-wire branch circuit must be grouped together by wire ties at the point of origination. Provide neutral and ground wire as specified elsewhere in documents.

C. Provide separate neutral conductor for all single phase branch circuits installed. No shared neutrals are allowed. Neutral conductor shall be the same size as the phase conductor.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. General: Install electric conductors and cables as indicated, in compliance with manufacturer's written instructions, applicable requirements of NEC and NECA's "Standards of Installation", and in accordance with recognized industry practices.

B. Coordinate installation work with electrical raceway and equipment installation work, as necessary for proper interface.

C. Cables may be pulled by direct attachment to conductors or by use of basket weave pulling grip applied over cables. Attachment to pulling device shall be made through approved swivel connection. Nonmetallic jacketed cables of small size may be pulled directly by conductors by forming them into a loop that pull wires can be attached; remove insulation from conductors before forming the loop. Larger sizes of cable may be pulled by using basket weave pulling grip, provided the pulling force does not exceed limits recommended by manufacturer; if pulling more than one cable, bind them together with friction tape before applying the grip. For long pulls requiring heavy pulling force, use pulling eyes attached to conductors.

D. Do not exceed manufacturer's recommendations for maximum allowable pulling tension, side wall pressure, and minimum allowable bending radius. In all cases, pulling tension applied to the conductors shall be limited to 0.008 lbs. per circular mil of conductor cross-section area.

E. Pull in cable from the end having the sharpest bend; i.e. bend shall be closest to reel. Keep pulling tension to minimum by liberal use of lubricant, and turning of reel, and slack feeding of cable into duct entrance. Employ not less than one man at reel and one in pullhole during this operation.

F. For training of cables, minimum bend radius to inner surface of cable shall be 12 times cable diameter.

G. Where cable is pulled under tension over sheaves, conduit bends, or other curved

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surfaces, make minimum bend radius 50% greater than specified above for training.

H. Use only wire and cable pulling compound recommended by the specific cable manufacturer, and that is listed by UL.

I. Seal all cable ends unless splicing is to be done immediately. Conduit bodies shall not contain splices.

J. Support all cables in pullholes, concrete trenches, and similar locations by cable racks and secure to rack insulators with nylon cord or self-locking nylon cable ties. Place each cable on separate insulator. In manholes, pullholes, concrete trenches, and similar locations, wrap strips of fire-proofing tape (approx. 1/16 inch thick by 3 inches wide) tightly around each cable spirally in half-lapped wrapping or in two butt-joined wrappings with the second wrapping covering the joints in the first. Apply tape with the coated side toward the cable, and extend tape one inch into the ducts. To prevent unraveling, random wrap the fireproofing tape the entire length of the fireproofing with pressure sensitive glass cloth tape. Provide fireproofing tape of a flexible, conformable fabric having one side coated with flame retardant, flexible, polymeric coating and/or a chlorinated elastomer not less than 0.050 inch thick weighing not less than 2.5 pounds per square yard. Provide tape that is noncorrosive to cable sheath, self-extinguishing, and that will not support combustion. Construct tape of materials that do not deteriorate when subjected to oil, water, gases, salt water, sewage and fungus.

K. Follow manufacturer's instructions for splicing and cable terminations.

3.2 AFTER INSTALLATION TEST FOR CABLE 600 VOLTS AND BELOW:

A. Prior to energization, test cable and wire for continuity of circuitry, and for short circuits, Megger all circuits of 100 amp and greater rating. Correct malfunctions. Record all test data and provide written test report.

B. Subsequent to wire and cable connections, energize circuitry and demonstrate functioning in accordance with requirements.

3.3 IDENTIFICATION OF FEEDERS: Refer to Section 26 0553 for requirements.

END OF SECTION 26 0519

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SECTION 26 0526 - GROUNDING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

B. Division-26 Basic Materials and Methods sections apply to work specified in this section.

C. RELATED SECTIONS: See Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 DESCRIPTION OF WORK:

A. Provide grounding as specified herein, and as indicated on drawings.

B. Provide grounding and bonding of all electrical and communication apparatus, machinery, appliances, building components, and items required by the NEC to provide a permanent, continuous, low impedance, grounding system.

C. Unless otherwise indicated, ground the complete electrical installation including the system neutral, metallic conduits and raceways, boxes, fittings, devices, cabinets, and equipment in accordance with all code requirements.

D. Ground each separately derived system, as described in NEC Section 250-30, unless otherwise indicated.

E. Types of grounding in this section include the following:

1. Underground Metal Water Piping
2. Metal Building Frames
3. Grounding Electrodes
4. Grounding Rods
5. Reference Ground Buses
6. Separately Derived Systems
7. Service Equipment
8. Enclosures
9. Systems
10. Equipment
11. Other items indicated on drawings

F. Requirements of this section apply to electrical grounding work specified elsewhere in these specifications.

1.3 QUALITY ASSURANCE:

A. Comply with NEC as applicable to electrical grounding and ground fault protection systems. Comply with applicable ANSI and IEEE requirements. Provide products that have been UL listed and labeled.

B. Resistance from the service entrance ground bus, through the grounding electrode to earth, shall not exceed 5 ohms.

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1.4 SUBMITTALS: Refer to Section 26 0502 for requirements.

PART 2 – PRODUCTS

2.1 MATERIALS AND COMPONENTS:

A. GENERAL: Except as otherwise indicated, provide each electrical grounding system as specified herein, and as shown on drawings, including but not necessarily limited to, cables/wires, connectors, terminals (solderless lugs), grounding rods/electrodes and plate electrodes, bonding jumper braid, and other items and accessories needed for complete installation. Where materials or components are not otherwise indicated, comply with NEC, NEMA and established industry standards for applications indicated.

B. ELECTRICAL GROUNDING CONDUCTORS: Unless otherwise indicated, provide electrical grounding conductors for grounding connections matching power supply wiring materials and sized according to NEC. Provide with green insulation.

C. GROUND RODS: Steel with copper welded exterior, 3/4" dia. x 10' long. Weaver or Cadweld.

D. GROUND WELL BOXES FOR GROUND RODS: Precast concrete box 9-1/2" W. x 16" L. X 18" D. with light duty concrete cover for non-traffic areas or rated steel plate for traffic areas. Provide covers with lifting holes. Engrave cover with "GROUND ROD".

E. CONCRETE ENCASED GROUNDING ELECTRODE (UFER GROUND): #2/0 AWG bare copper conductor.

F. INSULATED GROUNDING BUSHINGS: Plated malleable iron body with 150 degree Centigrade molded plastic insulating throat, lay-in grounding lug with hardened stainless steel fasteners, OZ-Gedney BLG, or Thomas & Betts #TIGB series.

G. CONNECTIONS TO PIPE: For cable to pipe, OZ-Gedney G-100B series or Thomas & Betts #390X series, or Burndy type GAR.

H. CONNECTIONS TO STRUCTURAL STEEL, GROUND RODS, OR SPLICES: For splicing and/or connecting conductors, use exothermic welds or high pressure compression type connectors. Provide exothermic weld kits manufactured by Cadweld or Thermoweld. If high compression type connectors are used for cable-to-cable, or cable-to-steel, or cable-to-ground rod connections, provide Thomas & Betts #53000 series, or Burndy Hyground series.

I. BONDING JUMPERS: OZ-Gedney Type BJ, or Thomas & Betts #3840 series, or Burndy type GG and type B braid.

J. MAIN BUILDING REFERENCE GROUND BUS: Provide one 18" L. X 2" H X 1/4" thick copper bus bar (or size noted on drawings). Mount on walls in locations shown, on insulating stand offs, 18" AFF. Furnish complete with lugs for connecting grounding system cables. All holes shall be drilled and tapped for single hole lugs. Provide 6 spare lugs and 6 lug spaces.

K. INTERSYSTEM BONDING TERMINAL: Provide one 12” L. x 2” H x ¼” thick copper bus bar. Mount on wall adjacent to Main Electrical Service Equipment on insulating standoffs, 18” A.F.F. Furnish complete with lugs for connecting systems grounding cables. All holes shall be drilled for 2 hole compression lugs. Provide 6 spare lugs. Connect to equipment grounding bus in Main Electrical Service Equipment with No. 4 AWG copper conductor.

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PART 3 - EXECUTION

3.1 INSTALLATION OF GROUNDING SYSTEMS:

A. Install electrical grounding systems in accordance with manufacturer's written instructions and with recognized industry practices to ensure grounding devices comply with requirements.

B. Install clamp-on connectors only on thoroughly cleaned and metal contact surfaces, to ensure electrical conductivity and circuit integrity.

C. Provide grounding for the entire raceway, enclosure, equipment and device system in accordance with NEC. All non-metallic raceways shall include copper grounding conductor sized in accordance with NEC. Include copper grounding conductor in all raceway installed in suspended slabs.

D. Provide service entrance grounding by means of ground rods (quantity of two, driven exterior to building), by means of bonding to water main, and by means of bonding to building structural steel. In addition, provide a grounding electrode for not less than 30 lineal feet in concrete footing or foundation that is in direct contract with earth. Size electrode in accordance with NEC, but in no case, smaller than No. 4 AWG bare copper. Support electrode so as to be below finished grade near the bottom of the trench, and approximately three inches from the bottom or sides of the concrete. Locate a point of connection for inspection.

E. Provide grounding conductors for dimming systems in accordance with manufacturer's requirement.

3.2 GROUNDING ELECTRODES:

A. Concrete Encased Grounding Electrode (UFER Ground): Provide a #2/0 AWG minimum bare copper conductor encased along the bottom of concrete foundation or footings that are in direct contact with the earth and where there is no impervious water-proofing membrane between the footing and the soil. Extend electrode through a horizontal length of 30 feet minimum and encase with not less than 2 nor more than 5 inches of concrete separating it from surrounding soils. At point of emergence from concrete, run electrode through a protective non-metallic sleeve and extend to the main building reference ground bus.

B. Separately Derived Electrical System Grounding Electrode: Ground each separately derived system per requirements in NEC Section 250-26 unless indicated otherwise.

C. GROUNDING ELECTRODE CONDUCTOR: Provide grounding electrode conductor sized per NEC table 250-94 or as indicated.

D. POWER SYSTEM GROUNDING: Connect the following items using NEC sized copper grounding conductors to lugs on the Main Building Ground Bus.

1. Grounding electrode conductor from concrete encased electrode, and from ground rods, and from service entrance ground bus.
2. Conductor from main incoming cold water piping system.
3. Conductor from building structural steel.
4. Ground for separately derived systems.

E. Run main grounding conductors exposed or in metallic conduit if protection or concealment is required.

F. EQUIPMENT BONDING/GROUNDING: Provide a NEC sized conductor, whether

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indicated or not on the drawings, in raceways as follows:

1. Non-metallic conduits and ducts.
2. Distribution feeders.
3. Motor and equipment branch circuits.
4. Device and lighting branch circuits.
5. Provide grounding bushings and bonding jumpers for all conduit terminating in reducing washers, concentric, eccentric or oversized knockouts at panelboards, cabinets and gutters.

G. Provide bonding jumpers across expansion and deflection couplings in conduit runs, across pipe connections at water meters, and across dielectric couplings in metallic cold water piping system.

H. Provide bonding wire in all flexible conduit.

3.3 TESTING:

A. Obtain and record ground resistance measurements both from service entrance ground bus to the ground electrode and from the ground electrode to earth. Install additional bonding and grounding electrodes as required to comply with resistance limits specified under this Section.

B. Include typewritten records of measured resistance values in the Operation and Maintenance Manual.

C. Use independent testing agency for all testing.

D. Use test equipment expressly designed for the purpose intended. Submit name of testing agency for review and approval, in writing, to the Engineer prior to the performance of any testing.

END OF SECTION 26 0526

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SECTION 26 0529 - SUPPORTING DEVICES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification section, apply to work of this section.

B. This section is a Division-26 Basic Materials and Methods section, and is a part of each Division-26, 27 and 28 section making reference to supports, anchors, sleeves, and seals, specified herein.

C. RELATED SECTIONS: See Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 DESCRIPTION OF WORK:

A. Extent of supports, anchors, and sleeves is indicated by drawings and schedules and/or specified in other Division-26 sections. See Section 260532, Raceways, for additional requirements.

B. Work of this section includes supports, anchors, sleeves and seals required for a complete raceway support system, including but not limited to: clevis hangers, riser clamps, C-clamps, beam clamps, one and two hole conduit straps, offset conduit clamps, expansion anchors, toggle bolts, threaded rods, U-channel strut systems, threaded rods and all associated accessories.

1.3 QUALITY ASSURANCE:

A. Comply with NEC as applicable to construction and installation of electrical supporting devices. Comply with applicable requirements of ANSI/NEMA Std. Pub No. FB 1, "Fittings and Supports for Conduit and Cable Assemblies". Provide electrical components that are UL-listed and labeled.

PART 2 - PRODUCTS

2.1 MANUFACTURED SUPPORTING DEVICES:

A. GENERAL:

1. Provide supporting devices; complying with manufacturer's standard materials, design and construction in accordance with published product information, and as required for a complete installation; and as herein specified. See drawings for additional requirements.

PART 3 - EXECUTION

3.1 INSTALLATION OF SUPPORTING DEVICES:

A. Install hangers, anchors, sleeves, and seals as required, in accordance with manufacturer's written instructions and with recognized industry practices to ensure supporting devices comply with requirements. Comply with requirements of NECA, NEC and ANSI/NEMA for installation of supporting devices.

B. Coordinate with other electrical work, including raceway and wiring work, as necessary to interface installation of supporting devices with other work.

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C. Install hangers, supports, clamps and attachments to support piping properly from building structures. Arrange for grouping of parallel runs of horizontal conduits to be supported together on trapeze type hangers where possible. For pre-and post tensioned construction, use pre-set inserts for support of all electrical work. Do not use toggle bolts, moly bolts, wood plugs or screws in sheetrock or plaster as support for any equipment or raceway.

D. RACEWAYS:

1. Support raceways that are rigidly attached to structure at intervals not to exceed 8 feet on center, minimum of two straps per 10 foot length of raceway, and within 12" of each junction box, coupling, outlet or fitting. Support raceway at each 90° degree bend. Support raceway (as it is installed) in accordance with the following:

NUMBER OF RUNS	3/4" TO 1-1/4" 0	1-1/2" & LARGER 0
1	Full straps, clamps or hangers.	Hanger
2	Full straps, clamps or hangers.	Mounting Channel
3 or more	Mounting Channel	Mounting Channel

2. Support suspended raceways on trapeze hanger systems; or individually by means of threaded rod and straps, clamps, or hangers suitable for the application. Do not use independent support wires as a portion of any raceway support system; do not support raceway from ceiling support wires.

E. FLOOR MOUNTED EQUIPMENT:

1. Provide rigid attachment of all floor mounted equipment to the floor slab or structural system. Provide 5/8" bolts or expansion anchors at each 90 degree corner and at intervals not to exceed 48" on center along entire perimeter of the equipment. Provide rigid attachment for all floor mounted switchboards, panelboards, power and control equipment, motor control centers, dimmer cabinets, transformers (provide neoprene vibrations isolators at anchor points), oil switches, battery packs and racks, and similar equipment furnished under Division 26, 27 and 28.

F. WIREWAYS, BUS DUCTS AND CABLE TRAYS:

1. Provide vertical and lateral support systems for all wireways, busway, and cable trays that are supported from overhead structure. See Sections 260536 and 262500 for additional requirements.

END OF SECTION 26 0529

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SECTION 26 0532 - CONDUIT RACEWAY

PART 1 – GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

B. This section is a Division-26 Basic Materials and Methods section, and is part of each Division-26 section making reference to electrical raceways and specified herein.

C. RELATED SECTIONS: See Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 DESCRIPTION OF WORK:

A. Extent of raceways is indicated by drawings and schedules.

B. Types of raceways in this section include the following:

1. Electrical Metallic Tubing
2. Flexible Metal Conduit
3. Intermediate Metal Conduit
4. Liquid-tight Flexible Metal Conduit
5. Rigid Metal Conduit
6. Rigid Non-metallic Conduit

1.3 QUALITY ASSURANCE:

A. MANUFACTURERS: Firms regularly engaged in manufacture of raceway systems of types and sizes required, whose products have been in satisfactory use in similar service for not less than three (3) years.

B. STANDARDS: Comply with applicable portions of NEMA standards pertaining to raceways. Comply with applicable portions of UL safety standards pertaining to electrical raceway systems; and provide products and components that have been UL-listed and labeled. Comply with NEC requirements as applicable to construction and installation of raceway systems.

C. SUBMITTALS: Refer to Section 26 0502 for requirements.

PART 2 – PRODUCTS

2.1 METAL CONDUIT AND TUBING:

A. GENERAL:

1. Provide metal conduit, tubing and fittings of types, grades, sizes and weights (wall thicknesses) as indicated; with minimum trade size of 3/4".

B. RIGID METAL CONDUIT (RMC): FS WW-C-0581 and ANSI C80.1.

C. INTERMEDIATE STEEL CONDUIT (IMC): FS WW-C-581.

D. PVC EXTERNALLY COATED RIGID STEEL CONDUIT: ANSI C80.1 and NEMA Std. Pub. No. RN 1.

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E. ALUMINUM CONDUIT: Not acceptable.

F. MC CABLE: Steel MC cable where it is fully concealed. Provide EMT conduit where visible.

1. The use of MC-PCS cable is acceptable for light fixture whips utilizing 0-10v control schemes, not longer than 72" in length, located above removable grid ceilings. All MC cable shall be provided with anti-short fittings.

a. Acceptable Manufacturers

i. AFC – MC Luminary Cable

ii. Encore – MC-LED Lighting Cable

iii. Southwire – MC-PCS Duo

G. RIGID AND INTERMEDIATE STEEL CONDUIT FITTINGS:

1. Provide fully threaded malleable steel couplings; raintight and concrete tight where required by application. Provide double locknuts and metal bushings at all conduit terminations. Install OZ Type B bushings on conduits 1-1/4" and larger.

H. ELECTRICAL METALLIC TUBING (EMT): FS WW-C-563 and ANSI C80.3.

I. EMT FITTINGS:

1. Provide insulated throat nylon bushings with non-indenter type malleable steel fittings at all conduit terminations. Install OZ Type B bushings on conduits 1" larger. Cast or indenter type fittings are not acceptable.

J. FLEXIBLE METAL CONDUIT: FS WW-C-566, of the following type;

1. Zinc-coated steel.

K. FLEXIBLE METAL CONDUIT FITTINGS: FS W-F-406, Type 1, Class 1, and Style A.

L. LIQUID TIGHT FLEXIBLE METAL CONDUIT:

1. Provide liquid-tight, flexible metal conduit; constructed of single strip, flexible continuous, interlocked, and double-wrapped steel; galvanized inside and outside; coated with liquid-tight jacket of flexible polyvinyl chloride (PVC).

M. LIQUID-TIGHT FLEXIBLE METAL CONDUIT FITTINGS: FS W-F-406, Type 1, Class 3, Style G.

N. EXPANSION FITTINGS: OZ Type AX, or equivalent to suit application.

2.2 NON-METALLIC CONDUIT AND DUCTS:

A. GENERAL:

1. Provide non-metallic conduit, ducts and fittings of types, sizes and weights as indicated; with minimum trade size of 3/4".

B. UNDERGROUND PVC PLASTIC UTILITIES DUCT:

1. Minimum requirements shall be schedule 40 for encased burial in concrete and for Type II for direct burial.

C. PVC AND ABS PLASTIC UTILITIES DUCT FITTINGS:

D. ANSI/NEMA TC 9, match to duct type and material.

E. HDPE CONDUIT: Not acceptable.

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2.3 CONDUIT; TUBING; AND DUCT ACCESSORIES:

A. Provide conduit, tubing and duct accessories of types and sizes, and materials, complying with manufacturer's published product information, that mate and match conduit and tubing. Provide manufactured spacers in all duct bank runs.

2.4 SEALING BUSHINGS:

A. Provide OZ Type FSK, WSK, or CSMI as required by application. Provide OZ type CSB internal sealing bushings.

2.5 CABLE SUPPORTS:

A. Provide OZ cable supports for vertical risers, type as required by application.

PART 3 - EXECUTION

3.1 INSTALLATION OF ELECTRICAL RACEWAYS:

A. Install electrical raceways where indicated; in accordance with manufacturer's written instructions, applicable requirements of NEC and NECA "Standard of Installation", and in accordance with the following:

1. SERVICE ENTRANCE CONDUCTORS, AND CONDUCTORS OVER 600 VOLTS:

a. Install in rigid metal conduit (RMC), or intermediate metal conduit (IMC); except where buried below grade, install in non-metallic conduit.

2. FEEDERS UNDER 600 VOLTS:

a. Install feeders to panels and motor control centers and individual equipment feeders rated 100 amps and greater, in rigid metal conduit (RMC), or intermediate metal conduit (IMC), or Electrical Metallic Tubing (EMT); except where buried below grade, install in non-metallic conduit or duct.

3. BRANCH CIRCUITS, SIGNAL AND CONTROL CIRCUITS, AND INDIVIDUAL EQUIPMENT CIRCUITS RATED LESS THAN 100 AMPS:

a. Install in electric metallic tubing (EMT). Below concrete slab-on-grade or in earth fill, install in non-metallic plastic duct. In areas exposed to weather, moisture, or physical damage, install in RMC or IMC..

B. Coordinate with other work including metal and concrete deck work, as necessary to interface installation of electrical raceways and components.

C. Install raceway in accordance with the following:

1. Provide a minimum of 12" clearance measured from outside of insulation from flues, steam and hot water piping, etc. Avoid installing raceways in immediate vicinity of boilers and similar heat emitting equipment. Conceal raceways in finished walls, ceilings and floor (other than slab-on-grade), except in mechanical, electrical and/or communication rooms, conceal all conduit and connections to motors, equipment, and surface mounted cabinets unless exposed work is indicated on the drawings. Run concealed conduits in as direct a line as possible with gradual bends. Where conduit is exposed in mechanical spaces, etc., install parallel with or at right angles to building or room structural lines. Do not install lighting raceway until piping and duct work locations have been determined in order to avoid fixtures being obstructed by overhead equipment.

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2. Where cutting raceway is necessary, remove all inside and outside burrs; make cuts smooth and square with raceway. Paint all field threads (or portions of raceway where corrosion protection has been damaged) with primer and enamel finish coat to match adjacent raceway surface.
3. Provide a minimum of 1 ½" from nearest surface of the roof decking to raceway.
4. Provide a maximum of three phase conductors in any one conduit or as approved by electrical engineer. Where phase conductors share a common neutral they must have a means to simultaneously disconnect all ungrounded conductors at the point where the branch circuits originate. The ungrounded and neutral conductors of a multi-wire branch circuit must be grouped together by wire ties at the point of origination.
5. Provide neutral and ground wire as specified elsewhere in documents.
6. Provide separate neutral conductor for all single phase branch circuits installed. No shared neutrals are allowed. Neutral conductor shall be the same size as the phase conductor.

D. Comply with NEC for requirements for installation of pull boxes in long runs.

E. Cap open ends of conduits and protect other raceways as required against accumulation of dirt and debris. Pull a mandrel and swab through all conduit before installing conductors. Install a 200 lb. nylon pull cord in each empty conduit run.

F. Replace all crushed, wrinkled or deformed raceway before installing conductors.

G. Do not use flame type devices as a heat application to bend PVC conduit. Use a heating device that supplies uniform heat over the entire area without scorching the conduit.

H. Provide rigid metal conduit (RMC) for all bends greater than 22 degrees in buried conduit. Provide protective coating for RMC bend as specified herein.

I. Where raceways penetrate building, area ways, manholes or vault walls and floors below grade, install rigid metal conduit (RMC) for a minimum distance of 10 feet on the exterior side of the floor or wall measured from interior face. Provide OZ, Type FSK, WSK or CSMI sealing bushings (with external membrane clamps as applicable) for all conduit penetrations entering walls or slabs below grade. Provide segmented type CSB internal sealing bushings in all raceways penetrating building walls and slabs below grade, and in all above grade raceway penetrations susceptible to moisture migration into building through raceway.

J. Install liquid-tight flexible conduit for connection of motors, transformers, and other electrical equipment where subject to movement and vibration.

K. Install spare 3/4" conduits (capped) from each branch panelboard into the ceiling and floor space. Run five into the ceiling space and five into the floor space. Where the floor is not accessible run six conduits into the ceiling space. Run conduits the required distance necessary to reach accessible ceiling space.

L. Provide OZ expansion fittings on all conduits crossing building expansion joints, both in slab and suspended.

M. Provide OZ cable supports in all vertical risers in accordance with NEC 300-19; type as required by application.

N. Complete installation of electrical raceways before starting installation of cables/conductors within raceways.

O. Raceway installation below grade:

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1. Apply protective coating to metallic raceways in direct contact with earth or fill of any type; consisting of spirally wrapped PVC tape (1/2" minimum overlap of scotch wrap tape or equal); or factory applied vinyl cladding (minimum thickness .020 inches). Completely wrap and tape all field joints.
2. Burial depths must comply with NEC Section 300-5 but in no case be less than 24", unless noted otherwise on drawings.

P. Raceway installation below slab-on-grade, or below grade:

1. For slab-on-grade construction, install runs of rigid plastic conduit (PVC) below slab. All raceway shall be located a minimum of 8” below bottom of slab. Install RMC (with protective coating) for raceways passing vertically through slab-on-grade. Slope raceways as required to drain away from electrical enclosures and to avoid collection of moisture in raceway low points.
2. Apply protective coating to metallic raceways in direct contact with earth or fill of any type; consisting of spirally wrapped PVC tape (1/2" minimum overlap of scotch wrap tape or equal); or factory applied vinyl cladding (minimum thickness .020 inches). Completely wrap and tape all field joints.
3. Mark all buried conduits that do not require concrete encasement by placing yellow plastic marker tape (minimum 6" wide) along entire length of run 12" below final grade. Where multiple small lines are buried in a common trench and do not exceed an overall width of 16", install a single line marker.
4. Burial depths must comply with NEC Section 300-5 but in no case be less than 24", unless noted otherwise on drawings.

Q. MC CABLE:

1. MC Cable shall be supported and secured as follows:
   a. Cables shall be supported at intervals not exceeding 6 feet.
   b. Cables shall be secured with 12 inches of every box, cabinet, fitting or other cable termination.

R. Raceway installation in suspended slabs:

1. Not allowed.

S. Electrical Identification: Refer to Section 260553 for requirements.

T. SPARE PARTS: Refer to Section 26 0502 for requirements.

END OF SECTION 26 0532

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SECTION 26 0533 - ELECTRICAL BOXES AND FITTINGS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specifications sections, apply to work of this section.

B. This section is a Division-26 Basic Materials and Methods section, and is a part of each Division-26, 27 and 28 section making reference to electrical wiring boxes and fittings specified herein. See Section 260532, Raceways, for additional requirements.

C. RELATED SECTIONS: See Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 DESCRIPTION OF WORK:

A. The extent of electrical box and electrical fitting work is indicated by drawings and schedules.

B. Types of electrical boxes and fittings in this section include the following:

1. Outlet Boxes
2. Junction Boxes
3. Pull Boxes
4. Floor Boxes
5. Conduit Bodies
6. Bushings
7. Locknuts
8. Knockout Closures
9. Miscellaneous Boxes and Fittings

1.3 QUALITY ASSURANCE:

A. Comply with NEC as applicable to construction and installation of electrical boxes and fittings. Comply with ANSI C 134,1 (NEMA Standards Pub No. OS 1) as applicable to sheet-steel outlet boxes, device boxes, covers and box supports. Provide electrical boxes and fittings that have been UL-listed and labeled.

1.4 SUBMITTALS: Refer to Section 26 0502 for requirements.

PART 2 - PRODUCTS

2.1 FABRICATED MATERIALS:

A. INTERIOR OUTLET BOXES:

1. Provide one piece, galvanized flat rolled sheet steel interior outlet wiring boxes with accessory rings, of types, shapes and sizes, including box depths, to suit each respective location and installation, construct with stamped knockouts in back and sides, and with threaded screw holes with corrosion-resistant screws for securing box and covers and wiring devices; minimum size 4"x4"x2-1/8".

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2. Provide an 'FS' box, with no knockouts when surface mounted in a finished, non-utility space. Surface mounting is only acceptable when approved by the Architect.

B. INTERIOR OUTLET BOX ACCESSORIES:

1. Provide outlet box accessories as required for each installation, including mounting brackets, hangers, extension rings, fixture studs, cable clamps and metal straps for supporting outlet boxes, that are compatible with outlet boxes being used and fulfilling requirements of individual wiring applications.

C. WEATHERPROOF OUTLET BOXES:

1. Provide corrosion-resistant cast-metal weatherproof outlet wiring boxes, of types, shapes and sizes (including depth) required, with threaded conduit ends, cast-metal face plates with spring-hinged waterproof caps suitably configured for each application, with face plate gaskets and corrosion-resistant fasteners.

D. JUNCTION AND PULL BOXES:

1. Provide code-gage sheet steel junction and pull boxes, with screw-on covers; of types, shapes and sizes to suit each respective location and installation; with welded seams and equipped with stainless steel nuts, bolts, screws and washers.

E. FLOOR BOXES:

1. Single Service Floor Box: Provide leveling and fully adjustable floor service receptacle outlets and fittings of types and ratings indicated; and with finish as selected by Architect. Equip with wiring devices as specified in Section 262726. Provide boxes compatible with floor system; provide epoxy-coated stamped steel boxes or cast iron boxes for slab-on-grade construction; provide stamped steel boxes for suspended slabs. Equip with tile and/or carpet flanges to accommodate floor finish material. Boxes shall be available in one, two or three gang configurations. Boxes shall comply with UL Standard UL514A.

2. Multi-Service Floor Box: Provide leveling and fully adjustable multi compartment floor box; there shall be multiple independent wiring compartments; the floor box shall permit tunneling from end power compartment to end power compartment. Floor box shall accommodate a minimum of two duplex receptacles and two mounting plates for telecommunication devices. Equip with wiring devices as specified in Section 262726. Provide boxes compatible with floor system; with finish as selected by Architect. Provide epoxy-coated stamped steel boxes or cast-iron boxes for slab-on-grade construction; provide stamped steel boxes for suspended slabs. Equip with tile and/or carpet flanges to accommodate floor finish material. Boxes shall comply with UL Standards UL514A and/or UL514C.

3. Manufacturer: subject to compliance with requirements, provide floor boxes of one of the following:

a. Bell Electric/Square D Co.

b. Crouse-Hinds Co.

c. Harvey Hubbell, Inc.

d. Thomas & Betts.

e. Wiremold

F. CONDUIT BODIES:

1. Provide galvanized cast-metal conduit bodies, of types, shapes and sizes to suit respective locations and installation, construct with threaded-conduit-entrance ends, removable covers, and corrosion-resistant screws.

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G. BUSHINGS, KNOCKOUT CLOSURES AND LOCKNUTS:

1. Provide corrosion-resistant punched-steel box knockout closures, conduit locknuts and malleable steel conduit bushings and offset connectors, of types and sizes to suit respective uses and installation.

PART 3 - EXECUTION

3.1 INSTALLATION OF ELECTRICAL BOXES AND FITTINGS:

A. GENERAL:

1. Install electrical boxes and fittings where indicated, complying with manufacturer's written instructions, applicable requirements of NEC and NECA's "Standard of Installation", and in compliance with recognized industry practices to ensure that products fulfill requirements.
2. Coordinate installation of electrical boxes and fittings with wire/cable and raceway installation work.
3. Provide coverplates for all boxes. See Section 262726, Wiring Devices.
4. Provide weatherproof outlets for interior and exterior locations exposed to weather or moisture.
5. Provide knockout closures to cap unused knockout holes where blanks have been removed.
6. Install boxes and conduit bodies to ensure ready accessibility of electrical wiring. Do not install boxes above ducts or behind equipment. Install recessed boxes with face of box or ring flush with adjacent surface. Seal between switch, receptacle and other outlet box openings and adjacent surfaces with plaster, grout, or similar suitable material.
7. Fasten boxes rigidly to substrates or structural surfaces, or solidly embed electrical boxes in concrete or masonry. Use bar hangers for stud construction. Use of nails for securing boxes is prohibited. Set boxes on opposite sides of common wall with minimum 10" of conduit between them. Set boxes on opposite sides of fire resistant walls with minimum of 24” separation.
8. Provide a minimum of 1 ½” from the nearest surface of the roof decking to the installed boxes.
9. Provide electrical connections for installed boxes.

END OF SECTION 26 0533

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SECTION 26 0548 - ELECTRICAL SEISMIC CONTROL

PART 1 – GENERAL

1.1 WORK INCLUDED:

A. Anchorage and seismic restraint systems for all Division 26 isolated and non-isolated equipment, cable tray, and conduit systems.

B. Anchorage and seismic restrain systems for electrical components shall include but not be limited to the following:

1. Pad Mounted Equipment
2. Conduit
3. Light Fixtures

C. RELATED SECTIONS: See Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 RELATED WORK:

A. Requirements: Provide Electrical Seismic Control in accordance with the Contract Documents.

B. Section 260500 – Electrical General Provisions

1.3 REFERENCES:

A. International Building Code, Current Edition in use by Jurisdictional Authority.

B. NFPA Bulletin 90A, Current Edition.

C. UL Standard 181.

D. ASCE 7-10

1.4 SYSTEM DESCRIPTION

A. The Division 26 Contractor shall be responsible for supplying and installing equipment, vibration isolators, flexible connections, rigid steel frames, anchors, inserts, hangers and attachments, supports, seismic snubbers and bracing to comply with the following:

1. Short period design spectral response acceleration coefficient SDS=0.70.
2. One second period design spectral response acceleration coefficient SD1=0.28.
3. Site Class B.
4. Seismic Design Category D.
5. Importance Factor (Ip) = 1.0

B. Seismic Restraint Exceptions

1. The following components are exempt from the requirements of this section

1.5 QUALITY ASSURANCE:

A. All supports, hangers, bases, anchorage and bracing for all isolated equipment and non-isolated equipment shall be designed by a professional engineer licensed in the state where the project is located, employed by the restraint manufacturer, qualified with seismic experience in bracing for electrical equipment. Shop drawings submitted for earthquake bracing and anchors shall bear the Engineer's signed professional seal. All

calculations/design work required for the seismic anchorage and restraint of all Division 26 equipment and systems shall be provided by a single firm.

B. The above qualified seismic engineer shall determine specific requirements for equipment anchorage and restraints, locations and sizes based on shop drawings for the electrical equipment that have been submitted, reviewed and accepted by the Architect/Engineer for this project.

C. Seismic Engineer or the Engineer's Representative shall field inspect final installation and certify that bracing and anchorage are in conformance with the Seismic Engineer's design. A certificate of compliance bearing the Seismic Engineer's signed Professional Engineer's seal shall be submitted and shall be included in each copy of the Operation and Maintenance Manuals.

D. The Division 26 Contractor shall require all equipment suppliers furnish equipment that meets the seismic code, with bases/skids/curb designed to receive seismic bracing and/or anchorage. All isolated and non-isolated electrical equipment bracing to be used in the project shall be designed from the Equipment Shop Drawings and certified correct by the equipment manufacturer for seismic description listed in Paragraph 1.4 above, with direct anchorage capability.

1.6 SUBMITTALS: Refer to Section 26 0502 for requirements.

PART 2 – PRODUCTS:

2.1 RESTRAINT EQUIPMENT AND SYSTEMS:

A. Acceptable Manufacturers and Suppliers for Non-Isolated Systems:

1. Mason Industries, Inc.
2. Korfund
3. Amber/Booth Company
4. Vibration Mountings and Control Company
5. Kinetics
6. International Seismic Application Technology
7. Tolco

B. Manufacture and design of restraints and anchors for isolated equipment shall be by the manufacturer of the vibration isolators furnished for the equipment.

2.2 SNUBBERS:

A. Snubbers shall be all-directional and consist of interlocking steel members restrained by replaceable shock absorbent elastomeric materials a minimum of 3/4 inch thick.

B. Snubbers shall be manufactured with an air gap between hard and resilient material of not less than 1/8 inch or more than 1/4 inch.

C. Snubbers shall be Mason Industries Z -1011 or accepted equivalent.

PART 3 – EXECUTION

3.1 DESIGN AND INSTALLATION:

A. General:

1. All electrical components shall be braced, anchored, snubbed or supported to withstand seismic disturbances in accordance with the criteria of this specification. Provide all engineering, labor, materials, and equipment for protection against

seismic disturbances as specified herein. The following electrical components are exempt from seismic restraint requirements.

a. Electrical components in Seismic Design Category A or B (see section 1.4)

b. Electrical components in Seismic Design Category C provided that the component importance factor, I_p, is equal to 1.0 (see section 1.4).

c. Electrical components in Seismic Design Categories D, E, or F where all of the following apply:

i. The component importance factor, I_p, is equal to 1.0;

ii. The component is positively attached to the structure;

iii. Flexible connections are provided between the component and associated ductwork, piping, and conduit; and either

1. The component weighs 400 lb (1,780 N) or less and has a center of mass located 4 ft (1.22 m) or less above the adjacent floor level; or

2. The component weighs 20 lb (89 N) or less or, in the case of a distributed system, 5 lb/ft (73 N/m) or less.

2. Powder-actuated fasteners (shot pins) shall not be used for component anchorage in tension applications in Seismic Design Category D, E, or F.

3. Attachments and supports for electrical equipment shall meet the following provisions:

a. Attachments and supports transferring seismic loads shall be constructed of materials suitable for the application and designed and constructed in accordance with a nationally recognized structural code such as, when constructed of steel, AISC, Manual of Steel Construction (Ref. 9.8-1 or 9.8-2).

b. Friction clips shall not be used for anchorage attachment.

c. Expansion anchors shall not be used for electrical equipment rated over 10 hp (7.45 kW). Exception: Undercut expansion anchors.

d. Drilled and grouted-in-place anchors for tensile load applications shall use either expansive cement or expansive epoxy grout.

e. Supports shall be specifically evaluated if weak-axis bending of light-gauge support steel is relied on for the seismic load path.

f. Components mounted on vibration isolation systems shall have a bumper restraint or snubber in each horizontal direction. The design force shall be taken as 2Fp. The intent is to prevent excessive movement and to avoid fracture of support springs and any non- ductile components of the isolators.

g. Seismic supports shall be constructed so that support engagement is maintained.

B. Pad Mounted Equipment

1. Spring Isolated Equipment:

a. All vibration isolated equipment shall be mounted on rigid steel frames or concrete bases as described in the vibration control specifications unless the equipment manufacturer certified direct attachment capability. Each spring mounted base shall have a minimum of four all-directional seismic snubbers that are double acting and located as close to the vibration isolators as possible to facilitate attachment both to the base and the structure. Snubbers shall be installed with factory set clearances.

2. Non-Isolated Equipment:

a. The section 260548 (Electrical Seismic Control) Contractor shall be responsible for thoroughly reviewing all drawings and specifications to determine all equipment i.e. switchboards, transformers, generators, etc. to be restrained. This Contractor shall be responsible for certifying that this equipment is mounted and braced such that it adheres to the system description criteria in part 1.4 of this specification section.

C. Conduit, Conduit Racks/Trapeze Assemblies:

1. Seismic braces for be omitted when the distance from the supporting structure to the raceway support point is 12” or less. Where rod hangers are used, they shall be equipped with swivels to prevent inelastic bending in the rod.
2. Seismic braces may be omitted where the total weight of the assembly is less than 10 lb/ft.
3. Seismic braces for individual conduit may be omitted for conduit less than 2.5 inch trade size.
4. A rigid conduit system shall not be braced to dissimilar parts of a building or two dissimilar building systems that may respond in a different mode during an earthquake. Examples: Wall and a roof; solid concrete wall and a metal deck with lightweight concrete fill.
5. Unbraced conduit attached to in-line equipment shall be provided with adequate flexibility to accommodate differential displacements.
6. At the interface of adjacent structures or portions of the same structure that may move independently, utility lines shall be provided with adequate flexibility to accommodate the anticipated differential movement between the ground and the structure.
7. Provide large enough pipe sleeves through wall or floors to allow for anticipated differential movements.
8. For spaces, where the Importance Factor (Ip) is equal to 1.5, all electrical components that are attached to structures that could displace relative to one another and for isolated structures where components cross the isolation interface, the components shall be designed to accommodate the seismic relative displacements.

D. Light Fixtures

1. Light fixtures, lighted signs, and ceiling fans not connected to ducts or piping, which are supported by chains or otherwise suspended from the structure, are not required to satisfy the seismic force and relative displacement requirements provided they meet all of the following criteria:
   a. The design load for such items shall be equal to 1.4 times the operating weight acting down with a simultaneous horizontal load equal to 1.4 times the operating weight. The horizontal load shall be

b. applied in the direction that results in the most critical loading for the design.
c. Seismic interaction effects shall not cause an effect so that the failure of the non-essential component causes a failure of an essential component.
d. The connection to the structure shall allow a 360° range of motion in the horizontal plane.

e. The component is less than 20 lbs and has flexible connections and an importance factor (Ip) equal to 0.

END OF SECTION 26 0548

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SECTION 26 0553 - ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

B. Requirements of the following Division 26 Sections apply to this section:

1. “Basic Electrical Requirements”.
2. “Basic Electrical Materials and Methods”.

C. **RELATED SECTIONS: See Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.**

1.2 SUMMARY

A. This section includes identification of electrical materials, equipment and installations. It includes requirements for electrical identification components including but not limited to the following:

1. Buried electrical line warnings.
2. Identification labels for raceways, cables and conductors.
3. Operational instruction signs.
4. Warning and caution signs.
5. Equipment labels and signs.
6. Arc-flash hazard labels

B. Related Sections: The following sections contain requirements that relate to this section:

C. Division 9 Section “Painting” for related identification requirements.

D. Refer to other Division 26 sections for additional specific electrical identification associated with specific items.

1.3 QUALITY ASSURANCE

A. Electrical Component Standard: Components and installation shall comply with NFPA 70 “National Electrical Code”

1.4 SUBMITTALS: Refer to Section 26 0502 for requirements.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. American Labelmark Co.
2. Calpico, Inc.
3. Cole-Flex Corp.
4. Emed Co., Inc.

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5. George-Ingraham Corp.
6. Ideal Industries, Inc.
7. Kraftbilt
8. LEM Products, Inc.
9. Markal Corp
10. National Band and Tag Co.
11. Panduit Corp.
12. Radar Engineers Div., EPIC Corp.
13. Seton Name Plate Co.
14. Standard Signs, Inc.
15. W.H Brady, Co.

2.2 ELECTRICAL IDENTIFICATION PRODUCTS

A. Colored paint for raceway identification:
   1. Use Kwal Paint colors as specified in Part 3 – Execution.
B. Color Adhesive Marking Tape for Raceways, Wires and Cables:
   1. Self-adhesive vinyl tape not less than 3 mills thick by 1” to 2” in width.
C. Underground Line Detectable Marking Tape:
   1. Permanent, bright colored, continuous-printed, acid- and alkali-resistant plastic tape specifically compounded for direct-burial service. Not less than 6” wide by 4 mills thick.
   2. With metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep.
   3. Printed legend indicative of general type of underground line below.
D. Wire/Cable Designation Tape Markers:
   1. Vinyl or vinyl-cloth, self-adhesive, wraparound, cable/conductor markers with pre-printed numbers and letters.
E. Brass or Aluminum Tags:
   1. Metal tags with stamped legend, punched for fastener.
   2. Dimensions: 2” X 2” 19 gage.
F. Engraved, Plastic Laminated Labels, Signs and Instruction Plates:
   1. Engraving stock plastic laminate, 1/16” minimum thickness for signs up to 20 sq. in. or 8” in length; 1/8 “ thick for larger sizes. Engraved legend in 1/4” high white letters on black face and punched for mechanical fasteners.
G. Arc-flash Hazard Labels:
   1. ANSI Z535.4 Safety Label.
   2. Adhesive backed polyester with self-laminating flap. Chemical, abrasion and heat resistant.
   3. Dimensions: 5” x 3.5”
   4. Information contained: Arc-flash boundary; Voltage; Flash Hazard Category; Incident Energy (arc rating); checkboxes for the required Personal Protective Equipment (PPE) and the date that the calculations were performed.

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H. Equipment Labels:

1. Adhesive backed polyester with self-laminating flap. Chemical, abrasion and heat resistant.
2. Dimensions: minimum 5” x 2”
3. Conductor-Identification-Means Labels:
   a. Information contained: the method utilized for identifying ungrounded conductors within switchboards, distribution panels and branch circuit panels.
4. Available-Fault-Current Labels:
   a. Information contained: maximum available fault current at the respective piece of equipment, and date of calculation of fault current.
5. Source-of-Supply Labels:
   a. Information contained: indicate the device or equipment where the power supply originates.

I. Baked Enamel Warning and Caution Signs for Interior Use:

1. Preprinted aluminum signs, punched for fasteners, with colors legend and size appropriate to location.

J. Fasteners for Plastic-Laminated and Metal Signs:

1. Self-tapping stainless steel screws or # 10/32 stainless steel machine screws with nuts, flat and lock washers.

K. Cable Ties:

1. Fungus-inert, self-extinguishing, one-piece, self-locking nylon cable ties, 0.18” minimum width, 50-lb. Minimum tensile strength, and suitable for a temperature range from minus 40° F. to 185° F. Provide ties for specified colors when used for color coding.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Lettering and Graphics:

1. Coordinate names, abbreviations, colors and other designations used in electrical identification work with corresponding designations specified or indicated. Install numbers, lettering and colors as approved in submittals and as required by code.

B. Install identification devices in accordance with manufacturer’s written instructions and requirements of NEC.

C. Sequence of Work:

1. Where identification is to be applied to surfaces that require a finish, install identification after completion of finish work.

D. Underground Electrical Line Identification.

1. During trench backfilling, for exterior underground power, signal, and communications lines, install continuous underground line detectable marking tape, located directly above line at 6 to 8 inches below finished grade. Where multiple lines are installed in a common trench or concrete envelope, do not exceed an overall width of 16 inches; install a single line marker.

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2. Install detectable marking tape for all underground wiring, both direct-buried and in raceway.
3. Provide red marker dye applied to concrete encased ductbank.

E. Conductor Color Coding.

1. Provide color coding for secondary service, feeder and branch circuit conductors throughout the project secondary electrical system as follows:

CONDUCTOR	208Y / 120V System	480Y / 277V System
Phase A	Black	Brown
Phase B	Red	Orange
Phase C	Blue	Yellow
Shared/Single Neutral	White	Gray
Neutral A (dedicated)	White w/Black Stripe	Gray w/Black Stripe
Neutral B (dedicated)	White w/Red Stripe	Gray w/Orange Stipe
Neutral C (dedicated)	White w/Blue Stripe	Gray w/Yellow Stipe
Equipment Ground	Green	Green
Isolated Ground	Green w/Yellow Strip	Green w/Yellow Stripe

2. Switch legs, travelers and other wiring for branch circuits shall be of colors other than those listed above.
3. Use conductors with color factory applied the entire length of the conductors except as follows:
   a. The following field-applied color-coding methods may be used in lieu of factory-coded wire for sizes larger than No. 10 AWG.
   b. Apply colored, pressure-sensitive plastic tape in half-lapped turns for a distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply the last two laps of tape with no tension to prevent possible unwinding. Use 1-inch-wide tape in colors as specified. Do not obliterate cable identification markings by taping. Tape locations may be adjusted slightly to prevent such obliteration.
   c. In lieu of pressure-sensitive tape, colored cable ties may be used for color identification. Apply three ties of specified color to each wire at each terminal or splice point starting 3 inches from the terminal and spaced 3 inches apart. Apply with a special tool or pliers, tighten for snug fit, and cut off excess length.

F. Power Circuit Identification.

1. Securely fasten identifying metal tags or aluminum wraparound marker bands to cables, feeders, and power circuits in vaults, pull boxes, junction boxes, manholes, and switchboard rooms with 1/4-inch steel letter and number stamps with legend to correspond with designations on Drawings. If metal tags are provided, attach them with approximately 55-lb monofilament line or one-piece self-locking nylon cable ties.
2. Tag or label conductors as follows:

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a. Future Connections: Conductors indicated to be for future connection or connection under another contract with identification indicting source and circuit numbers.

b. Multiple Circuits: Where multiple branch circuits or control wiring or communications/ signal conductors are present in the same box or enclosure (except for three-circuit, four-wire home runs), label each conductor or cable. Provide legend indicating source, voltage, circuit number, and phase for branch circuit wiring. Phase and voltage of branch circuit wiring may be indicated by mean of coded color of conductor insulation. For control and communications/signal wiring, use color coding or wire/cable marking tape at terminations and at intermediate locations where conductors appear in wiring boxes, troughs, and control cabinets. Use consistent letter/number conductor designations throughout on wire/cable marking tapes.

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.

G. Apply warning, caution and instruction signs and stencils as follows:

1. Install warning, caution, or instruction signs where required by NEC, where indicated, or where reasonably required to assure safe operation and maintenance of electrical systems and of the items they connect. Install engraved plastic-laminated instruction signs with approved legend where instructions or explanations are needed for system or equipment operation. Install butyrate signs with metal backing for outdoor items. Warning and caution signs shall be furnished and installed on, but not be limited to the following equipment and locations:

a. Entrances to rooms and other guarded locations that contain exposed live parts 600 volts or less; signs shall forbid unqualified personnel to enter.

b. Switch and Overcurrent device enclosures with splices, taps and feed-through conductors. Provide warning label on the enclosures that identifies the nearest disconnecting means for any feed-through conductors.

c. Entrances to buildings, vaults, rooms or enclosures containing exposed live parts or exposed conductors operating at over 600 volts: DANGER-HIGH VOLTAGE-KEEP OUT.

d. Metal-enclosed switchgear, unit substations, transformers, enclosures, pull boxes, connection boxes and similar equipment operating at over 600 volts shall have appropriate caution signs and warning labels.

e. Indoor and Outdoor substations operating over 600 volts. Provide warning signs, instructional signs and single-line diagrams in accordance with NEC 225.70.

H. Emergency Operating Signs: Install engraved laminated 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.

I. Install equipment/system circuit/device identification as follows:

1. Apply equipment identification labels of engraved plastic-laminate on each major unit of electrical equipment in building, including central or master unit of each electrical system. This includes communication/signal/alarm systems, unless unit is specified with its own self-explanatory identification. Except as otherwise indicated, provide single line of text, with 1/4"-high lettering on 1-inch-high label (1 1/2-inch-high where two lines are required) white lettering in black field. White lettering in red field for Emergency Power Systems. Text shall match terminology

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and numbering of the Contract Documents and shop drawings. Apply labels for each unit of the following categories of electrical equipment.

a. Each service disconnect, to identify it as a service disconnect.

b. Panelboards (exterior and interior), electrical cabinets, and enclosures. For subpanels, identify feeder circuit served from.

c. Switches in fusible panelboards shall be labeled. Main switches shall be identified.

d. Access doors and panels for concealed electrical items.

e. Electrical switchgear and switchboards.

f. Motor starters, including circuit origination, HP, heater size, FLA, and mechanical equipment designation.

g. Disconnect switches.

h. Pushbutton stations.

i. Power transfer equipment.

j. Contactors.

k. Dimmers.

l. Control devices.

m. Power generating units, to include transfer switches.

n. Fire alarm master station or control panel.

o. Variable frequency drives.

p. Lighting Control Equipment.

J. Post Conductor-Identification-Means labels at locations of switchboards, distribution panels and branch circuit panels. The labels shall identify the color-coding used on ungrounded conductors for each voltage system used on the premises.

K. Apply Available-Fault-Current labels at the service entrance equipment.

L. Apply Source-of-Supply labels on the exterior covers of equipment (except in single- or two-family dwellings) as follows:

1. Each switchboard supplied by a feeder.

2. Each branch circuit panelboard supplied by a feeder.

3. Each disconnect switch serving elevators, escalators, moving walks, chairlifts, platform lifts and dumbwaiters.

4. Each dry type transformer (or primary-side disconnect switch at transformer). If the primary-side disconnect is remote from the transformer, both the remote disconnect and the transformer shall be labeled, and the transformer label shall also indicate the location of the disconnect.

5. Each feeder disconnect, branch circuit disconnect, panelboard or switchboard in a remote building or structure.

6. Each on-site emergency power source, with sign placed at service entrance equipment to comply with NEC 700.

M. The label shall identify the device or equipment where the power supply originates, and the system voltage and phase. For example: Feeder Power Supply for Panel “XX” Originates at Panel “XX” (or Switchboard “XX”, Transformer “XX”, Switch “XX”, etc.); 120/208 volts, 3-phase (or 120/240, 277/480, etc.).

N. Install Arc-flash hazard labels on the following equipment:

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1. Each piece of service entrance equipment.
2. Each power distribution switchboard or panel.
3. Each individually mounted circuit breaker.
4. Each branch circuit panelboard.
5. Each motor control center.
6. Each individually mounted motor starter.
7. Each meter socket enclosure.

O. Apply circuit/control/item designation labels of engraved plastic laminate for disconnect switches, breakers, pushbuttons, pilot lights, motor control centers, and similar items for power distribution and control components above, except panelboards and alarm/signal components, where labeling is specified elsewhere.

P. Install labels at locations indicated and at locations for best convenience of viewing without interference with operation and maintenance of equipment.

Q. Engrave all receptacle plates other than those serving 120 volt, single phase devices. State voltage and amperage characteristics: Example; “208V 30A”.

R. Mark each device box (for each type of wiring device) with a permanent ink felt tip marker, indicating the circuit that the device is connected to: Example; “CKT A-1”

S. Label circuit breaker feeding fire alarm panel “Fire Alarm Circuit”. Using plastic laminate label, white lettering on a red background.

END OF SECTION 26 0553

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SECTION 26 0573 - PROTECTIVE DEVICE STUDY

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary conditions and Division 1 Specification sections, apply to work of this section.

B. **RELATED SECTIONS: See Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.**

1.2 DESCRIPTION OF WORK:

A. Studies in this section include the following:

1. Fault current protective device and equipment evaluation
2. Protective device coordination study
3. Arc-flash hazard analysis and study

1.3 QUALITY ASSURANCE:

A. Provide protective device and arc-flash hazard studies performed by qualified engineers of the equipment manufacturer or an approved consultant. Studies must bear the professional engineer's stamp of the engineer in responsible charge of the protective device studies. Perform all work in accordance with latest IEEE and ANSI standards.

1.4 SUBMITTALS: Refer to Section 26 0502 for requirements.

PART 2 – STUDIES

2.1 FAULT CURRENT PROTECTIVE DEVICE & EQUIPMENT EVALUATION

A. Perform fault current analysis with the aid of a computer and appropriate software. Include as input data the maximum available short circuit contribution, resistance and reactance components of the branch impedances, the X/R ratios, base quantities selected, and other source impedances.

B. Coordination Criteria:

1. All overcurrent protective devices serving the essential electrical system shall be coordinated for the period of time that a fault's duration extends beyond 0.1 second.

2. Coordination shall not be required as follows:

a. Between transformer primary and secondary overcurrent protective devices, where only one overcurrent protective device or set of overcurrent protective devices exist on the transformer secondary.

b. Between overcurrent protective devices of the same size (ampere rating) in series.

C. Calculate fault current close and latch duty values and interrupting duty values on the basis of assumed three-phase bolted short circuits at each switchgear bus, medium voltage

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controller, switchboard, low voltage motor control center, distribution panelboard, branch circuit panel and other significant locations throughout the system. Include symmetrical fault currents, and X/R ratios in the fault current tabulations. For each fault location, list the total duty on the bus, as well as the individual contribution from each connected branch, with its respective X/R ratio. Calculate ground fault currents at each bus. Incorporate major motor contributions in determining momentary and interrupting ratings of protection devices.

D. Perform an evaluation to determine the adequacy of circuit breakers, molded case switches, automatic transfer switches, and fuses, by tabulating and comparing the short circuit ratings of these devices with the calculated fault currents. Apply appropriate multiplying factors based on system X/R ratios and protective device rating standards. Report problem areas or inadequacies in the equipment due to short circuit currents prior to release for fabrication of switchgear, switchboards and/or appliance panelboard.

2.2 PROTECTIVE DEVICE COORDINATION STUDY

A. Perform a protective device coordination study including the necessary calculations and logic decisions required to select power fuse ratings, protective relay characteristics and settings, ratios and characteristics of associated current transformers, and low voltage breaker trip characteristics and settings. Perform the studies in accordance with the latest applicable IEEE and ANSI standards.

B. Include all medium and low voltage classes of equipment in the coordination study from the building or plant service protective devices down to and including the largest rated device in the low voltage motor control centers and panelboards. Include the phase and ground overcurrent protection as well as settings of all other adjustable protective devices.

C. Develop time-current characteristics of the specified protective devices on log-log paper. Include complete titles, representative one-line diagram and legends, significant motor starting characteristics, complete parameters of transformers, complete operating bands of low voltage circuit breaker trip curves and fuses. Indicate on plots the types of protective devices selected, proposed relay taps, time dial and instantaneous trip settings, transformer magnetizing inrush and ANSI transformer withstand parameters, cable thermal overcurrent withstand limits and significant symmetrical and asymmetrical fault currents. Adhere to all restrictions of the National Electrical Code. Maintain proper coordination intervals and separation of characteristic curves.

D. Provide coordination plots for phase and ground protective devices on a system basis. Provide a sufficient number of separate curves to clearly indicate the coordination achieved.

E. Provide the selection and settings of the protective devices in a tabulated form listing circuit identification, IEEE device number, current transformer ratios and connection, manufacturer and type, range of adjustment and recommended settings. Provide a tabulation of the recommended power fuse selection for medium voltage fuses where applied in the system. Promptly report any discrepancies, problem areas, or inadequacies prior to release for fabrication of switchgear, switchboards and/or appliance panels.

2.3 ARC-FLASH HAZARD ANALYSIS AND STUDY

A. Perform an arc-flash hazard analysis and study. Include the necessary calculations required to determine the level of Personal Protection Equipment (PPE) that a worker must use, the Arc Flash Boundary in inches, and the incident energy at each location. This information shall be calculated and determined for each piece of service entrance equipment, each power distribution switchboard or panel, each separately-mounted circuit breaker, each motor control center, each individually mounted motor starter, and for each

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branch circuit panelboard.

B. Perform the analysis and study in accordance with IEEE 1584.

C. Furnish and install a label at each piece of service equipment, each power distribution switchboard or panel, each separately mounted circuit breaker, each motor control center, each individually mounted motor starter, and each branch circuit panel board. The label shall be an ANSI approved Arc Flash Warning Label that warns and instructs workers of the arc flash hazard, voltage, arc flash boundary, and required PPE (Personal Protective Equipment).

2.4 ANALYSIS/REPORT

A. Include the following in the report.

1. Description, purpose, basis and scope of the study and a single line diagram of that portion of the power system that is included within the scope of the study.
2. Tabulations of circuit breaker, fuse and other protective device ratings versus calculated short circuit duties and commentary regarding same. Include formulas and description of methods used.
3. Protective device time versus current coordination curves, tabulations of relay and circuit breaker trip settings, fuse selection, and commentary regarding same.
4. Fault current calculations including a definition of terms and guide for interpretation of computer printout.
5. Recommended size for power fuses and recommended settings for ground fault relays and for all adjustable trip relays, circuit breakers, etc.
6. Tabulation of arc-flash calculations for each location and tabulation of arc-flash hazard, voltage, boundary and required PPE for each equipment item listed in the arc-flash analysis.

2.5 PROTECTIVE DEVICE TESTING, CALIBRATION AND ADJUSTMENT

A. Provide the services of a qualified field engineer employed by the equipment manufacturer, and necessary tools and equipment to test, calibrate and adjust the protective relays, ground fault relays and circuit breaker trip devices as recommended in the Protective Device Study.

2.6 TYPEWRITTEN DEVICE SETTING TABULATION:

A. Provide type written tabulation that includes all settings for each protective relay, ground fault relay and circuit breaker solid-state trip devices. Enclose the table in a protective plastic sleeve and affix to the main service entrance equipment.

END OF SECTION 26 0573

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SECTION 26 0923 - OCCUPANCY SENSORS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

B. This section is a Division-26 Basic Materials and Methods section, and is part of each Division-26 section making reference to wiring devices specified herein.

C. RELATED SECTIONS: See Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 DESCRIPTION OF WORK:

A. The extent of occupancy sensor work is indicated by drawings and schedules.

B. Types of occupancy sensors in this section include the following:

1. Control Pack
2. Dual Technology Wall Switch
3. Dual Technology Wall Switch with Dimming and Daylight Control.
4. Dual Technology Ceiling Sensor w/ Control Pack

1.3 QUALITY ASSURANCE:

A. Comply with NEC and NEMA standards as applicable to construction and installation of occupancy sensors. Provide occupancy sensors that have been UL listed and labeled.

B. All sensors shall be capable of operating normally with electronic ballasts, PL lamp systems, motor loads and any other passive infrared or microwave systems.

1.4 SUBMITTALS: Refer to Section 26 0502 for requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURER: The manufacturer shall have a minimum of five years of experience in the sensor and lighting control industry. Sensors and related relays shall be compatible with the specific lighting types controlled. All sensors shall be of the same manufacturer, mixing brands of sensors is not acceptable.

A. DUAL TECHNOLOGY WALL SWITCH: Where units are indicated provide a sensor that meets the following minimum requirements:

1. Sensor shall utilize PIR (Passive Infrared) to turn on the lights and then PIR or US (Ultrasonic) technologies to keep lights on.
2. Sensor shall incorporate an inrush current limiter circuit to protect the relay contacts.
3. Sensor shall utilize single or dual dry relay contacts for control of the lighting loads. Contractor shall verify requirements in coordination with the drawings.
4. Sensor shall have a self-adjusting time delay, selectable 5, 15 and 30 minutes.
5. Sensor shall have automatic sensitivity adjustment and be microprocessor controlled.

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6. Sensor shall have light level sensing 0 to 200 footcandles.
7. Sensor shall have a 180 degree field of view, coverage up to 800 square feet and shall detect 6 inches of hand movement towards the sensor up to 300 square feet; and body motion towards the sensor up to 1000 square feet.
8. Sensor shall be rated for 0 to 800 watts at 120VAC and 0 to 1200 watts at 277VAC.
9. Sensor shall be automatic on and shall have an automatic to off override switch on the unit. Switch shall be equipped with an air gap switch to disconnect power to the lighting load.
10. Sensor shall have real time motion indicator on the front of the unit.
11. Sensor shall mount to a single gang switch box.
12. Subject to compliance with the above requirements. Provide models of one of the following:
    a. Greengate ONW-DT
    b. Sensor Switch WSX PDT Series
    c. Douglas WOS Series

B. DUAL TECHNOLOGY WALL SWITCH WITH DIMMING AND DAY-LIGHT CONTROL: Where units are indicated, provide a sensor that meets the following minimum requirements:

1. Dual technology sensors shall have one of its two technologies, not require motion to detect occupancy.
2. Sensors shall offer a minimum on timer of at least 15 minutes, in order to prevent all cycling of lamps before they have burned for the lamp manufacturers minimum recommended time period.
3. Sensors shall utilize an occupancy time delay that keeps lights on after last detected occupancy. Factory default setting of the occupancy time delay shall be 15 minutes.
4. Manual adjustment to the occupancy time delay so as to increase it shall be accommodated.
5. Sensor shall be capable of switching both 120 VAC and 277 VAC.
6. Sensor shall recess into single gang switch box and fit standard GFI opening.
7. Sensor shall meet NEC grounding requirements by providing a dedicated ground connection and intrinsically grounding through its mounting strap.
8. Line and load wire connections shall be interchangeable.
9. Wall switch sensor shall have field programmable adjustments for selecting operational modes, occupancy time delays, minimum on time, and photocell set-point.
10. Sensor shall be capable of both auto-on and manual operation.
11. Combination photocell/dimming sensors set point and deadband shall be automatically calibrated through the sensors microprocessor by initiating the

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automatic set point programming procedure. Min and max dim settings as well as set point may be manually entered.

12. Subject to compliance with the above requirements, provide models of one of the following:

    a. Sensor-Switch – WSX-PDT-D Series

    b. Green Gate – CSW-d-010

C. DUAL TECHNOLOGY CEILING SENSOR: Where units are indicated, provide a sensor that meets the following minimum requirements:

1. Sensor shall incorporate ultrasonic (microphonics) and infrared technologies in a single unit.
2. Sensor shall be Class 2, low voltage; capable of mounting in the ceiling for maximum coverage.
3. Sensor shall use internal microprocessor for motion signal analysis and automatic self-adjustment.
4. Sensor shall have automatic self-adjustment algorithm that adjusts timer and sensitivity settings to maximize performance and minimize energy usage.
5. Sensor shall have manual time-out adjustment from 8 minutes to 32 minutes and automatic time out from 8 minutes to 100 minutes.
6. Sensor shall have test time-out setting of 8 seconds, with automatic return to 8 minutes after one hour if sensor is left in test mode.
7. Sensor's microprocessor shall automatically extend timer by 1 hour in response to recognition to false off condition. After 5 hours, sensor reduces extended time by 30 minutes and continues to reduce by 30 minute increments over the next few days.
8. Sensor's microprocessor shall automatically reduce either PIR or ultrasonic sensitivity in response to false on condition.
9. Sensor microprocessor will automatically monitor PIR background threshold signal level and makes corresponding sensitivity adjustments automatically.
10. Sensor microprocessor algorithm shall incorporate automatic adaptation to continuous airflow.
11. For airflow that is so intense as to mask motion, sensor shall flash indicator LED code to indicate excessive airflow.
12. Sensor's microprocessor shall use a four week learning period and develop a circadian calendar.
13. An internal 24 hour 7 day clock establishes what periods the room is typically occupied, biasing sensor to keep lights on while normally occupied and off when normally unoccupied.
14. Sensor shall have selection settings for the following dual technology schemes:
    a. High Sensitivity and High Confidence (miser mode)
15. Sensor shall be available with either 180 degrees or 360 degrees coverage pattern.
16. Infrared lens shall have 360 degree field of view. Two types of lens shall be available, standard and extra dense.

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17. Sensor shall have a variety of mask inserts for PIR coverage rejection to prevent false tripping.
18. Transducers shall be protected from tampering.
19. Sensor shall have manual adjustments for timer and sensitivities and override switches to force manual adjustment mode.
20. Sensor shall have adjustable sensitivity from 0% to 100% for both ultrasonic and infrared.
21. Controls shall be behind cover to resist tampering. All adjustments shall be accessible from the front of the sensor.
22. Sensor shall be available with a photocell adjustment from 20 to 3,000 Lux.
23. Sensor shall provide internal operating status and settings confirmation via LED motion lamp indicator.
24. Sensor shall have two (if 180 degree) or three (if 360 degree) real time LED motion indicators visible from the front of the unit: Red = infrared; green = ultrasonic.
25. Subject to compliance with the above requirements, provide models of one of the following:
    a. Hubbell-ATD Series
    b. Sensor Switch-CM-PDT 9/10 Series
    c. Wattstopper-DT Series
    d. Mytech-Omni-DT Series
    e. Leviton – OSC UOW Series
    f. Greengate OAC– DT Series
    g. Douglas – WOR Series

D. 24 VDC POWER/CONTROL PACK: Where units are indicated, provide a power/control pack that meets the following minimum requirements:

1. Control module shall consist of a DC power supply and a dry contact relay for switching a lighting load.
2. Control module shall be available in versions to accept 120, and 277 VAC line voltages.
3. Output shall be 24VDC nominal, and shall be inherently safe, low voltage, limited power output (Class 2).
4. Output shall supply 100mA current, in addition to current consumed internally to operate internal relay.
5. Relay shall utilize normally open, silver alloy dry contacts, and shall be rated for a 20A ballast load at 120V and 277V.
6. Relay function shall not require more than 5 mA control current to operate.
7. Control module shall have line voltage wiring, consisting of input voltage and relay contact connections, exiting from one end, and low voltage DC connections, consisting of ground, power, and control wires, exiting from the other end.
8. Control module shall be sized to fit inside a standard 4” x 4” junction box.
9. Control module shall be equipped with a 1/2” EMT threaded male fitting on the line voltage end, such that it may be mounted to the outside of a junction box with the line voltage wiring internal to the box and the low voltage wiring external.
10. Control module shall be equipable with accessory 1/2” EMT threaded male fitting on the low voltage end, such that it may be mounted to the inside of a ballast cavity

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with the box and line voltage wiring internal to the cavity and the low voltage wiring external.

11. Slave module shall be available for switching additional circuits. Slave module has same construction and specifications as control module except without power supply function.

12. Subject to compliance with the above requirements, provide models of one of the following:

    a. Hubbell-CU Series
    b. Sensor Switch-MP20 Series
    c. Wattstopper-BEP Series
    d. Mytech-MP Series
    e. Greengate SP20-MV Series
    f. Leviton – OSC/OSA Series
    g. Douglas – WP-PP

PART 3 – EXECUTION

3.1 INSTALLATION OF LIGHTING CONTROL EQUIPMENT:

A. Install occupancy lighting control system components and ancillary equipment as indicated, in accordance with equipment manufacturer's written instructions, and with recognized industry practices, to ensure that lighting control equipment complies with requirements.

B. Comply with requirements of NEC, and applicable portions of NECA's "Standard of Installation" pertaining to general electrical installation practices.

C. Coordinate with other electrical work, including raceways, and electrical boxes and fittings, as necessary to interface installation of lighting control equipment work with other work.

D. Contractor shall be on site as required, to adjust lighting control units for proper operation.

E. Mount the switchpack in a standard 4" junction box. Mount sensor to a standard 4” junction boxes. Refer to manufacturer supplied mounting instructions.

F. Spare Parts: Refer to Section 26 0502 for requirements.

3.2 FIELD QUALITY CONTROL:

A. Upon completion of installation and after circuitry has been energized, demonstrate capability and compliance of system with requirements.

B. System start-up: Provide a factory authorized technician to verify the installation and test the system.

C. Where possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units, and proceed with retesting.

D. Contractor shall visit the job site 3 months after the owner has taken occupancy and adjust any units not operating properly, otherwise remove and replace with new units.

3.3 PRODUCT SUPPORT AND SERVICES:

A. System Start-Up: Provide a factory authorized technician to verify the installation, test the system, and train the owner on proper operation and maintenance of the system. Before requesting start-up services, the installing contractor shall verify that:

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1. The sensors have been fully installed in accordance with manufacturer's installation instructions.
2. Low voltage wiring for overrides and sensors is completed.
3. Accurate 'as-built' load schedules have been prepared.
4. Proper notification of the impending start-up has been provided to the owner's representative.
5. Programming of all switches, sensors, power packs, relays, etc. shall be completed by factory authorized technician, prior to final and training.

B. Factory support: Factory telephone support shall be available at no cost to the owner during the warranty period. Factory assistance shall consist of assistance in solving programming or other application issues pertaining to the control equipment. The factory shall provide a toll free number for technical support.

C. Functional Testing:

1. The owner shall hire a third party that will conduct and certify the functional testing.

2. Lighting controls devices shall be tested to ensure that control hardware and software are calibrated, adjusted, programmed, and in proper working conditions in accordance with the construction documents, manufacturer's instructions and code requirements. The following shall be performed:

   a. Certify that sensors have been located, aimed and calibrated per manufacturer recommendations.

   b. Status indicator operates properly.

   c. Fixtures that are controlled by auto-on controls turn on to permitted level.

   d. Fixtures that are controlled by manual on controls operate when manually activated.

   e. Fixtures do not turn on incorrectly due to HVAC or movement outside the controlled area.

   f. Confirm that occupancy sensors turn off after space is vacated and do not turn on unless space is occupied.

   g. Simulate unoccupied conditions and confirm that vacancy sensors only turn on manually and turn off after space is vacated.

3. The party responsible for the functional testing shall provide documentation that the installed lighting controls meet or exceed all performance criteria and shall not be directly involved in the design or construction of the project.

3.4 WARRANTY:

A. Manufacturer shall provide a one (1) year limited warranty on lighting control system. A ten (10) year limited warranty shall be provided on the lighting control relays.

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3.5 RECORD DRAWINGS: Refer to Section 26 0502 for requirements.

3.6 TRAINING

A. Provide four (4) hours of video taped training in two 2 hour sessions on the operation and use of the lighting control equipment, at job site, at no cost to the Owner.

3.7 MANUFACTURER AUTHORIZED PERSONNEL TRAINING:

A. Building Operating Personnel Training: Train Owner's building personnel in procedures for starting-up, testing and operating lighting control system equipment.

END OF SECTION 26 0923

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SECTION 26 0943 - LIGHTING CONTROL EQUIPMENT

PART 1 – GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

B. Division-26 Basic Materials and Methods sections apply to work specified in this section.

C. **RELATED SECTIONS: See Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.**

1.2 DESCRIPTION OF WORK

A. Extent of lighting control equipment work is indicated by drawings and schedules, and is hereby defined to include, but not by way of limitation, lighting control panels, control stations and other user interface devices, wiring and ancillary equipment.

B. Types of lighting control equipment specified in this section, includes the following:

1. Low voltage relay control panels
2. Wall stations
3. Occupancy sensors
4. Daylight photosensor

C. Requirements are indicated elsewhere in these specifications for work including but not limited to raceways, electrical boxes and fittings required for installation of lighting control equipment, not work of this section.

1.3 QUALITY ASSURANCE:

A. Manufacturers: Firms regularly engaged in 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 5 years. To ensure a uniform installation and single responsibility, all switching and dimming equipment described herein shall be supplied by a single manufacturer.

B. Installer: Qualified with at least 3 years of successful installation experience on projects with lighting control equipment installation work similar to that required for project.

C. NEC Compliance: The control system shall comply with all applicable National Electrical Codes regarding electrical wiring standards.

D. NEMA Compliance: The control system shall comply with all applicable portions of the NEMA Standard regarding the types of electrical equipment enclosure.

E. Codes and Standards: Provide units that meet the requirements of IEEE Std. 2000.1.1999.

F. Independent Testing Laboratory: Provide units that have been tested and listed under UL 916 energy management equipment.

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G. Component Pre-testing: All control equipment shall undergo strict inspection standards. The equipment shall be previously tested and burned-in at the factory prior to installation.

1.4 SUBMITTALS: Refer to Section 26 0502 for requirements.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

A. Manufacturer: Subject to compliance with requirements, provide lighting control equipment of one of the following;

1. Douglas Lighting Controls
2. Greengate Lighting Control
3. Lighting Control & Design
4. Lutron
5. Nexlight
6. Wattstopper
7. Hubbell Automation

2.2 SYSTEM DESCRIPTION

A. The lighting control system shall provide seamless control and monitoring of all lighting included in the scope of work regardless of whether it is relay switched or dimmed.

B. The lighting control system shall consist of low voltage relay control panels with programmable switch inputs, the panel shall be microprocessor controlled with a touchscreen interface display. The touchscreen shall provide relay status information viewable through a protected windowed enclosure. All local programming shall be permissible through the self-prompting touchscreen.

C. Programmable intelligence shall include:

1. Time of day control (64 time-of-day/holiday schedules)
2. 32 holiday dates
3. Timed inputs (adjustable from 1 to 99 minutes)
4. Timed override (from touchscreen, adjustable from 1 to 999 minutes, then resumes normal schedule)
5. Pre-set controls
6. Auto daylight savings adjust
7. Astronomical clock with offsets
8. Local control (from touchscreen and local switch)
9. Digital switches
10. Flash warning of impending off for occupants
11. Network override

D. The controller shall permit lighting to be overridden on for after-hours use or cleaning. The controller shall provide priority and masking choices to allow for customizing the functions of switch inputs, thereby enabling switches to function differently at different times of day.

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These overrides shall be digital, network or hard-wired inputs.

E. The lighting control system shall be fully programmable through PC programming software. Programming shall be permitted through a direct RS-232 connection, modem or TCP/IP.

F. The control system shall provide networking between lighting control panels. The network shall support up to a maximum of 254 control panels. Panels shall permit data sharing for global controls. All inputs shall be transferable over the network to create any switching pattern.

G. The lighting control system shall log all control events. Log reports shall be available through the integral touchscreen or enterprise software.

2.3 EQUIPMENT

A. Relay Panel

1. Enclosure: Shall be NEMA 1 rated, code gauge steel cabinet. Enclosure and contents shall be designed to operate in interior spaces with temperatures of 32°f - 104°f (0°-40°c) and 0-90% non-condensing humidity. Enclosure shall be available with optional recessed mounting hardware. See drawings for mounting requirements and refer to schedules on drawings for sizes.
2. Interior: Interiors shall be sized to accept relays and will provide true on/off indication of relay status through LED's. The system shall employ all modular connectors to avoid repeat wiring in case of component failure. The system CPU board shall be mounted on quick release hinge pins. All connections for the dry contact inputs shall incorporate modular connectors.
3. Power Supply: The control panel shall incorporate the use of a multi-tapped transformer. The panel shall not require specification of voltage for each control location. The voltage of 120 and 277 VAC shall be available with each control panel.
4. Cover: Provide surface cover with captive screws in hinged, lockable configuration. A wiring schedule directory card shall be affixed to the covers back to allow identification of circuits/relays/load controlled. Schedules must be typed and related to final room names and numbers (not bid document room names and numbers).
5. High Voltage Barrier: The controller shall provide the ability to provide for either voltage separation or emergency circuit separation.
6. Relays: The system shall utilize normally open control relays, that are rated to 20A at 120/277 VAC. The relays shall be mechanically latching, and shall permit individual override and LED configuration of relay status. The relays shall be rated for 10 million operations.
7. System Controller: The system controller shall consist of an integral touchscreen that provides access to the main programming features. The touchscreen shall permit the user to manually command any or all relays individually.
    a. Provide master on/off control of a relay group while still allowing individual relays to be overridden by their local switch.
    b. The control system shall permit up to 32 dry contact inputs for override purposes. Momentary 3 wire or 2 wire (toggle) inputs shall be supported. Any input shall be software linked to any number or relays.
    c. The controller shall provide timers for each override. Each override timer

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shall be capable of 0-999 minutes. Software shall enable or disable overrides based on priorities, masks or time of day scheduling.

d. The controller shall accept either dry contact or analog ambient light sensors. The controller shall provide power for the sensor. Sensors shall provide for outdoor, indoor or skylight applications and issue a command to the controller once the threshold is reached.

e. Each control panel shall incorporate diagnostic aids for confirmation of proper operation. The control panel shall employ both a backlit touchscreen and LED's to indicate:

i. Power

ii. System OK

iii. Network communications

iv. System clock and date

v. Programming confirmation

vi. Control panel subnet network communications

8. Switches: The lighting controller shall support digitally addressable LED annunciated switches. Provide low voltage push-button switches in up to 6 button configurations. Provide factory engraved labeling for individual push-buttons. Provide in color to match wiring devices and coverplate to match devices and plates in Wiring Devices (Section 26 2726).

9. Wiring:

a. Provide CAT5 cable between switches and controller to create a digital switch network.

b. Provide CAT5 cable between controller and other controllers via a RS-485 network. The RS-485 network shall support up to 250 controllers with a maximum distance of 4000 feet.

c. Programming: Provide a RS-232 (RJ-R Connection) to allow programming through either a local connection or remotely through a modem.

d. Provide wiring in conduit located within the walls and non-accessible ceilings. Provide wiring above accessible ceilings in non-continuous supports (j-hooks) (where concealed) to system enclosure.

B. Room Controllers:

1. The room controller shall provide the following functionality;

a. Provide interface with room occupancy sensor to provide lighting control and be programmable as either manual on/automatic off or automatic on/automatic off (automatic on shall not allow lighting to exceed 50% level). Provide interface with room wall stations to provide multi-level switching and/or variable dimming. Provide interface with daylight photosensors to provide daylighting controls of lighting fixture via multi-level (step dimming) and/or variable dimming.

2. Provide with network interface to tie to building relay panel

3. The room controller shall be a fully functional lighting control system to match the room lighting and control requirements. The controller shall provide the following features:

a. Separate compartments for line voltage, emergency voltage and low voltage connections.

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b. Breakouts for direct conduit connections.

c. Dual voltage (120/277 VAC)

d. Low voltage connections using standard RJ-45 connectors.

e. Zero cross circuitry for each load.

f. Relay and 0-10V dimming zone configuration to match room requirements.

4. Emergency Lighting: When the room controller is provided with emergency relay, the controller shall be UL 924 Listed and monitor the normal power circuit. The UL 924 relay will track the normal power operation. Upon loss of normal power the emergency lighting will be forced on to full bright (if dimming) until normal power is restored. The following features shall be included:

   a. 120/277 VAC

   b. Push-to-test

5. Daylight photo sensors shall work with the room controller to provide automatic daylight dimming capabilities for loads connected to the room controller. The daylight sensor shall include the following features:

   a. An additional photodiode that measures only the visible spectrum.

   b. The sensor shall have three light level ranges;

      i. Low (3-300 LUX), high (30-3000 LUX) and direct sun (300-30,000 LUX).

   c. The sensor shall provide the capability of controlling multiple (up to three) daylight zones for dimming daylight harvesting.

   d. The sensor shall include an internal photodiode that measures light in a 60 degree angle cutting off the unwanted light from the interior of the room.

6. Ceiling Mounted Occupancy Sensors: Sensors shall utilize dual-technology (ultrasonic and infrared technologies) and have the following additional features:

   a. Sensor shall be class 2, low voltage; capable of mounting in the ceiling for maximum coverage.

   b. Sensor shall have automatic self-adjustment algorithm that adjusts timer and sensitivity settings to maximize performance and minimize energy usage.

   c. Sensor shall have 360 degree field of view.

   d. Sensor shall incorporate non-volatile memory such that all settings and parameters are saved in protected memory.

   e. Sensor shall have time delays from 10 to 30 minutes.

   f. Sensor shall provide a visual means of indication that motion is being detected via an LED.

   g. Sensors shall have readily accessible, user adjustable settings for time delay and sensitivity.

7. Wall Stations: Provide low voltage momentary push-button switches up to 6 button configurations to match requirements of lighting control within the room. Provide factory engraved labeling for individual push buttons. Provide in a color to match wiring devices and coverplates to match devices and plates in Wiring Devices (Section 26 2726). Wall station shall connect to the room controller via the room controller local network. Wall stations that require user interface to allow for raise/lower control of dimming, loads shall include a slider function.

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PART 3 - EXECUTION:

3.1 INSTALLATION OF LIGHTING CONTROL EQUIPMENT:

A. Install lighting control system components and ancillary equipment as indicated, in accordance with equipment manufacturers written instructions, and with recognized industry practices, to ensure that lighting control equipment complies with requirements.

B. Comply with Requirements of NEC, and applicable portions of NECA's 'Standard of Installation' pertaining to general electrical installation practices.

C. Coordinate with other electrical work, including raceways, electrical boxes and fittings, as necessary to interface installation of lighting control equipment work with other work.

D. Electrical Identification: Refer to Section 26 0553 for requirements.

3.2 FIELD QUALITY CONTROL:

A. Upon completion of installation and after circuitry has been energized, demonstrate capability and compliance of system with requirements.

B. Where possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units, and proceed with retesting.

3.3 PRODUCT SUPPORT AND SERVICES:

A. System Start-Up: Provide a factory authorized technician to verify the installation, test the system, and train the owner on proper operation and maintenance of the system. Before requesting start-up services, the installing contractor shall verify that:

1. The control system has been fully installed in accordance with manufacturer's installation instructions.
2. Low voltage wiring for overrides and sensors is completed.
3. Accurate 'as-built' load schedules have been prepared for each lighting control panel.
4. Proper notification of the impending start-up has been provided to the owner's representative.
5. Programming of all switches, relays, groups of relays and interfaces with building automation shall be completed by factory authorized technician, prior to final and training.

B. Factory support: Factory telephone support shall be available at no cost to the owner during the warranty period. Factory assistance shall consist of assistance in solving programming or other application issues pertaining to the control equipment. The factory shall provide a toll free number for technical support.

3.4 WARRANTY:

A. Manufacturer shall provide a one (1) year limited warranty on lighting control system. A ten (10) year limited warranty shall be provided on the lighting control relays.

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3.5 RECORD DRAWINGS: Refer to Section 26 0502 for requirements.

3.6 TRAINING

A. Provide four (4) hours of video taped training in two 2 hour sessions on the operation and use of the lighting control equipment, at job site, at no cost to the Owner.

END OF SECTION 26 0943

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SECTION 26 2413 - SWITCHGEAR AND SWITCHBOARDS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

B. Division-26 Basic Materials and methods sections apply to work of this section except as otherwise indicated. See Section 262713 Service Entrance, for metering requirements. See Section 264313 for SPD requirements.

C. RELATED SECTIONS: See Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 DESCRIPTION OF WORK:

A. Extent of switchgear and switchboards is indicated by drawings and schedules.

B. Types of switchgear and switchboards in this section include the following:

1. AC Dead Front Switchboards (600V)

1.3 QUALITY ASSURANCE:

A. Comply with NEC as applicable to construction and installation of electrical switchgear and switchboards. Provide switchgear and switchboards that have been UL listed and labeled.

1.4 SUBMITTALS: Refer to Section 26 0502 for requirements.

A. MAINTENANCE STOCK FUSES: Refer to Section 26 0502 for requirements.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

A. Subject to compliance with requirements, provide products of one of the following (for each type of switchgear and switchboard):

B. AC DEAD FRONT SWITCHBOARDS (600V):

1. Cutler-Hammer Products, Eaton Corp.
2. GE/ABB
3. Siemens Energy & Automation, Inc.
4. Square D Co.

2.2 EQUIPMENT SECTIONS AND COMPONENTS:

A. GENERAL: Except as otherwise indicated, provide switchgear and switchboards of types, sizes, characteristics, and ratings indicated, that comply with manufacturer's standard design, materials, components, and construction in accordance with published product information, and as required for a complete installation. See drawings and Section 262815. Series rated systems are not accepted.

B. Overcurrent Protection Devices, for main and branch devices. Provide switchgear, switchboards, and overcurrent devices of one manufacturer.

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C. Provide each service entrance switchboard with surge protective device (SPD) mounted in a separate enclosure adjacent to the switchboard/switchgear. See Section 264313 for SPD unit requirements. Provide in-line fusing for each phase of the device, and wire in accordance with manufacturer's instructions, with conductor length not exceeding 18".

2.3 AC DEAD-FRONT SWITCHBOARDS (600V):

A. Provide factory assembled, dead front, metal enclosed, floor standing, self supporting, group mounted, secondary power switch boards, of sizes, electrical ratings and characteristics indicated consisting of panel (vertical) units, and containing circuit breaker and fusible switch assemblies of quantities, ratings and types indicated. Provide copper or aluminum main bus and connections to switching devices of sufficient capacity to limit rated continuous current operating temperature rise to UL standard; with main bus and tap connections silver-surfaced or tin-plated and tightly bolted for maximum interrupting capacity. Provide accessibility of line and load terminations from front of switchboard. Prime and paint switchboard with manufacturer's standard finish and color. Equip units with built-in lifting eyes and yokes; provide individual panel (vertical) units, suitable for bolting together at project site, and constructed for the following environment:

1. Installation: Indoors, NEMA Type 1.

B. Limit height of upper most overcurrent device handle to 6'-2" to accommodate 4" curb.

PART 3 - EXECUTION

3.1 INSTALLATION OF SWITCHGEAR AND SWITCHBOARDS:

A. Install switchgear and switchboards where shown, in accordance with manufacturer's written instructions with recognized industry practices to ensure that switchgear and switchboards comply with requirements of NEMA and NEC standards, and applicable portions of NECA's "Standard of Installation".

B. Install all switchgear and switchboards on 4" high concrete curb. Install concrete wiring trench under switchgear and switchboards; 18" deep, and 4" smaller in length and width than equipment base. Install grounding bushings on conduits penetrating trench. Secure equipment to pad/trench. Refer to section 26 0548 Electrical Seismic Control.

C. Arrange conductors within switchgear and switchboards in neat fashion, and secure with suitable ties.

D. Tighten fuses, if any, in each switchgear and switchboard.

E. Provide and install spare fuse cabinet in main electrical room.

F. Electrical Identification: Refer to Section 260553 for requirements.

G. Provide a surge protective device on each switchboard located on the emergency distribution system. Refer to Section 26 4313 for requirements.

3.2 ADJUST AND CLEAN:

A. Adjust operating mechanisms for free mechanical movement.

B. Touch-up scratched or marred surfaces to match original finish.

3.3 FIELD QUALITY CONTROL:

A. Prior to energization of switchgear and switchboards, check with ground resistance tester phase to phase and phase to ground insulation resistance levels to ensue requirements

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are fulfilled.

B. Prior to energization, check switchgear and switchboards for electrical continuity of circuits, and for short circuits.

C. Subsequent to wire and cable connections, energize switchgear and switchboard and demonstrate functioning in accordance with requirements.

END OF SECTION 26 2413

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SECTION 26 2416 - PANELBOARDS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

B. This section is a Division-26 Basic Materials and Methods section, and is part of each Division-26 section making reference to panelboards specified herein.

C. RELATED SECTIONS: See Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 DESCRIPTION OF WORK:

A. The extent of panelboard and enclosure work, is indicated by drawings and schedules.

B. Types of panelboards and enclosures in this section include lighting and appliance panelboards, and power distribution panelboards.

1.3 QUALITY ASSURANCE:

A. Provide units that have been UL listed and labeled. Comply with NEC as applicable to installation of panelboards, cabinets, and cutout boxes. Comply with NEC pertaining to installation of wiring and equipment in hazardous locations. Comply with NEMA Stds. Pub No. 250, "Enclosures for Electrical Equipment (1000 volt maximum). Pub No. 1, "Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less".

1.4 SUBMITTALS: Refer to Section 26 0502 for requirements.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

A. Subject to compliance with requirements, provide of one of the following:

1. Cutler Hammer Products, Eaton Corp.
2. GE/ABB
3. Siemens Energy & Automation, Inc.
4. Square D Company

2.2 PANELBOARDS:

A. GENERAL:

1. Except as otherwise indicated, provide panelboards, enclosures and ancillary components, of types, sizes, and ratings indicated. Equip with number of unit panelboard devices as required for complete installation. Fully equip "spaces" with hardware to receive breaker or switch of size indicated. Provide CU/AL rated lugs of proper size to accommodate conductors specified.

B. POWER DISTRIBUTION PANELBOARDS:

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1. Provide dead-front safety type power distribution panelboards as indicated, with switching and protective devices in quantities, ratings, types and with arrangement shown. Equip with copper or aluminum bus bars, full-sized neutral bus and ground bus. Provide fusible or circuit breaker branch and main devices as indicated. Series rated systems are not acceptable. See Section 262815, Overcurrent Protection Devices.

C. LIGHTING AND APPLIANCE PANELBOARDS:

1. Provide dead-front safety type lighting and appliance panelboards as indicated, with switching and protective devices in quantities, ratings, types, and arrangement shown. Provide bolt-on thermal magnetic type branch breakers. Where multiple breakers are indicated, provide with common trip handle. Series rated systems are not acceptable. Equip with copper or aluminum bus bars, full-sized neutral bus, and ground bus.

D. PANELBOARD ENCLOSURES:

1. Provide galvanized sheet steel cabinet type enclosures, in sizes and NEMA types as indicated, code-gage minimum 16-gage thickness. Provide door-in-door hinged fronts. Provide fronts with adjustable indicating trim clamps, and doors with flush locks and keys, all panelboard enclosures keyed alike, with concealed door hinges and door swings as indicated. Equip with interior circuit-directory frame, and card with clear plastic covering. Provide baked gray enamel finish over a rust inhibitor. Provide enclosures fabricated by same manufacturer as overcurrent devices contained therein Bolt engraved plastic laminate labels indicating panel name and voltage on the interior and exterior of panelboards.

E. FINISH:

1. Coat interior and exterior of surface with manufacturer's standard color; baked on enamel finish.

F. ELECTRICAL IDENTIFICATION:

1. Refer to Section 260553 for requirements.

PART 3 – EXECUTION

3.1 INSTALLATION OF PANELBOARDS:

A. GENERAL:

1. Install panelboards and enclosures where indicated, in accordance with manufacturer's written instructions, applicable requirements of NEC and NECA's "Standard of Installation", in compliance with recognized industry practices to ensure products fulfill requirements.

2. Provide a surge protective device on each panelboard located on the emergency distribution system. Refer to section 26 4313 for requirements.

B. MOUNTING:

1. Provide 4" high concrete curb under floor standing distribution panelboards.

2. Coordinate installation of panelboards and enclosures with cable and raceway installation work. Anchor enclosures firmly to walls and structural surfaces, ensuring they are permanently and mechanically secure. Arrange conductors neatly within enclosure, and secure with suitable nylon ties. Fill out panelboard's circuit directory card upon completion of installation work. Utilize actual final building room numbers, not architectural numbers used on drawings. Identify

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individual lighting circuits and individual receptacle circuits by room served. Label circuit breakers to identify location of subpanel or equipment supplied using room numbers and equipment names. Include room number with equipment circuit designations. All directories to be typewritten.

END OF SECTION 26 2416

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SECTION 26 2713 - SERVICE ENTRANCE

PART 1 – GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

B. Division-26 Basic Materials and Methods sections apply to work specified in this section.

C. RELATED SECTIONS: See Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 DESCRIPTION OF WORK:

A. Extent of service-entrance work is indicated by drawings and schedules.

B. Switchboards, panels, disconnects, transformers, etc., used for service-entrance equipment are specified in applicable Division-26 sections, and are included as work of this section.

C. Consult local utility relative to all costs for line extensions, connections, etc., and include all costs for bringing service to the facility in base bid. Confirm location of point of service before bidding.

D. Provide labor and materials as required to accomplish power company metering in accordance with power company standards and requirements.

E. Provide concrete pads of size and type required for service transformers. Verify location, size, openings, reinforcing requirements with local utility before beginning work. Comply with local utility code required clearance requirements.

1.3 QUALITY ASSURANCE:

A. Comply with NEC and NEMA standards as applicable to construction and installation of service-entrance equipment and accessories. Provide service-entrance equipment and accessories that are UL-listed and labeled, and equipment marked, "Suitable for use as Service Equipment".

1.4 SUBMITTALS: Refer to Section 26 0502 for requirements.

A. MAINTENANCE STOCK, FUSES: Refer to Section 26 0502 for requirements.

PART 2 – PRODUCTS

2.1 SERVICE - ENTRANCE EQUIPMENT:

A. GENERAL: Provide service-entrance equipment and accessories, of types, sizes, ratings and electrical characteristics indicated, that comply with manufacturer's standard materials, design and construction in accordance with published product information, and as required for complete installation, and as herein specified.

B. Provide each service entrance switchboard with Surge Protective Devices as required by Section 264313.

2.2 OVERCURRENT PROTECTIVE DEVICES:

A. GENERAL: Provide overcurrent protective devices complying with Division-26 section

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"Overcurrent Protective Devices", and as indicated on drawings.

2.3 METERING:

A. METER SOCKETS: Provide meter sockets that comply with requirements of local utility company supplying electrical power to service-entrance equipment of building project.

B. METERS: Provide meters, current and potential transformers, selector switches, wiring, etc. for a complete metering system. Provide meter of same manufacturer as switchboard (equal to Square D Power Logic Circuit Monitor, Class 3020, Model CM-3250), integrally mounted in service equipment, completely wired with control power input. Provide capability for metering the following data:

INSTANTANEOUS READINGS	DEMAND READINGS
RMS Current Values	Current Values
Phase A Current	Average Demand Current Phase A
Phase B Current	Average Demand Current Phase B
Phase C Current	Average Demand current Phase C
3-Phase Average Current	Peak Demand Current Phase A
Apparent RMS Current	Peak Demand Current Phase B
RMS Voltage Values	Peak Demand Current Phase C
Phase A-B Voltage	Real Power Values
Phase B-C Voltage	Average Demand Real Power
Phase C-A Voltage	Predicted Demand Real Power
Phase A-N Voltage	Peak Demand Real Power
Phase B-N Voltage	Phase C-N Voltage
Power Factor Values	Energy Readings
Phase A Power Factor	-
Phase B Power Factor	Energy Accumulated
Phase C Power Factor	Reactive Energy Accumulated
3-Phase Total Power Factor	-
3-Phase Total Power Values	-
Real Power, 3-Phase Total	-
Reactive Power, 3-Phase Total	-
Apparent Power, 3-Phase Total	-
Frequency	-
Temperature	-

C. Provide with integral display, selection keys, and indicting LEDs. For each instantaneous reading, provide a running maximum and minimum history in non-volatile memory, capable of externally operated reset. Provide "waveform capture" feature to allow subsequent analysis of actual current and voltage profile for harmonic distortion.

2.4 RACEWAYS AND CONDUCTORS:

A. GENERAL: Provide raceways and conductors complying with applicable Division-26 Basic Materials and Methods sections.

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B. WALL AND FLOOR SEALS: Provide wall and floor seals complying with Division-26 Basic Materials and Methods section "Raceways".

PART 3 – EXECUTION

3.1 INSTALLATION OF SERVICE-ENTRANCE EQUIPMENT:

A. Install service-entrance equipment as indicated, in accordance with manufacturer's written instructions, and with recognized industry practices, to ensure that service-entrance equipment fulfills requirements. Comply with applicable installation requirements of NEC and NEMA standards.

B. Coordinate with other work, including utility company wiring, as necessary to interface installation of service-entrance equipment work with other work.

C. Install all floor standing service equipment on 4" high concrete curb and bolt equipment to curb with 3/8" anchors at each corner and at intervals not to exceed 8' along perimeter. Install concrete wiring trench under floor standing equipment; 12" deep, and 4" smaller in length and width than equipment base. Install grounding bushings on conduits penetrating trench.

3.2 GROUNDING:

A. Provide system and equipment grounding and bonding connections for service-entrance equipment and conductors, as required.

3.3 ADJUST AND CLEAN:

A. Adjust operating mechanisms for free mechanical movement.

B. Touch-up scratched or marred enclosure surfaces to match original finishes.

3.4 FIELD QUALITY CONTROL:

A. Upon completion of installation of service-entrance equipment and electrical circuitry, energize circuitry and demonstrate capability and compliance with requirements. Where possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units, and proceed with retesting.

END OF SECTION 26 2713

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SECTION 26 2726 - WIRING DEVICES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

B. This section is a Division-26 Basic Materials and Methods section, and is part of each Division-26 section making reference to wiring devices specified herein.

C. RELATED SECTIONS: See Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 DESCRIPTION OF WORK:

A. The extent of wiring device work is indicated by drawings and schedules. Wiring devices are defined as single discrete units of electrical distribution systems that are intended to carry but not utilize electric energy.

B. Types of electrical wiring devices in this section include the following:

1. Receptacles
2. Dimmer controls
3. Flat Panel Display Wall Box
4. Poke-through assemblies

1.3 QUALITY ASSURANCE:

A. Comply with NEC and NEMA standards as applicable to construction and installation of electrical wiring devices. Provide electrical wiring devices that have been UL listed and labeled.

1.4 SUBMITTALS: Refer to Section 26 0502 for requirements.

PART 2 - PRODUCTS

2.1 FABRICATED WIRING DEVICES:

A. GENERAL:

1. Provide factory-fabricated wiring devices, in types, and electrical ratings for applications indicated and complying with NEMA Stds. Pub No. WD 1.

B. Provide wiring devices (of proper voltage rating) as follows:

	RECEPTACLE	SWITCHES			
MFGR		1-POLE	3-WAY	4-WAY	W-PILOT
Hubbell	HBL 5352	HBL 1221	HBL 1223	HBL 1224	HBL 1221-PL
Bryant	5352	1221	1223	1224	1221-PL
Pass Seymour	5352	20AC1	20AC3	20AC4	20AC1-RPL
Leviton	5362	1221	1223	1224	

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Cooper	5352	1221	1273	1224	1221-PL

C. Provide devices in colors selected by Architect. Provide red devices on all emergency circuits.

D. TRANSIENT VOLTAGE SURGE SUPPRESSION (TVSS) RECEPTACLES:

1. Provide TVSS receptacles having 4 series parallel 130V MOV's capable of a minimum of 140 joules suppression. Provide units with visual (and audible) surge status indicators to monitor condition of surge circuit; visual indicator to be "on" when power present and suppression circuit is fully functional. (Audible indicator shall sound a "beep" alarm approximately every 30 seconds if suppression circuit has been damaged.) Provide NEMA 5-20R, 20 amp, 125V receptacle of one of the following manufacturers:

	MANUFACTURER	
SPECIFICATION GRADE	HUBBELL	PASS SEYMOUR
Duplex Recept-Visual only	5350	5352 XXXSP
Duplex Recept-Visual/Audible	5352	5362 XXXSP
Single Recept-Visual only	5351	N/A
Duplex Recept-Isol Gnd, Visual/Audible	IG5352S	IG5362 XXXSP
Single Recept-Isol Gnd, Visual only	IG5351S	N/A
HOSPITAL GRADE	HUBBELL	PASS SEYMOUR
Duplex Recept-Visual/Audible	8300HS	8300 XXXSP
Single Recept-Visual only	8310HS	N/A
Duplex Recept-Isol Gnd, Visual/Audible	IG8300HS	IG8300 XXXSP
Single Recept-Isol Gnd, Visual only	IG8310HS	N/A

2. Color of devices selected by Architect. Provide red devices on all emergency circuits.

E. GROUND-FAULT INTERRUPTER:

1. Provide general-duty, duplex receptacle, ground-fault circuit interrupters; feed-thru types, capable of protecting connected downstream receptacles on single circuit; grounding type UL-rated Class A, Group A, 20-amperes rating; 120-volts, 60 Hz; with solid-state ground-fault sensing and signaling; with 5 milliamperes ground-fault trip level; color as selected by Architect. Provide Hospital grade where required elsewhere by specification or drawings. Provide units of one of the following:

a. P&S/Sierra

b. Hubbell

c. Leviton

d. Square D

F. USB RECEPTACLE

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1. Provide duplex receptacle with two (2) USB 3.0 amps, 5VDC, 2.0 Type A charging ports.

2. Provide products of one of the following:

   a. Bryant – USB20-X
   b. Cooper – TR7736-X
   c. Hubbell – USB20X2-X
   d. Legrand – TR5362USB-X
   e. Leviton – T5832-X

G. TAMPER RESISTANT RECEPTACLES:

1. Provide tamper resistant receptacles in the following areas; Dwelling units, guest rooms and guest suites, child care facilities, pre-school and elementary education facilities, business offices, corridors, waiting rooms and the like in Clinics, medical/dental offices and outpatient facilities, assembly occupancies and Dormitories.

2. Provide products of one of the following:

   a. Leviton-TWR20-X
   b. Hubbell – BR20XTR
   c. Pass Seymour – TR63X
   d. Cooper – TR5362

H. WEATHER-RESISTANT RECEPTACLES

1. Provide weather-resistant receptacles in outdoor locations such as under roofed open porches, canopies, marquees, etc.

2. Provide products of one of the following:

   a. Pass & Seymour 2095TRWRXXX.
   b. Hubbell GFTR20XX

2.2 WIRING DEVICE ACCESSORIES:

A. WALL PLATES:

1. Provide coverplates for wiring devices; plate color to match attached wiring devices. Provide nylon or Lexan coverplates in all finished areas. Provide galvanized steel plates in unfinished areas. Provide blank coverplates for all empty outlet boxes.

B. WEATHER-PROTECTING DEVICE ENCLOSURES:

1. Where required for compliance with NEC 406-8 (receptacles installed outdoors for use other than with portable tools or equipment), provide weather-tight device covers that provide complete protection with the cord and cap inserted into the wiring device. Provide units that mount on either single or double gang devices.

2. Provide products of one of the following for In Box Horizontal for brick and cast stone:

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a. Arlington Industries

i. DSHB1C Clear Cover

ii. DSHB1W White Cover

iii. DSHB1BR Brown Cover

iv. DSHB1BRC Brown Clear Cover

3. Provide products of one of the following for In Box Vertical or Horizontal for Stucco and Metal Sidings:

a. Arlington Industries

i. DSBVM1C Clear Cover

ii. DSBVM1W White Cover

iii. DSBHM1C Clear Cover

iv. DSBHM1W White Cover

4. Provide products of one of the following for roof mounted installations:

a. Intermatic WP1020 or WP1030

b. P&S WIUC10C or WIUC20c

2.3 FLAT PANEL DISPLAY WALL BOX:

A. Provide a factory assembled display wall box made of 14 gauge steel. Wall box shall have provisions for a UL Listed single gang box for mounting of duplex receptacle and additional back box with a minimum of (1) 1 ¼" conduit opening to allow for low voltage terminations. Coordinate low voltage plate configuration with drawings. Provide device manufactured by one of the following:

1. FSR Metal Products – PWB-320
2. Chief Manufacturing – PAC 526FCW
3. Wiremold – EFSB4

2.4 POKE-THROUGH ASSEMBLY DEVICES:

A. Provide factory-assembled poke-through assembly devices equipped with wiring devices as specified herein; capable of maintaining fire floor rating of 3 hours. Unit shall be UL514A listed. Construct for installation in concrete floor with center tube, fire-stop wafers, spreader plates, service fitting base plate, and 4-11/16" conduit box. Provide service fitting with alignment adjustment screws for complete installation; finish as selected by Architect. Provide devices manufactured by one of the following:

1. Hubbell
2. Wiremold Co.

B. Provide the following poke-thru assemblies as noted on the drawings:

1. Type PT-1 Power and Data; Provide a poke-thru assembly to provide interface between power and communications cabling. These devices shall provide flush device outlets that will not obstruct the floor area. The activation cover shall be supplied with a 20 amp duplex receptacle and capable of accommodations for up to four (4) modular communications jacks.

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2. Type PT-2 Furniture Feed; Provide a poke-thru assembly to provide interface between power and communications cabling and the modular furniture workstation or activation location. The activation cover shall provide one ¾" NPSM threaded opening for power and one 1 ¼" NPSM threaded opening for communications.

3. Type PT-3 AV 6"; Provide a poke-thru assembly to provide interface between power, communications and audio/visual (AV) and the workstation or activation location. This assembly shall provide recessed device outlets that will not obstruct the floor. The insert body shall have three compartments that allows for up to three duplex receptacles and/or twelve communications ports and/or ten Extron® electronics MAAP™ and/or two AAP™ devices.

4. Type PT-4 AV 8"; Provide a poke-thru assembly to provide interface between power, communications and/or audio/visual (AV) and the workstation or activation location. This assembly shall provide recessed device outlets that will not obstruct the floor. The insert body shall have five compartments that allow for up to five duplex receptacles and/or twenty-two communications ports and/or sixteen Extron® electronics MAAP™ and/or two APP™ devices.

PART 3 – EXECUTION

3.1 GENERAL

A. Install wiring devices as indicated, in compliance with manufacturer's written instructions, applicable requirements of NEC and NECA's "Standard of Installation" and in accordance with recognized industry practices to fulfill project requirements.

B. Coordinate with other work, including painting, electrical box and wiring work, as necessary to interface installation of wiring devices with other work. Install devices in boxes such that front of device is flush and square with coverplate. Drawings are small scale and, unless dimensioned, indicate approximate locations only of outlets, devices, equipment, etc. Locate outlets and apparatus symmetrically on floors, walls and ceilings where not dimensioned and coordinate with other work. Verify all dimensioned items on job site. Consult architectural cabinet, millwork, and equipment shop drawings before beginning rough-in of electrical work. Adjust locations of all electrical outlets as required to accommodate work in area, and to avoid conflicts with wainscoat, back splash, tackboards, and other items.

C. Install wiring devices only in electrical boxes that are clean; free from excess building materials, dirt, and debris.

D. Install blank plates on all boxes without devices.

E. Delay installation of wiring devices until wiring work and painting is completed. Provide separate neutral conductor from panel to each GFI receptacle.

F. Install GFI receptacles for all receptacles installed in the following locations:

1. Restrooms, locker rooms, kitchens, within 6 feet of any sink, or when serving vending machines and electric drinking fountains.

2. Indoor wet locations, non-dwelling garages, elevator rooms and pits.

3. Outdoors, and on rooftops.

4. Dwelling unit garages, crawlspaces and unfinished basements, accessory buildings, boathouses, and receptacles for boat hoists.

G. Where light switches or wall box dimmers are specified, provide a separate neutral for each phase of the branch circuits that switches or dimmers are connected.

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H. Electrical Identification: Refer to Section 260553 for requirements.

3.2 PROTECTION OF WALL PLATES AND RECEPTACLES:

A. At time of substantial completion, replace those items, that have been damaged, including those stained, burned and scored.

3.3 GROUNDING:

A. Provide electrically continuous, tight grounding connections for wiring devices, unless otherwise indicated.

3.4 TESTING:

A. Prior to energizing circuitry, test wiring devices for electrical continuity and proper polarity connections. After energizing circuitry, test wiring devices to demonstrate compliance with requirements.

END OF SECTION 26 2726

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SECTION 26 2815 - OVERCURRENT PROTECTIVE DEVICES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

B. This section is a Division-26 Basic Materials and Methods section, and is part of each Division-26 section making reference to overcurrent protective devices specified herein.

C. RELATED SECTIONS: See Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 DESCRIPTION OF WORK:

A. Extent of overcurrent protective device work is indicated by drawings and schedules and specified herein. Overcurrent protective devices specified herein are for installation as individual components in separate enclosures; and for installation as integral components of switchboard and panelboards. See Section 262413, Switchgear and Switchboards, and Section 262416, Panelboards.

B. Types of overcurrent protective devices in this section include the following for operation at 600 Volts and below:

1. Molded case thermal circuit breakers
2. Molded case solid-state circuit breakers
3. Insulated case circuit breakers
4. Fuses

C. Refer to other Division-26 sections for cable/wire and connector work required in conjunction with overcurrent protective devices.

1.3 QUALITY ASSURANCE

A. Comply with NEC requirements and NEMA and ANSI standards as applicable to construction and installation of overcurrent devices.

1.4 SUBMITTALS: Refer to Section 26 0502 for requirements.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

A. Subject to compliance with requirements, provide products of one of the following (main and branch device manufacturer must be same as panelboard and/or switchboard manufacturer):

B. CIRCUIT BREAKERS :

1. Cutler Hammer Products, Eaton Corp.
2. GE/ABB
3. Square D Co.
4. Siemens Energy and Automation

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C. MOLDED CASE THERMAL TRIP CIRCUIT BREAKERS:

1. Provide factory-assembled, molded case circuit breaker for power distribution panelboards and switchboards; and for individual mounting, as indicated. Provide breakers of amperage, voltage, and RMS interrupting rating shown, with permanent thermal trip and adjustable instantaneous magnetic trip in each pole. Series rated systems are not acceptable. Construct with overcenter, trip-free, toggle type operating mechanisms with quick-make, quick-break action and positive handle indication. Construct breakers for mounting and operating in any physical position and in an ambient temperature of 40 degrees C. Provide with mechanical screw type removable connector lugs, AL/CU rated, of proper size to accommodate conductors specified.

2. Circuit breakers 15 amps through 599 amps shall be molded case thermal trip circuit breakers.

D. MOLDED CASE SOLID-STATE CIRCUIT BREAKERS:

1. Provide factory-assembled, molded case solid-state circuit breakers for power distribution switchgear and switchboards. Provide breakers of amperage, voltage and RMS interrupting rating shown, and with solid-state trip mechanisms. Breakers shall be UL listed for application at 100% of their continuous ampere rating.

2. Circuit breakers 600 amps through 1199 amps shall be molded case solid-state circuit breakers.

3. Solid-state trip mechanisms shall have the following functions: Adjustable long time ampere rating; adjustable long time delay; adjustable short time pick up; adjustable short time delay and adjustable instantaneous pick up.

E. INSULATED CASE CIRCUIT BREAKERS

1. Provide factory-assembled, insulated case circuit breakers for power distribution switchgear and switchboards. Provide breakers of amperage, voltage and RMS interrupting rating shown, with solid-state trip mechanisms and with manual spring charging mechanism. Breakers shall be UL listed for application at 100% of their continuous ampere rating.

2. Circuit breakers 1200 amps and larger shall be insulated case circuit breakers.

3. Solid-state trip mechanisms shall have the following functions: Adjustable long time ampere rating; adjustable long time delay; adjustable short time pick up; adjustable short time delay and adjustable instantaneous pick up.

4. On service disconnect breakers where phase to ground voltage exceeds 150V and the breaker is capable of being set at or over 1000A (and also where GFP protection is indicated on the one line diagram for downstream breakers), the solid-state trip mechanism shall also include the following:

   a. Adjustable ground fault pick up and adjustable ground fault time delay, and ground fault test button.

   b. Over/under voltage trip

   c. Current imbalance trip

5. Provide an energy-reducing maintenance switch with local, lit status indicator to allow for a reduction of the instantaneous pickup and instantaneous delay settings for use during maintenance. Device shall mount in face of dead-front. The switch shall be provided by the same manufacturer as the circuit breaker.

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6. Include integral phase failure (single-phasing) protection where phase failure (PF) is indicated on the one line diagram

2.2 FUSES

A. GENERAL: Except as otherwise indicated, provided fuses of type, sizes and ratings and electrical characteristics of a single manufacturer as follows. Provide fuses labeled UL Class L or UL Class R, current limiting and rated for up to 200,000 amperes. Provide Buss KAZ signal activating fuses where required elsewhere in specification.

B. Where fuses are shown feeding individual or groups of equipment items, comply with manufacturer's recommendation for fusing; adjust fuse size and type as necessary to comply with manufacturer's recommendation.

C. Provide and install spare fuse cabinet in main electrical room.

D. BRANCH CIRCUITS: For motor circuits, transformer circuits, or other inductive loads, provide UL Class RK5 (FRN-R, FRS-R or TR-R, TRS-R or ECN-R, ECN-S or FLN-R, FLS-A). For other circuits, provide UL Class RK1, (KTN-R, KTS-R OR A2K-R, A6K-R or NCLR, SCLR OR KLNR, KLSR).

E. MANUFACTURER: Subject to compliance with requirements, provide fuses of one of the following:

1. Bussman Mfg. Co.
2. Mersen (Ferraz Shawmut)
3. Reliance Fuse Div./Brush Fuse Inc.
4. Littlefuse, Inc.

PART 3 – EXECUTION

3.1 INSTALLATION OF OVERCURRENT PROTECTIVE DEVICES:

A. Install overcurrent protective devices as indicated, in accordance with the manufacturer's written instructions and with recognized industry practices to ensure that protective devices comply with requirements. Comply with NEC and NEMA standards for installation of overcurrent protective devices.

B. Coordinate with work as necessary to interface installations of overcurrent protective devices with other work.

C. Install fuses in overcurrent protective devices. For motor circuits, fuse sizes shown on drawings are for general guidance only. Size fuses in accordance with fuse manufacturer's recommendation for given motor nameplate ampere rating. Test operation. If nuisance tripping occurs, increase fuse size and disconnect device (if necessary) as required to provide nuisance free tripping. Adjust fuse size properly for ambient temperature, frequent starting and stopping of motor loads, and for loads with long start times. Include all costs in bid.

D. After the switchgear is energized and just prior to Substantial Completion, the contractor shall ensure that the field-adjustable circuit breakers and solid-state circuit breakers and associated trip mechanisms have been set to the appropriate settings as recommended by the equipment Manufacturer (or as recommended by the electrical contractor's Protective Device Study if section 260573 has been included in the project). Time-current trip curves and trip setting information as was required in the Submittal portion of this specification shall be made available by the contractor at this time.

E. Field test all ground fault protective devices for proper operation; test to be performed by

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representative of the manufacturer. Include verification of complete time current trip characteristics.

F. Electrical Identification: Refer to Section 260553 for requirements.

3.2 FIELD QUALITY CONTROL

A. Prior to energization of overcurrent protective devices, test devices for continuity of circuitry and for short-circuits. Correct malfunctioning units, and then demonstrate compliance with requirements.

END OF SECTION 26 2815

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SECTION 26 2816 - MOTOR AND CIRCUIT DISCONNECTS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

B. This section is a Division-26 Basic Materials and Methods section, and is part of each Division-26 section making reference to motor and circuit disconnect switches specified herein.

C. RELATED SECTIONS: See Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 DESCRIPTION OF WORK:

A. Extent of motor and circuit disconnect switch work is indicated by drawings and schedule. Work includes complete installations and electrical connections.

1.3 QUALITY ASSURANCE:

A. Provide motor and circuit disconnect switches that have been UL listed and labeled. Comply with applicable requirements of NEMA Standards Pub. No. KS 1, and NEC.

1.4 SUBMITTALS: Refer to Section 26 0502 for requirements.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

A. MANUFACTURER: Subject to compliance with requirements, provide products of one of the following (for each type of switch):

1. Cutler Hammer Products, Eaton Corp.
2. Square D Company
3. GE/ABB
4. Siemens Energy & Automation, Inc.

2.2 FABRICATED SWITCHES:

A. GENERAL: Provide disconnect and safety switches as indicated herein. Provide:

1. General duty switches on 240 Volt rated circuits.
2. Heavy duty switches on 480 volt rated circuits.
3. HP rated switches on all motor circuits.

B. GENERAL DUTY SWITCHES: Provide general-duty type, sheet-steel enclosed switches, fusible or non-fusible as indicated of types, sizes and electrical characteristics indicated; rated 240 volts, 60 hertz; incorporating spring assisted, quick-make, quick-break mechanisms. Provide single phase or three phase and with solid neutral as required by application. Equip with operating handle that is capable of being padlocked in OFF position. Provide NEMA 1 or NEMA 3R as required by application, unless noted. Provide fusible

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switches with Class R rejection fuse clip kits.

C. HEAVY-DUTY SWITCHES: Provide heavy-duty type, sheet-steel enclosed safety switches, fusible or non-fusible as indicated, of types, sizes and electrical characteristics indicated; rated 600 volts, 60 hertz; incorporating quick-make, quick-break type mechanisms. Provide single phase or 3 phase, and with solid neutral as required by application, Equip with operating handle that is capable of being padlocked in OFF position. Provide NEMA 1 or NEMA 3R as required by application unless noted. Provide fusible switches with Class R rejection fuse clip kits.

D. FUSES: Provide fuses for switches, as required of classes, types and ratings needed to fulfill electrical requirements for service indicated. See Section 262815 Overcurrent Protective Devices for fuse types. Refer to Section 26 0502 for requirements.

E. Electrical Identification: Refer to Section 260553 for requirements.

PART 3 - EXECUTION

3.1 INSTALLATION OF MOTOR AND CIRCUIT DISCONNECT SWITCHES:

A. Install motor and circuit disconnect switches where indicated, complying with manufacturer's written instructions, applicable requirements of NEC, NEMA, and NECA's "Standard of Installation" and in accordance with recognized industry practices to ensure that products fulfill requirements.

B. Coordinate motor and circuit disconnect switch installation work with electrical raceway and cable work, as necessary for proper interface.

C. Install disconnect switches used with motor driven appliances, and motors and controllers within sight of controller position.

D. For disconnect switches serving motors controlled by variable frequency drives, provide late-make, early-break auxiliary contacts on each disconnect switch. (Provide Heavy-Duty switch). Wire auxiliary contact to VFD safety contact, such that disconnecting the motor will shut down the drive first, and closing the switch will start the drive only after power is applied to the motor.

E. For disconnect switches serving elevators with auxiliary power hydraulic units, provide auxiliary contacts on each disconnect switch. Wire auxiliary contact to auxiliary power such that disconnecting the motor will disconnect the auxiliary power.

END OF SECTION 26 2816

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SECTION 26 2913 - MOTOR STARTERS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

B. This section is a Division-26 Basic Materials and Methods section, and is part of Division-26 sections making reference to motor starters specified herein.

C. **RELATED SECTIONS: See Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.**

1.2 DESCRIPTION OF WORK:

A. Extent of motor starter work is indicated by drawings and schedules.

B. Types of motor starters in this section include the following:

1. AC Fraction Horsepower Manual Starters
2. AC Line Voltage Manual Starters
3. AC Non-Reversing Magnetic Starters
4. AC Combination Non-Reversing Magnetic Starters

1.3 QUALITY ASSURANCE:

A. Comply with NEC and NEMA Standards as applicable to wiring methods, construction and installation of motor starters. Comply with applicable requirements of UL 508, "Electric Industrial Control Equipment", pertaining to electrical motor starters. Provide units that have been UL-listed and labeled.

1.4 SUBMITTALS: Refer to Section 26 0502 for requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURER:

A. Subject to compliance with requirements, provide products of one of the following (for each type and rating of motor starter):

1. Allen-Bradley Co.
2. Appleton Electric Co.
3. Crouse-Hinds Co.
4. Eaton Corp., Cutler Hammer Products
5. GE/ABB
6. Siemens Energy & Automation, Inc.
7. Square D Co.

B. MAINTENANCE STOCK, FUSES: Refer to Section 26 0502 for requirements.

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2.2 MOTOR STARTERS:

A. GENERAL: Except as otherwise indicated, provide motor starters and ancillary components; of types, sizes, ratings and electrical characteristics indicated that comply with manufacturer's standard materials, design and construction in accordance with published information and as required for complete installations.

B. THERMAL OVERLOAD UNITS: Provide thermal overload units, sized to actual running full load current, not to motor plate current. Size heaters for mechanical equipment after air and water balancing have been completed.

C. AC FRACTIONAL HP MANUAL STARTERS (EQUAL TO SQUARE D CLASS 2510): Provide manual, single-phase, 1 and 2 pole, 300 volt AC max, fractional HP motor starters, of types, ratings and electrical characteristics indicated; equip with one piece thermal overload relay with field adjustment capability of plus or minus 10 percent of nominal overload heater rating; for protection of AC motors of 1 HP and less. (For manually controlled motors in excess of 1 HP, see Line Voltage Manual Starters specified herein). Provide starter with quick-make, quick-break trip free toggle mechanisms, green pilot lights, and with lock-off toggle operated handle. Mount surface units in NEMA 1 enclosures, unless noted otherwise. Provide NEMA 3R enclosure in exterior or damp location unless noted otherwise. Provide flush mounted units with coverplate to match wiring device coverplates.

D. AC LINE VOLTAGE MANUAL STARTERS (EQUAL TO SQUARE D CLASS 2510): Provide line voltage manual starters, of types, ratings and electrical characteristics indicated; 2 or 3 pole, 600 volt AC max; equip with pushbutton operator, low voltage protection feature, and green pilot light. Provide starters with trip free mechanism such that contacts will open under load and remain open until thermal element has cooled, and unit is reset. Mount surface units in NEMA 1 enclosure, unless noted otherwise. Provide NEMA 3R enclosure in exterior or damp location, unless noted otherwise. Provide overlapping trim for flush mounted units.

E. AC NON-REVERSING MAGNETIC STARTERS (EQUAL TO SQUARE D CLASS 8536): Provide line voltage magnetic starters, of types, ratings and electrical characteristics indicated; 2 or 3 pole, 600 volt max, with thermal overload protection in all phases and inherent under voltage release. Equip units with holding contact, 2 normally open, and 2 normally closed auxiliary contacts, unless noted otherwise. Provide fused control transformer in each starter and 120V control coil. Mount hand-off-auto switch, red pilot light, and reset button in face of enclosure. Provide NEMA 1 enclosure unless noted otherwise. Provide NEMA 3R enclosure in exterior or damp location, unless noted otherwise. Equip all spare starters complete with items as specified herein.

F. AC COMBINATION NON-REVERSING MAGNETIC STARTERS (EQUAL TO SQUARE D CLASS 8539): Provide line voltage combination starters, of types, ratings and electrical characteristics indicated; 2 or 3 pole, 600 volts max with non-reversing magnetic starters as specified herein; in common cubicle or enclosure with motor circuit protector. Provide motor circuit protector, instantaneous trip circuit breaker as indicated and adjust to comply with manufacturer's recommendations. Mount hand-off-auto switch, red pilot light, and reset button in face of enclosure. Provide combination starters for individual mounting, or for group mounting in motor control center as indicated. Provide NEMA 3R enclosure in exterior or damp locations, unless noted otherwise. Provide NEMA 1 enclosures unless otherwise indicated.

G. AC COMBINATION NON-REVERSING MAGNETIC STARTERS (EQUAL TO SQUARE D CLASS 8538): Provide line voltage combination starters, of types, ratings, and electrical characteristics; 2 or 3 pole, 600 volt maximum with non-reversing magnetic starters as specified herein; in common cubicle or enclosure with fusible disconnect switch. Provide

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quick-make, quick-break, disconnect for NEMA sizes 1, 2, 3, and 4; and visible blade, automatic circuit interrupters with push-to-trip feature and separate fuse clips for larger NEMA sizes. Fuse all starters with dual-element (time-delay) fuses equal to Bussman FRN/FRS-R. Equip disconnect switch with Class R rejection fuse kits. Mount hand-off-auto switch, red pilot light, and reset button in face of enclosure. Provide combination starters for individual mounting, or for group mounting in motor control centers as indicated. Provide NEMA 1 enclosures unless otherwise indicated. Provide NEMA 3R enclosure in exterior or damp locations, unless noted otherwise.

PART 3 - EXECUTION

3.1 INSTALLATION OF MOTOR STARTERS:

A. Install motor starters as indicated, in accordance with manufacturer's written instructions, applicable requirements of NEC, NEMA standards, and NECA's "Standards of Installation", and in compliance with recognized industry practices to ensure that products fulfill requirements.

B. Install fuses in fusible disconnects, if any. Mount chart inside each starter indicating heater type, size, and ampere ratings available.

C. Electrical Identification: Refer to Section 260553 for requirements.

3.2 ADJUST AND CLEAN:

A. Inspect operating mechanisms for malfunctioning and, where necessary, adjust units for free mechanical movement.

B. Touch-up scratched or marred surfaces to match original finish.

3.3 FIELD QUALITY CONTROL:

A. Subsequent to wire/cable hook-up, energize motor starters and demonstrate functioning of equipment in accordance with requirements.

END OF SECTION 26 2913

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SECTION 26 3213 - EMERGENCY ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

B. Division-26 Basic Materials and Methods sections apply to work specified in this section.

C. RELATED SECTIONS: See Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 DESCRIPTION OF WORK:

A. Extent of emergency electrical system work is indicated by drawings and schedules.

B. Types of emergency system components specified in this section include the following:

1. By-pass/Isolation Switches (BP/IS)

C. CONDUCTORS/CABLES, RACEWAYS, AND ELECTRICAL BOXES AND FITTINGS are specified in applicable Division-26 Basic Materials and Methods sections.

D. Refer to other Division-26 sections as applicable for work required in connection with emergency electrical systems.

1.3 QUALITY ASSURANCE:

A. Comply with NEC as applicable to wiring methods, materials, construction and installation of emergency electrical systems. Comply with applicable requirements of UL 924, "Emergency Lighting and Power Equipment" and UL 1008, "Automatic Transfer Switches". Provide system components, that are UL-listed and labeled.

B. Comply with applicable requirements of NFPA Nos. 37, (99), 101, and 110 pertaining to stationary combustion engines, (health care facilities), life safety code, and emergency and standby power supplies.

C. Comply with ANSI/NEMA Std. Pub. No. ICS 2, pertaining to AC automatic transfer switches. Comply with applicable requirements of ANSI/NEMA MG 1, "Motors and Generators", and MG 2, "Safety Standard for Construction and Guide for Selection, Installation and Use of Electric Motors and Generators". Comply with applicable portions of IEEE Std. 241, "IEEE Recommended Practice for Electric Power Systems in Commercial Buildings" pertaining to standby power.

1.4 SUBMITTALS: Refer to Section 26 0502 for requirements.

PART 2 – PRODUCTS

2.1 GENERAL:

A. Provide emergency electrical systems and components, of types, ratings, and electrical characteristics indicated. Provide all system components thru one supplier to guarantee total system responsibility. Provide system and components capable of start and load transfer within 10 seconds of power outage.

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2.2 ENVIRONMENTAL CONDITIONS:

A. Provide system components and accessories as required to ensure proper system operation at rated capacities under the following environmental conditions:

1. Altitude: Per project elevation.
2. Maximum ambient temperature: 50 degrees C.
3. Minimum ambient temperature: 0 degrees C.
4. Seismic Zone as indicated in General Structural Notes.

2.3 BY-PASS/ISOLATION SWITCHES:

A. Provide each by-pass isolation switch in the same enclosure as the associated transfer switch, complete with all interconnecting wiring for power and control. Provide separate compartments for the BP/IS and ATS switches with barriers between the component switches. Construct the switch to permit load by-pass to either the normal or the emergency source of power and to allow complete isolation of the associated ATS, independent of the operating position of the ATS. BP/IS shall not have overload or fault current protective devices. The BP/IS and the associated ATS shall be the products of the same manufacturer and shall be completely interconnected, and tested at the factory. Provide BP/IS of equal or greater comparable electrical ratings than specified for the associated ATS.

B. Switch design and construction shall prevent stops in an intermediate or neutral position during operations, but shall permit load by-pass and transfer switch isolation in no more than two manual operations that can be performed by one person in 5 seconds or less. Operation of the BP/IS shall be assured regardless of the position of the ATS. Provide indicating lights to show the BP/IS in the by-pass position, and in the fully isolated position.

C. The switch shall be fully manually operated and shall not be dependent upon electrical operators, relays, or interlocks for operation. Provide main contacts and operating linkages identical to the ATS except that the operation shall be manual.

D. Provide necessary controls to assure that the “engine run” circuit remains closed when the switch is in the bypass to emergency position, even though the associated transfer switch is in the “normal” position or completely removed from the enclosure.

E. The BP/IS switch shall be have the same number of poles (3 or 4) as specified for the associated ATS.

F. Provide a solenoid interlock to prevent the operator from switching the BP/IS switch to a dead source of power.

G. MANUFACTURERS: Subject to compliance with requirements, provide automatic transfer switches of one of the following:

1. ASCO, Inc.
2. Onan Corp.
3. Russelectric Co.
4. Zenith Controls, Inc.
5. Kohler Power System
6. Generac

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2.4 SURGE PROTECTIVE DEVICES:

A. Provide a surge protective device on each switchboard and panelboard located on the emergency distribution system. Refer to section 26 4313 for requirements.

2.5 ON SITE TRAINING:

A. Conduct a training course for operating staff as designated by the Owner. The training period shall consist of a total of 8 hours of normal working time distributed between two shifts, and shall start after the system is functionally complete but prior to final acceptance. The course instruction shall cover pertinent points involved in operating, starting, stopping, servicing the equipment as well as all major elements of the operation and maintenance manuals. Additionally, the course instruction shall demonstrate all routine maintenance operations such as oil change, oil filter change, air filter change, etc.

2.6 FIELD ENGINEER:

A. Provide a qualified field engineer to supervise the installation of the engine generator set, transfer and by-pass switches, etc., assist in the performance of the on-site tests, and instruct personnel as to the operational and maintenance features of the equipment.

2.7 SERVICE AND SUPPORT

A. The manufacturer of the generator set shall maintain service parts inventory at a central location that is accessible to the service location 24 hours per day, 365 days per year.

B. The generator set shall be serviced by the local service organization (during the warranty period) that is trained and factory certified in generator set service the supplier shall maintain an inventory of critical replacement parts at the local service organization, and in service vehicles. The service organization shall be on call 24 hours per day, 365 days per year.

END OF SECTION 26 3213

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SECTION 26 4313 - SURGE PROTECTIVE DEVICES (SPD)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

B. Division 26 Basic Materials and Methods sections apply to work specified in this section.

C. **RELATED SECTIONS: See Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.**

1.2 DESCRIPTION OF WORK:

A. Extent of SPD's work is indicated by drawings, schedules and specified herein. Work includes complete installation, electrical connections, testing, and commissioning.

1.3 QUALITY ASSURANCE:

A. Comply with NEC, NEMA and IEEE Standards as applicable to wiring methods, construction and installation of SPD's. Comply with applicable requirements of ANSI/IEEE C62.11, C62.41.2 and C62.45; NFPA 70 285 (Type 2), 75, and 78; and ANSI/UL 1449 4th edition. Provide complete packaged units that have been listed and labeled by Underwriters Laboratory. UL surge ratings (UL 1449) must be permanently affixed to the SPS's device.

1.4 SUBMITTALS: Refer to Section 26 0502 for requirements.

PART 2 - PRODUCTS:

2.1 ACCEPTABLE MANUFACTURERS:

A. Subject to compliance with requirements, provide products manufactured by one of the following as indicated by "Location Category" herein.

1. Advanced Protection Technologies Inc.
2. Current Technology Inc.
3. Cutler Hammer, Inc.
4. L.E.A. International
5. Emerson Network Power Surge Protection Inc.
6. United Power Corporation
7. GE
8. Eaton
9. Surgelogic (Square D)
10. Siemens Energy & Automation, Inc.

2.2 GENERAL:

A. Except as otherwise indicated, provide high energy surge protective devices, with high

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frequency line noise filtering, suitable for application in Category A, B, and C environments as indicated. Provide types, sizes, ratings and electrical characteristics indicated that comply with manufacturer's standard materials, design, and construction in accordance with published information and as required for a complete installation.

2.3 VOLTAGE SURGE SUPPRESSION – GENERAL:

A. Electrical Requirements

1. Unit Operating Voltage – Refer to drawings for operating voltage and unit configuration.

2. Maximum Continuous Operating Voltage (MCOV) – The MCOV shall not be less than 115% of the nominal system operating voltage.

3. The suppression system shall incorporate thermally protected metal-oxide varistors (MOVs) as the core surge suppression component for the service entrance and all other distribution levels. The system shall not utilize silicon avalanche diodes, selenium cells, air gaps, or other components that may crowbar the system voltage leading to system upset or create any environmental hazards.

4. Protection Modes – The SPD must protect all modes of the electrical system being utilized. The required protection modes are indicated by bullets in the following table:

	Protection Modes			
Configuration	L-N	L-G	L-L	N-G
Wye	●	●	●	●
Delta	N/A	●	●	N/A
Single Split Phase	●	●	●	●
High Leg Delta	●	●	●	●

5. Nominal Discharge Current (In) – All SPDs applied to the distribution system shall have a 20kA In rating regardless of their SPD Type (includes Types 1 and 2) or operating voltage. SPDs having an In less than 20kA shall be rejected.

6. ANSI/UL 1449 4th Edition Voltage Protection Rating (VPR) – The maximum ANSI/UL 1449 4th Edition VPR for the device shall not exceed the following:

B. SPD Design

1. Maintenance Free Design – The SPD shall be maintenance free and shall not require any user intervention throughout its life. SPDs containing items such as replaceable modules, replaceable fuses, or replaceable batteries shall not be accepted. SPDs requiring any maintenance of any sort such as periodic tightening of connections shall not be accepted. SPDs requiring user intervention to test the unit via a diagnostic test kit or similar device shall not be accepted.

2. Balanced Suppression Platform – The surge current shall be equally distributed to all MOV components to ensure equal stressing and maximum performance. The surge suppression platform must provide equal impedance paths to each matched MOV. Designs incorporating replaceable SPD modules shall not be accepted.

3. Electrical Noise Filter – Each unit shall include a high-performance EMI/RFI noise rejection filter. Noise attenuation for electric line noise shall be up to 50 dB from 10

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kHz to 100 MHz using the MIL-STD-220A insertion loss test method. Products unable able to meet this specification shall not be accepted.

4. Internal Connections – No plug-in component modules or printed circuit boards shall be used as surge current conductors. All internal components shall be soldered, hardwired with connections utilizing low impedance conductors.

5. Monitoring Diagnostics – Each SPD shall provide the following integral monitoring options:

   a. Protection Status Indicators - Each unit shall have a green / red solid-state indicator light that reports the status of the protection on each phase.

      i. For wye configured units, the indicator lights must report the status of all protection elements and circuitry in the L-N and L-G modes. Wye configured units shall also contain an additional green / red solid-state indicator light that reports the status of the protection elements and circuitry in the N-G mode. SPDs that indicate only the status of the L-N and L-G modes shall not be accepted.

      ii. For delta configured units, the indicator lights must report the status of all protection elements and circuitry in the L-G and L-L modes.

      iii. The absence of a green light and the presence of a red light shall indicate that damage has occurred on the respective phase or mode. All protection status indicators must indicate the actual status of the protection on each phase or mode. If power is removed from any one phase, the indicator lights must continue to indicate the status of the protection on all other phases and protection modes. Diagnostics packages that simply indicate whether power is present on a particular phase shall not be accepted.

   b. Remote Status Monitor – The SPD must include Form C dry contacts (one NO and one NC) for remote annunciation of its status. Both the NO and NC contacts shall change state under any fault condition.

   c. Audible Alarm and Silence Button – The SPD shall contain an audible alarm that will be activated under any fault condition. There shall also be an audible alarm silence button used to silence the audible alarm after it has been activated.

   d. Surge Counter – The SPD shall be equipped with an LCD display that indicates to the user how many surges have occurred at the location. The surge counter shall trigger each time a surge event with a peak current magnitude of a minimum of 50 ± 20A occurs. A reset pushbutton shall also be standard, allowing the surge counter to be zeroed. The reset button shall contain a mechanism to prevent accidental resetting of the counter via a single, short-duration button press. In order to prevent accidental resetting, the surge counter reset button shall be depressed for a minimum of 2 seconds in order to clear the surge count total.

      i. The ongoing surge count shall be stored in non-volatile memory. If power to the SPD is completely interrupted, the ongoing count indicated on the surge counter's

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display prior to the interruption shall be stored in non-volatile memory and displayed after power is restored. The surge counter's memory shall not require a backup battery in order to achieve this functionality.

6. Overcurrent Protection

   a. The unit shall contain thermally protected MOVs. These thermally protected MOVs shall have a thermal protection element packaged together with the MOV in order to achieve overcurrent protection of the MOV. The thermal protection element shall disconnect the MOV(s) from the system in a fail-safe manner should a condition occur that would cause them to enter a thermal runaway condition.

7. Fully Integrated Component Design – All of the SPD's components and diagnostics shall be contained within one discrete assembly. SPDs or individual SPD modules that must be ganged together in order to achieve higher surge current ratings or other functionality shall not be accepted.

8. Safety Requirements

   a. The SPD shall minimize potential arc flash hazards by containing no user serviceable / replaceable parts and shall be maintenance free. SPDs containing items such as replaceable modules, replaceable fuses, or replaceable batteries shall not be accepted. SPDs requiring any maintenance of any sort such as periodic tightening of connections shall not be accepted. SPDs requiring user intervention to test the unit via a diagnostic test kit or similar device shall not be accepted.

   b. SPDs designed to interface with the electrical assembly via conductors shall require no user contact with the inside of the unit. Such units shall have any required conductors be factory installed.

   c. Sidemount SPDs shall be factory sealed in order to prevent access to the inside of the unit. Sidemount SPDs shall have factory installed phase, neutral, ground and remote status contact conductors factory installed and shall have a pigtail of conductors protruding outside of the enclosure for field installation.

2.4 SYSTEM APPLICATION

A. The SPD applications covered under this section include distribution and branch panel locations, busway, motor control centers (MCC), switchgear, and switchboard assemblies. All SPDs shall be tested and demonstrate suitability for application within ANSI/IEEE C62.41 Category C, B, and A environments.

B. Provide a surge protective device on each switchboard and panelboard located on the emergency distribution system. Refer to table below for category type.

Minimum surge current capacity based on ANSI / IEEE C62.41 location category			
CATEGORY	Application	Per Phase	Per Mode
C	Service Entrance Locations (Switchboards, Switchgear, MCC, Main Entrance)	250 kA	125 kA
B	High Exposure Roof Top Locations (Distribution Panelboards)	160 kA	80 kA
A	Branch Locations (Panelboards, MCCs, Busway)	120 kA	60 kA

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C. Surge Current Capacity – The minimum surge current capacity the device is capable of withstanding shall be as shown in the following table:

D. SPD Type – all SPDs installed on the line side of the service entrance disconnect shall be Type 1 SPDs. All SPDs installed on the load side of the service entrance disconnect shall be Type 1 or Type 2 SPDs.

2.5 LIGHTING AND DISTRIBUTION PANELBOARD REQUIREMENTS

A. The SPD application covered under this section includes lighting and distribution panelboards. The SPD units shall be tested and demonstrate suitability for application within ANSI/IEEE C62.41 Category B environments.

1. The SPD shall not limit the use of through-feed lugs, sub-feed lugs, and sub-feed breaker options.

2. SPDs shall be installed immediately following the load side of the main breaker. SPDs installed in main lug only panelboards shall be installed immediately following the incoming main lugs.

3. The panelboard shall be capable of re-energizing upon removal of the SPD.

4. The SPD shall be interfaced to the panelboard via a direct bus bar connection. Alternately, an SPD connected to a 30A circuit breaker for disconnecting purposes may be installed using short lengths of conductors as long as the conductors originate integrally to the SPD. The SPD shall be located directly adjacent to the 30A circuit breaker.

5. The SPD shall be included and mounted within the panelboard by the manufacturer of the panelboard.

6. The SPD shall be of the same manufacturer as the panelboard.

7. The complete panelboard including the SPD shall be UL67 listed.

B. Switchgear, Switchboard, MCC and Busway Requirements

1. The SPD application covered under this section is for switchgear, switchboard, MCC, and busway locations. Service entrance located SPDs shall be tested and demonstrate suitability for application within ANSI/IEEE C62.41 Category C environments.

2. The SPD shall be of the same manufacturer as the switchgear, switchboard, MCC, and busway

3. The SPD shall be factory installed inside the switchgear, switchboard, MCC, and/or bus plug at the assembly point by the original equipment manufacturer

4. Locate the SPD on the load side of the main disconnect device, as close as

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possible to the phase conductors and the ground/neutral bar.

5. The SPD shall be connected through a disconnect (30A circuit breaker). The disconnect shall be located in immediate proximity to the SPD. Connection shall be made via bus, conductors, or other connections originating in the SPD and shall be kept as short as possible.

6. The SPD shall be integral to switchgear, switchboard, MCC, and/or bus plug as a factory standardized design.

7. All monitoring and diagnostic features shall be visible from the front of the equipment.

2.6 ENCLOSURES

A. All enclosed equipment shall have NEMA 1 general purpose enclosures, unless otherwise noted. Provide enclosures suitable for locations as indicated on the drawings and as described below:

1. NEMA 1 – Constructed of a polymer (units integrated within electrical assemblies) or steel (sidemount units only), intended for indoor use to provide a degree of protection to personal access to hazardous parts and provide a degree of protection against the ingress of solid foreign objects (falling dirt).

2. NEMA 4 – Constructed of steel intended for either indoor or outdoor use to provide a degree of protection against access to hazardous parts; to provide a degree of protection of the equipment inside the enclosure against ingress of solid foreign objects (dirt and windblown dust); to provide a degree of protection with respect to the harmful effects on the equipment due to the ingress of water (rain, sleet, snow, splashing water, and hose directed water); and that will be undamaged by the external formation of ice on the enclosure. (sidemount units only)

3. NEMA 4X – Constructed of stainless steel providing the same level of protection as the NEMA 4 enclosure with the addition of corrosion protection. (sidemount units only)

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install SPD’s as indicated in accordance with manufacturers recommendations and as necessary to meet requirements. Install with conductors of minimum length practicable, but in no case exceeding 30" in length; minimum conductor size - #8 AWG copper.

B. Install conductors in straight runs with a minimum of turns or bends (minimum bend radius to be 90 degrees). Do not splice phase or ground conductors in SPD’s circuit. Torque all conductor terminations in accordance with manufacturer's recommendations.

3.2 FIELD QUALITY CONTROL:

A. Upon completion of installation of equipment, energize and demonstrate capability and compliance with requirements. Remove malfunctioning units, replace with new units and proceed with retesting.

END OF SECTION 26 4313

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SECTION 26 5100 - INTERIOR AND EXTERIOR BUILDING LIGHTING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

B. Division-26 Basic Materials and Methods sections apply to work specified in this section.

C. RELATED SECTIONS: See Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 DESCRIPTION OF WORK:

A. Types of lighting fixtures in this section are indicated by schedule and include the following:

1. High-Intensity-Discharge (HID)
2. Fluorescent
3. Incandescent/Halogen
4. LED (Light Emitting Diode)

1.3 QUALITY ASSURANCE:

A. Comply with NEC, NEMA and ANSI 132,1 as applicable to installation and construction of lighting fixtures. Provide lighting fixtures that have been UL-listed and labeled.

B. Components and fixtures shall be listed and approved for the intended use by a National Recognized Testing Laboratory (NRTL) including: UL, ETL, and CSA or equivalent

C. All led products shall comply with the latest version of Illuminating Engineer Society (IES) publications LM-79 and LM-80.

1.4 SUBMITTALS: Refer to Section 26 0502 for requirements.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

A. Subject to compliance with requirements, provide products of one of the following (for each type of fixture):

1. LED:
   a. Cree
   b. Nichia
   c. Samsung
   d. Philips Lumiled
   e. Osram
   f. Xicato

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2.2 INTERIOR AND EXTERIOR LIGHTING FIXTURES:

A. GENERAL:

1. Provide lighting fixtures, of sizes, types and ratings indicated complete with, but not necessarily limited to, housings, lamps, lamp holders, reflectors, ballasts, LED drivers, starters, and wiring. Label each fixture with manufacturer's name and catalog number. Provide all enclosed fixtures with positive latch mechanisms; spring tension clips not acceptable. Provide all exterior fixtures with damp or wet location label as required by application.

B. SUPPORT REQUIREMENTS:

1. Provide all pendant and stem hung fixtures with flexible ball joint hangers at all points of support. Equip hooks used to hang fixtures with safety latches. Provide all detachable fixture parts, luminous ceiling accessories, louvers, diffusers, lenses, and reflectors with locking catches, screws, safety chain, or safety cable.

C. BALLAST FUSING:

1. Provided in-line fusing for all fluorescent and HID ballasts. For fluorescent ballasts, provide GLR fuses and HLR -in-line fuse holders for each ballast. For HID fixtures provide KTK fuses and HPF fuse holders. Size fuses per ballast manufacturer's recommendation.

D. LIGHT EMITTING DIODE (LED) LUMINAIRES:

1. LED luminaires that can be serviced in place shall have a disconnecting means internal to the luminaries to disconnect simultaneously from the source of supply all conductors of the driver, including the grounded conductor. Disconnects shall not be required under the following exceptions:

a. Luminaries located in hazardous locations.

b. Luminaries used for egress lighting.

c. Cord-and-plug luminaries.

d. In industrial establishments with restricted public access where conditions of maintenance and supervision ensure that only qualified persons service the installation.

e. Where more than one luminaire is installed in a space and where disconnecting the supply conductors to the luminaire will not leave the space in total darkness.

f. Provide LED luminaires which are tested in accordance with IES LM-79, diodes tested in accordance with IES LM-80, and provide a minimum R9 rating of ≥ 50 (unless specified differently), a CRI rating of ≥ than 80 and L70 (6K) = 50,000 hours (IES TM-21). Provide with 0-10V dimming drivers as standard.

g. The fixture manufacturer(s) shall warrant the luminaires, in their entirety, to be free from defects in material or workmanship for at least 5 years from date of manufacture. Provide warranty in accordance with other sections of this specification and include a certificate of warranty from the fixture manufacturer with extended warranty information and proper forms and procedure description.

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PART 3 - EXECUTION

3.1 INSTALLATION OF LIGHTING FIXTURES

A. Install lighting fixtures at locations and heights as indicated, in accordance with fixture manufacturer's written instructions, applicable requirements of NEC, NECA's "Standards of Installation", NEMA standards, and with recognized industry practices to ensure that lighting fixtures fulfill requirements.

B. Coordinate with other work as appropriate to properly interface installation of lighting fixtures with other work. Consult architectural reflected ceiling plan for exact location of all lighting fixtures.

C. Provide all necessary supports, brackets, and miscellaneous equipment for mounting of fixtures. Support all ceiling mounted fixtures from the building structure; independent of the ceiling system, unless noted. Support each recessed fixture (fluorescent incandescent, and/or HID) from the building structure with #12 ga. steel wire attached to each corner (in addition to supports normally provided for attachment to the ceiling system). Provide backing supports above (or behind) sheetrock, plaster and similar ceiling and wall materials. Support surface mounted ceiling fixtures from channel. Support ceiling mounted outlet boxes independent of the raceway system, and capable of supporting 200 pounds. Feed each recessed fixture directly from an outlet box with flex conduit as required; do not loop from fixture to fixture. See plans for additional details.

D. FIXTURE WHIPS:

1. Provide each lay-in light fixture with at least 36" (Not to exceed 72") of 3/8" steel flexible conduit.

2. With-in spaces utilizing 0-10v control schemes ie: Room Controllers, the fixture whip shall be comprised of a MC-PCS Cable (see Section 26 0532 Conduit raceways) with at least 36” and not to exceed 72” in length located above removable grid ceilings.

E. Coordinate lighting in mechanical room with duct and equipment locations to avoid obstruction of illumination.

F. Provide gypsum board protection as required, (acceptable to fire official having jurisdiction) to ensure fire rating of each ceiling that the fixtures are installed in.

G. COORDINATION MEETINGS:

1. Meet at least twice with the ceiling installer. Hold first meeting before submittal of shop drawings to coordinate each light fixture mounting condition with ceiling type. During second meeting, coordinate fixture layout in each area.

2. Meet at least once with the mechanical installer prior to fabrication and installation of duct work. Coordinate depth and location of all fixtures and duct work in all areas.

H. ADJUST AND CLEAN:

1. Clean lighting fixtures of dirt and debris upon completion of installation.

2. Protect installed fixtures from damage during remainder of construction period. Repair all nicks and scratches to appearance of original finish.

I. SPARE PARTS: Refer to Section 26 0502 for requirements.

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3.2 FIELD QUALITY CONTROL:

A. Upon completion of installation of lighting fixtures, and after building circuitry has been energized, apply electrical energy to demonstrate capability and compliance with requirements.

B. Where possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise remove and replace with new units, and proceed with retesting.

C. At the time of Substantial Completion, replace lamps in interior lighting fixtures that are observed to be noticeably dimmed after the Contractor's use and testing, as judged by Architect/Engineer.

D. GROUNDING:

1. Provide equipment grounding connections for each lighting fixture.

END OF SECTION 26 5100

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SECTION 26 5600 - EXTERIOR AREA LIGHTING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

B. Division-26 Basic Materials and Methods sections apply to work specified in this section.

C. RELATED SECTIONS: See Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 DESCRIPTION OF WORK:

A. Types of lighting fixtures in this section are indicated by schedule and include the following:

1. LED (Light Emitting Diode)

B. Excavation and backfilling for exterior area lighting poles, standards and foundations are specified in applicable Division-26 general provision sections.

C. Concrete for embedding poles, and for pole foundations and footings is specified in other sections of specification. Provide pole bases under this section of the specification.

D. Refer to other Division-26 sections for cable, wire and connectors required in connection with exterior area lighting poles and standards.

1.3 QUALITY ASSURANCE:

A. Comply with NEC, NEMA and ANSI/IES requirements as applicable to location and installation of lighting poles and standards. Provide lighting components and fittings that are UL-listed and labeled.

B. Comply with other portions of specification as applicable for forming, splicing, and curing of concrete bases provided under this section.

1.4 SUBMITTALS: Refer to Section 26 0502 for requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURER: Subject to compliance with requirements, provide products as scheduled on drawings.

A. FUSES: Refer to Section 26 0502 for requirements.

B. CONCRETE: 3000 psi Class.

C. LIGHT FIXTURE POLES: Provide light fixture poles that comply with the following minimum requirements.

1. The pole shaft constructed of seamless aluminum alloy per requirements of ASTM B221. Include a flush covered hand hole in each pole with finish hardware. Provide a permanent marking with the manufacturer name inside the hand hole for easy recognition.

2. Provide aluminum alloy anchor base welded to the pole shaft. Welding must comply with AWS Specification D1.2, Structural Welding Code – Aluminum. The

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complete assembly must be heat-treated to a T6 temper.

3. Provide super durable thermosetting polyester power coat paint, a minimum of 1.5 mils thick along the entire length of the pole.

4. Include aluminum nut covers for a “Shoe Base” trim.

5. Provide a 10 year minimum guarantee, which covers the pole structure and paint.

6. Provide vibration dampening in poles.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. Install area lighting units as indicated, in accordance with manufacturer's written instructions, applicable requirements of NEC, NESC and NEMA standards and with recognized industry practices to ensure that lighting units fulfill requirements.

B. Coordinate with other work as necessary to properly interface installation of roadway and parking area lighting with other work.

C. Comply with NEC 300-5 (or State of Utah requirement, whichever is most stringent), for raceway burial depth.

D. Mount lighting units on concrete bases as indicated, complete with anchor bolts and reinforcing bars. Coordinate proper size and location of all bases as required to ensure proper installation. Provide 3000 psi class concrete; hand rub all exposed concrete to uniform, smooth finish.

E. Deliver poles to job site with factory finish paint.

F. Set poles and standards plumb. Support adequately during backfilling, or anchoring to foundations.

G. Provide sufficient space encompassing hand access and cable entrance holes for installation of underground cabling.

H. Provide Bussman HEB fuseholder (or Littelfuse LEB-XX-S) with "breakaway" receptacles in all conductors running to the top of each pole. Locate fuseholder at hand hole or in base junction box as applicable. Provide KTK fuses in each phase conductor, sized 1.5 times maximum full load current of ballasts served by each conductor. Do not exceed rating of circuit overcurrent protective device. Provide fuse blanks in neutral conductors. Make up all other splices in pole or pole base using Scotchcast 400 Resin for watertight connection.

3.2 GROUNDING:

A. Provide equipment grounding connections for each lighting unit installation.

END OF SECTION 26 5600

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271500 TELEPHONE/DATA SYSTEMS

COMMUNICATIONS

division 27

SAA

SANDERS ASSOCIATES ARCHITECTS

SECTION 27 1500 - TELEPHONE/DATA SYSTEMS

PART 1 – GENERAL

1.1 SCOPE OF DOCUMENT:

A. The following are project specifications that all cabling systems must adhere to. These specifications apply to all installers (hereinafter referred to as “the Contractor”) for all sites, that require, standards-compliant structured cabling systems and shall be used for all the installation, testing, and acceptance of the information transport systems as described in the attached specifications. Prices quoted of the installation facilities shall be all-inclusive and represent a complete installation at such sites as prescribed in this specification and contract documents. The Contractor shall be solely responsible for all parts, labor, testing, acceptance and all other associated processes and physical apparatus necessary to turn-over a completed system fully warranted and operational for acceptance by the Customer. Final acceptance of the installation shall be in writing by the Architect and Engineer.

B. In all instances where Standards are cited, it is assumed Installer will have familiarity with and implicitly follow the recommendations of the most current version of the Standard referenced at the time of installation. Compliance with most current Standards is the sole responsibility of the Contractor.

1.2 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

B. Division-7 Firestopping, apply to work of this section.

C. Division-26 Basic Materials and Methods sections apply to work specified in this section.

D. **RELATED SECTIONS: See Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.**

1.3 SCOPE OF WORK:

A. The extent of telephone/data system work is indicated by drawings and is hereby defined to include, but not be limited to racks, cabinets, patch panels, cables, raceway, outlet boxes, device plates, backboard, and grounding. Contractor is responsible for installation of all specified and unspecified necessary and miscellaneous items required for delivery of a complete and functional data cabling and device system.

B. Contractor shall provide complete cable and outlet system as indicated on the drawings and described herein. Work shall include all associated infrastructure transmission components and support appliances including, but not be limited to cable, jacks, terminal blocks, racks, cabinets, wire management, labeling, transient voltage surge suppression, patch cords, telecommunications grounding system and all terminations as specified herein.

C. Contractor shall provide system testing as described herein using up-to-date and industry accepted Level IIIe, IV, V test equipment appropriate to the types of links being tested and in accordance with the latest edition of IEC 61935-1. All testers used shall be factory calibrated within one year of use with references set daily prior to testing.

D. All active equipment (electronics) will be owner furnished and owner installed.

E. Contractor shall be solely responsible for all parts, labor, testing, documentation and all other associated processes and physical apparatus necessary to turn-over the completed

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system fully warranted and operational for acceptance by Owner and Engineer.

F. Contractor shall provide all labor, materials, tools and equipment required for the complete installation of work called for in the Construction Documents.

G. Copper solution must match optical fiber solution and be provided by the same manufacturer. No two separate warranties are acceptable for the copper connectivity and optical fiber connectivity.

H. Contractor shall provide 1-1" EMT conduit from telecommunications outlet/connector to accessible ceiling space, then utilize non-continuous cable support devices to EF/ER/TR/TE.

1.4 CONTRACTOR QUALIFICATIONS

A. The contractor shall be fully conversant and capable in the cabling of low voltage applications such as, but not limited to voice and data network systems. The Contractor shall at a minimum possess the following qualifications:

1. Must have at a minimum (1) RCDD certified individual employed full time at the time of bidding and throughout entire project. PROVIDE PROOF OF RCDD CERTIFICATION IMMEDIATELY UPON JOB AWARD.
2. Approved and certified by connectivity manufacturer. Provide proof of certification immediately upon job award.
3. BICSI Certified Installers or equivalent.
4. Possess those licenses/permits required to perform telecommunications installations in the specified jurisdiction.
5. Have a minimum of 5 years in the communications structured cabling business and be able to provide three owner references for the type of installation described in this specification for projects within the last 18 months.
6. Personnel trained and certified in fiber optic cabling, splicing, termination and testing techniques. Personnel must own not rent a light meter or fiber test adapter head, and OTDR and shall be factory certified by the manufacturer of the products being installed.
7. Personnel trained in the installation of pathways and support for housing horizontal and backbone cabling.
8. Personnel knowledgeable in local, state, province and national codes, and regulations. All work shall comply with the latest revision of the codes or regulations. When conflict exists between local or national codes or regulations, the most stringent codes or regulations shall be followed.
9. Be factory certified by the manufacturer used in installation of all transmission components of all copper and fiber links and able to provide the manufacturer warranty.

1.5 QUALITY ASSURANCE

A. Required Pre-Telecommunications Construction Meeting with Communications Engineer: Electrical contractor/representative AND Communications Contractor will be required to attend a pre-communications construction meeting (approximately 30-60 minutes) with Communications representative in the electrical engineer's office prior to communications construction commencement. This meeting will address any questions on the part of the contractor and the expectations of the Engineer with regard to specifications, plans and site visits for both rough and finish electrical work.

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B. Owner IT Contact:

1. Firstname Lastname, email address, phone number

C. BNA IT Contact:

1. Josh Oakeson RCDD; josh@bnaconsulting.com, 801-532-2196

1.6 APPLICABLE CODES AND STANDARDS

A. Contractor is responsible for compliance with all applicable portions of the NEC code as to type of products used and installation of components. All materials used shall be products and materials that have been UL-listed and labeled. All installed products shall comply with applicable NEMA standards for low loss extended frequency cable.

B. In addition, installation shall adhere to the following Standards:

1. ANSI/TIA-568-C.0 - Generic Telecommunications Cabling for Customer Premises, or most recent edition at the time of installation
2. ANSI/TIA-568-C.1 – Commercial Building Telecommunications Cabling Standards, or most recent edition at the time of installation
3. ANSI/TIA-568-C.2 - Balance Twisted Pair Communications and Components Standards, or most recent edition at the time of installation
4. ANSI/TIA –942 -Telecommunications Infrastructure for Data Centers, or most recent edition at the time of installation
5. TIA-569-B - Commercial Building Standard for Telecom Pathways and Spaces, or most recent edition at the time of installation
6. ANSI/TIA-606-A – Administration Standard for the Telecommunications Infrastructure of Commercial Buildings, or most recent edition at the time of installation
7. ANSI/NECA/BICSI-607 - Commercial Building Grounding/Bonding Requirements, or most recent edition at the time of installation
8. ANSI/TIA 1152 – Testing of Copper Links
9. BICSI Telecommunications Distribution Methods Manual, 13th edition or most recent edition at the time of installation.
10. TIA 758-A - Customer owned Outside Plant Telecommunications Infrastructure Standard (2004), including all applicable addenda and the most recent revision at the time of installation.
11. BICSI Information Transport Systems Installation Manual - 5th edition or most recent edition at the time of installation.
12. ANSI/NFPA-70 - 2017 National Electrical Code, revision, or most recent revision at the time of installation.
13. ANSI/IEEE C-2 - 2017 National Electrical Safety Code or most recent revision at the time of installation.
14. OSHA Standards and Regulations All applicable
15. Local Codes and Standards All applicable

C. Note: Anywhere cabling standards conflict with electrical or safety codes, Contractor shall defer to NEC and any applicable local codes or ordinances, or default to the most stringent requirements listed by either. Knowledge and execution of applicable codes is the sole

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responsibility of the Installer. Any code violations shall be remedied at the Contractor's expense.

1.7 ACCEPTABLE MANUFACTURERS:

A. General:

1. Unapproved product substitutions are not allowed. Contractor wishing to substitute any products for those expressly specified shall submit three samples of the alternate product to Engineer no less than two weeks prior to the last addendum accompanied by all engineering documents, drawings and third party test data proving mechanical and transmission equivalency. Acceptance of substitutions shall be received from Engineer in writing. All unapproved substitutions installed shall be removed by Contractor who shall assume all costs for removal and replacement with approved products. Such costs shall include, but not be limited to labor, materials, as well as any penalties or fees for late completion.

B. APPROVED MANUFACTURERS:

1. Contractor shall select only one line item in the each section of Parts 2, 3, and 4. Contractor shall NOT utilize multiple line items for the project within each Part. For example, if Panduit / General Cable is selected to be used for the project, all copper cabling and connectivity shall be by Panduit or General Cable. No other manufacturer or combination of manufacturers may be used for the copper cabling or connectivity equipment.

2. Copper Cabling / Connectivity Approved Manufacturers:

a. CommScope

b. Panduit/General Cable

c. Leviton / Berk-Tek

d. Siemon

e. Belden/ Mohawk

3. Fiber Cabling Approved Manufacturers

a. Same manufacturer from Part 2.

b. Corning

4. Non-Cabling / Connectivity Approved Manufacturers:

a. Same manufacturer from Part 2.

b. Chatsworth

1.8 SUBMITTALS: Refer to Section 26 0502 for requirements.

PART 2 - PRODUCTS

2.1 GENERAL:

A. All products shall be in new condition and UL listed.

B. Provide complete raceway, outlet boxes and miscellaneous items. All conduit utilized shall be EMT grade.

C. Provide 5" x 2.875" (or 4-11/16" x 3.25" square) deep square outlet box at each outlet location with single gang plaster or tile ring. Provide wall board adapters / accessories as

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necessary.

1. Approved solutions:

a. RANDL 5 Square Telecommunications Outlet Box Model TX-550-YY where “X” could be a bracket box and “YY” could be knockout arrangements.

b. Hubbell Large Capacity Wall Box Model HBL260. If a 2” knockout is required for installation purposes, provide this box.

D. Communication grounding and bonding shall be constructed and installed to meet or exceed the requirements of the National Electrical Code (NEC), IEC 1000-5-2 and ANSI/J-STD--607-A throughout the entire grounding system.

E. All termination hardware shall be rated to meet specified cabling specifications.

2.2 ENTRANCE FACILITY (EF) / EQUIPMENT ROOM (ER) / TELECOMMUNICATIONS ROOM (TR)

A. General:

1. Contractor shall be responsible for the adequate and appropriate design of all racking systems, paying particular attention to sizing of all cable management troughs and supports both horizontal and vertical installation of patch panels and wire management into rack.

2. Provide line surge suppressors at main telephone board in ER for all incoming phone lines if not provided by service provider. Provide ground connection to TMGB.

B. Provide the following, see specifications for each item in this document:

1. Wall Linings in each EF, ER, and TR:

a. In addition to the architectural walls, provide plywood wall lining that mounts at 8” A.F.F that shall:

i. Be fire-rated or treated on all sides with at least two coats of fire-resistant light-colored paint. Fire-retardant plywood is also acceptable. Leave fire rated stamp on plywood unpainted.

ii. Have walls lined with A/C grade or better, void-free plywood, 8 feet high with a minimum thickness of ¾”. See plans for additional wall locations.

iii. Install the plywood with grade A surface exposed. Plywood shall be securely fastened to wall-framing members to ensure that it can support attached equipment.

iv. Use flush hardware and supports to mount plywood.

v. Plywood shall be void free and kiln-dried to a maximum moisture content of 15 percent to avoid warping.

2. Main Cross Connect (MC) / Horizontal Cross Connects (HC):

a. Floor Mounted Racks (See Plans for Locations):

i. Provide two post 19” wide minimum 7’ tall EIA aluminum rack with ANSI/EIA 310-D rail size, 45RU capacity, painted black, top flanges, and mounting holes.

ii. Provide paint-piercing washers to electrically bond racks.

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iii. Approved Equipment

1. Chatsworth 55053-703 Standard Rack
2. CommScope RK3-45A
3. Panduit R2P
4. Belden BHRR194

b. Wall Mounted Cabinet (See Plans for Locations)

i. Provide black cabinet, with swing out cabinet body, perforated front door, and black color. Door shall be lockable.

ii. Size cabinet to accommodate all passive equipment necessary. Minimum cabinet size to be 30 RU. Plan for 6RU minimum of active equipment.

iii. Provide horizontal slack manager and 3" cable bend radius posts.

iv. Provide cabinet fan kit.

v. Approved Equipment

1. Chatsworth CUBE-iT Plus Cabinet System.
2. Belden XHW-4830-GD with XHWFANKIT115V

c. Flat Copper Patch Panels:

i. Provide flush mount flat patch panels of required number and size to accommodate shown telecommunications outlets on plans. (No horizontal cable managers are required)

ii. Size panels to provide minimum 25% spare capacity. Fill all available space in remaining patch panels so that panels are fully populated.

iii. Support Category 6 or higher applications.

iv. Shall accommodate 8-Pin 8-Contact (8P8C) ports.

v. Mount to standard EIA 19" rack.

vi. Each patch panel shall include mounted behind it one "towel rack" style cable support bar for each 24 connections that the Contractor shall dress cables using hook and loop type cable ties.

vii. Approved Equipment

48-Port Patch Panel Cat 6		
Manufacturer	Model Name	Flat Patch Panel
CommScope	Uniprise	UNP-6-DM-2U-48
Panduit	NetKey	NK6PPG48Y
Leviton	Leviton	69586-U48
Siemon	HD	HD6-48
Belden	Rev	RV6PPF2U48BK

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48-Port Patch Panel Cat 6A		
Manufacturer	Model Name	Flat Patch Panel
CommScope	Uniprise	UNP-6A-DM-2U-48
Panduit	NetKey	NK6XPPG48Y
Leviton	Leviton	6A586-U48
Siemon	Z-Max	Z6A-PNL-U48K
Belden	Rev	RVAPPF2U48BK

d. Fiber Shelves and Cassettes

i. Provide fiber shelves and cassettes as required to complete project with a maximum of 36 strands in 1RU.

ii. Provide rack mounted, sliding type fiber trays as required to complete project.

iii. Provide OM4 fiber adapter patch panels that contain modular, dual LC adapter panels as required to complete project. Color for OM4 ports to be aqua, color for OS2 ports to be yellow.

iv. Provide minimum 25% spare capacity of fiber adapter panels. Provide additional rack mounted fiber trays/fiber adapter patch panels if necessary to meet 25% spare capacity requirement.

v. Approved Equipment

Manufacturer	Model Name	Fiber Shelf	Cassette (OS2)
CommScope	Systimax 360	SD-1U-FX	PNL-CS-24LCW-PT
Panduit	HD-FLEX	FLEX1U06	FHS9N-12-10P
Leviton	Opt-X	5R1UM-S03	SPLCS-24L
Corning	CCH	CCH-01U	CCH-CP24-A9
Siemon	FCP3	FPC3-DWR	FMS2-12-LCSM-01
Belden		ECX-01U	FCSX06LDFS + FTSLC900PR12

e. Vertical Cable Managers:

i. Provide a vertical cable management panel on both sides of rack.

ii. Manager shall consist of a metal backbone with cable management fingers that align with EIA rack spacing. Provide cover for all cable management.

iii. Vertical panel shall be able to manage all the cable on the rack without the aid of horizontal cable managers.

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iv. Size all vertical cable managers according to factory recommendations for the cable being installed. In no case shall design require more than 35% fill ratio when rack is fully populated.

v. Provide molded plastic slack spools in front to facilitate minimum bend radius compliance.

vi. Minimum width to be 6".

vii. Approved Equipment

1. Chatsworth Velocity Double Sided 1391X-703
2. CommScope VCM-DS-84-xB (6", 8", 10", 12").
3. Panduit PatchRunner PRV6
4. Leviton 8980L-VFR (8")
5. BHVHH06 with BHSK020

f. Horizontal Cable Management

i. Provide horizontal cable management capable of managing copper and fiber cables.

ii. Manager shall consist of bend radius control throughout the fingers, pass through holes, and transitions between horizontal and vertical pathways.

iii. Provide front hinged cover that shall open 180 degrees.

iv. Manager should mount to standard EIA 19" rack.

v. Size according to factory recommendations for the cable being installed. In no case shall design require more than 40% fill ratio when rack is fully populated.

vi. Approved Equipment

1. Panduit NMFX, where X refers to the number of rack units
2. CommScope HTK-19-SS-XU, where X refers to the size.
3. Leviton 492RU-HFR (2RU) or 491UR-HFR (1RU)
4. Chatsworth 13930-70X (X denotes 1-3 RU)
5. BHH191UR / BHH192UR

g. Power Distribution Units (PDUs)

i. Provide monitored vertical mount power outlet unit with amperage and voltage indicated on plans. Unit shall have (24) NEMA 5-20R receptacles per circuit and internal thermal breaker of power outlet unit's listed amperage. Provide data cable to each PDU for reporting.

ii. Approved Equipment

1. Chatsworth eConnect P3-1C0A5
2. 9PG2-241003 with XDRPDUK401

h. Uninterruptible Power Supply (UPS)

i. Provide 1500VA, 120V rack-mounted UPS for each rack/cabinet on project with capability of providing backup to the full connected load for a minimum of 10 minutes, regardless of shown load on electrical panel schedules.

ii. Provide a minimum of (2) output receptacles.

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iii. Provide submittal for each UPS showing run time graph that shows compliance with the specifications.

iv. Approved Manufacturers

1. APC
2. Eaton

i. Cable Tray (only within the EF/ER/TR)

i. This cable tray section is only applicable within the EF/ER/TR and does not apply outside of those spaces. See specification 26 0536 Raceway Systems for any cable tray requirements outside of the EF/ER/TR (if applicable to the project.)

ii. Provide overhead ladder tray:

1. Tray shall have minimum 6" rung spacing.
2. Mount tray 18" above racks unless otherwise noted. Provide additional vertical tray as required to provide pathways between the tray above racks and the tray entering the communications room from outside.
3. Size tray according to quantity of cables entering space. However, in no case shall the tray be smaller than 4" high by 6" wide. Do not exceed 50% cable fill of tray.
4. For overhead installations, utilize profile supports to support tray every 5'-0".
5. For wall mounted installations, utilize shelf brackets to support tray every 5'-0".
6. Provide blind ends to provide closure for a dead-end tray.
7. Provide cable rollers, two at each 90-degree bend. A radius shield or horizontal bend radius may also be used in lieu of cable rollers.
8. Provide drop-out fittings, or waterfalls, over each cabinet of sufficient quantity to provide an acceptable path for cables to enter equipment. For single cables leaving the tray, utilize a cable drop-out in lieu of a waterfall.
9. Cables must enter the racks from the top.
10. Provide conduit to tray adapters for each conduit terminating to cable tray.

iii. Acceptable Manufacturers

1. Chatsworth Universal Cable Runway
2. Cooper B-Line Redi Rail Runway
3. Cablofil PW Ladder Tray
4. CommScope Cable Runway
5. Panduit WyrGrid Cable Tray
6. MonoSystems Series MR-16T

2.3 CABLING DISTRIBUTION SYSTEMS AND MISCELLANEOUS EQUIPMENT

A. General:

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1. Provide plenum rated cable/connectors if required, cabling/connectors must be appropriate for the environment that it is installed in. Provide wet rated cable for all wet locations, including any conduit in or below slab on grade.
2. Contractor shall be responsible for sizing all pathways such that newly installed cable represents not more than a 35% fill as per manufacturer's directions. Overfilled pathways are the sole responsibility of the Contractor who shall remove and reinstall at Contractors expense.
3. Provide products rated for the environment that it is installed in (i.e. riser, plenum, outdoor). All cabling installed in wet locations (i.e. underground conduit, conduit in slab on grade) shall be listed for use in wet locations.

B. Backbone Cabling Distribution System – Optical Fiber

1. General:
   a. Provide an optical fiber backbone cabling distribution system between telecommunication spaces. Provide OFNR or OFNP as required. Provide 900μm tight-buffered optical fiber cable for premise cable and loose tube for outside plant cable.
   b. Provide fiber jumpers of appropriate length and cable type for each terminated optical fiber port to be connected.
2. Single-Mode Fiber Optic Cable (OS2)
   a. All singlemode optical fiber cabling shall be 9/125μm.
   b. Provide minimum of two strands for every 48-port patch panel.
   c. Approved Equipment

Manufacturer	Model	Premise Cable (Tight Buffer)		Outside Plant (Loose Tube)	Indoor/Outdoor
		Riser	Plenum		
General Cable	NEXTGEN	AP###1PNR	AP###1PNU	AQxxxxM1A-DWB	AQxxx4M1D-DT
CommScope	TeraSPEED	R-###-DS-8W	P-###-DS-8W	O-###-LN-8W	5125012AWPBK
Berk-Tek	GIGALite	PDRXXX-AB0707	PDPXXX-AB0707	LTRXXX-AB0707	LTPxxx-AB0403
Corning	NIC Cable	XXXE81-3XX31-24	XXXE88-3XX31-29	XXXZU4-T4F22D20	XXXESP-T4101-D20
Siemon		9BB8R012G-E205A	9BB8P012G-E205A	9PE8C(xxx)(x)-E201A	9GD8(x)(xxx)(x)-E201A
Belden		FISDxxxR9	FISDxxxP9	FSSLxxxNG	FDSDxxxR9

3. Connectors:
   a. Provide LC-Duplex Connectors.
   b. Mechanical connectors are acceptable. Do not utilize polish type connectors. Clean all preterm connectors, no exceptions.
   c. For all simplex connectors, provide duplex type clip.
   d. Approved Manufacturers:

Manufacturer	Single-Mode (OS2)
CommScope	SDC-LCR-16-BL

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Panduit	FLCDSx
Leviton	49990-SDL
Corning	95-201-98-SP
Siemon	FC1-LB-LCU-9BL
Belden	FTSLC900FS01

C. Backbone Cabling Distribution System – Copper

1. General:

   a. Provide copper backbone distribution system between telecommunication spaces as shown on drawings.

   b. Provide Hitachi cable (Drybit Category 6 Indoor/Outdoor Cable) for the location requiring plenum indoor/outdoor cable or the conduit shall be run all the way back to the data room with non-plenum indoor/outdoor cable. NO transition point is permitted from outdoor to indoor cabling.

2. Backbone Cabling Distribution System

   a. Provide multiple pair Cat 5e cable with wire count as shown on drawings.

   b. Provide copper patch cables of appropriate length and cable type for each terminated patch panel port with an additional 25% spare.

   c. Acceptable Manufacturers:

      i. Copper backbone cabling shall be by same manufacturer as copper horizontal cabling.

3. Multipair Bundle Copper Termination Blocks:

   a. Provide termination blocks that support Category 6 applications and facilitate cross-connection using either cross- connect wire or patch cords.

   b. Provide termination blocks for voice and data as required for all building telecommunications needs. A minimum of two Category 6 termination blocks shall be provided at each back board location sized for incoming telecommunications needs.

   c. Connecting hardware block shall support all Category 3, 5e or 6 applications and facilitate cross-connection and/or inter-connection using either cross-connect wire or patch cords.

   d. Provide wiring spindles and channels as necessary to allow neat bundling of all wire and cable. Provide wiring channel (horizontal) above and/or below each termination block. Provide wiring channels by same manufacturer of termination block. Provide Velcro type ties for all cables at telephone backboard not run in conduit or channels. Provide wiring channel from demarcation point to termination block.

   e. Approved Equipment

      i. Panduit GPKBW24Y Punchdown Kit.

      ii. Leviton CAT6+ 110-style wiring block (96-pair) # 41AB6-1F4

      iii. Commscope

      iv. Belden Gigabix AX101470

4. Primary Protection (Surge Protection)

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a. General

i. Provide surge protection for each pair of copper cabling between buildings and any end point devices that are located outside. For example, if a camera is mounted or located on the exterior of the building—surge protection is required.

ii. Surge suppressions shall be achieved through 5-pin, solid state, plug-in type modules for each conductor pair.

iii. Provide necessary grounding of equipment to building electrical ground. Size all grounding conductor based on distance to electrical ground according to the requirements of this section.

iv. Provide 25% spare modules.

v. Approved Equipment

1. For data outlets where POE is present

a. ITWLinx 1Gb CAT6-POE.

2. For outlets where no POE is present

a. ITWLinx 1Gb CAT6-LAN

3. For copper multi-pair backbones

a. ITWLinx ML25-CAT5-75

4. If power is required on all four pairs. (Note: If Cisco switches are connected via a copper backbone, this product is required.)

a. ITWLinx 1Gb CAT6-75

D. Horizontal Cabling Distribution System – Balanced Twisted Pair

1. General:

a. Provide appropriate number of Category 6 horizontal cables, patch cables, work area cables, for all terminated data drops, between switches, etc. so that building-wide networking will be operational once all installation is complete.

2. Horizontal Cabling

a. Provide Cat 6 UTP, min-compliant, 4-Pair 100Ω Balanced Twisted Pair Cable to all locations shown on plans.

b. Provide cabling rated for the environment that it is installed in (i.e underground conduit, conduit in slab on grade). All cabling installed in wet locations shall be listed for use in wet locations.

c. Provide a minimum of (2) cables, unless otherwise noted, to each location shown on plans.

i. Provide (2) Category 6A cables to each wireless access point (WAP).

d. Horizontal cable shall be blue.

e. Approved Equipment

Cat 6

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Manufacturer	Model	Riser	Plenum
General Cable	GenSPEED 6	7133800	7131800
CommScope	Uniprise	65N4	6504
Berk-Tek	LANmark-6	10136339 (Blue, CMR)	10136226 (Blue, CMP)
Siemon		9C6R4-E3-06-RXA	9C6P4-E3-06-RXA
Belden		2412	2413

Cat 6A			
Manufacturer	Model	Riser	Plenum
General Cable	GenSPEED 6 10,000	7133819	7131819
CommScope	Uniprise	UN884031014/10	UN874035114/10
Berk-Tek	LANMark-10G2	10137700 (Blue, CMR)	10130484 (Blue, CMP)
Siemon		9C6R4-A5-06AR1A	9C6P4-A5-06AR1A
Belden		10GXS12	10GXS13

f. Field Terminable Plug (FTP)

i. Provide an FTP for each camera and WAP. Provide one FTP for each camera and two FTPs for each WAP. Confirm FTPs are compatible with WAPs and Cameras.

g. Approved Equipment

WAP/Camera Field Terminable Plug	
Manufacturer	Model
Panduit	FP6X88MTG
Leviton	6APLG-S6A
Siemon	ZP1—6AS-01S
Belden	RVAFPUBK-S1

3. Patch and Work Area Cables:

a. Provide and install (1) 7-foot-long patch cable for each workstation and (1) 5 foot or 7 foot patch cable for each patch panel port in the TR/TC. Provide half of the TR/TC patch cables in 5 foot lengths and the remaining half in 7 foot lengths.

b. No patch or work area cords shall in any case exceed in total 10 meters as per TIA Standard unless design includes Standards compliant MUTOA (multi-user termination outlet) and work area cord adjustments are made according to recommendations for zone cabling contained within TIA 568-C or most recent revision at the time of installation. Coordinate with owner for preferred patch cord lengths at patch panel and work area.

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c. Copper patch cord and work area outlet cabling must be provided by the same manufacturer and meet the same performance standards as the horizontal cabling.

d. Patch cord and work area cables shall be blue.

e. Provide (1) 5 foot, 2-strand optical fiber patch cable for each patch panel, utilizing same performance standards and connector types as specified for the backbone. The cable shall be provided by the same manufacturer and meets the same performance standards as the backbone optical fiber.

4. Telecommunications Outlets/Connectors (See Plans for Locations):

a. Flat Faceplates:

i. Provide modular type information outlets with flat telephone jack or data outlet. Provide single gang faceplate kits to allow up to six data or voice jacks as shown on plans. Provide faceplate kits for wall outlets in colors and materials that match power wiring device plates. Provide faceplate kits that allow labeling schemes described herein. Faceplates shall accept STP, UTP, fiber optic or audio/video modules as an option.

ii. Blank off all unused ports.

iii. Color: Standard color as selected by owner/architect.

b. Angled Connector:

i. Color: Standard color as selected by owner/architect.

c. Approved equipment

Connector			
Manufacturer	Model	Connector Cat 6	Connector Cat 6A
CommScope	GigaSPEED XL	MGS400-xxx	MGS600-xxx
Panduit	NetKey	NK688Mxx	NK6X88Mxx
Leviton	QuickPort, eXtreme	61110-Rx6	6110G-Rx6
Siemon		MX6-(xx)	Z6A-(xx)
Belden		RV6MJKUxx-S1	RVAMJKUxx-S1

Flat Plate			
Manufacturer	Model	Plastic Faceplates	Stainless Steel Faceplates
CommScope	GigaSPEED XL	M1XI-262	M1xSP
Panduit	Netkey	NK3FNE	NKFxs
Leviton	QuickPort, eXtreme	42080-xxL	43080-xLx
Siemon		MX-FP-S-(xx)-(xx)	MX-FP-S-(xx)-SS-L
Beldon		AX102249	AX104232

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PART 3 – EXECUTION

3.1 GENERAL

A. Prior to pathway rough-in, low voltage contractor shall meet with electrical contractor to review pathway installation requirements.

B. Pathway Requirements:

1. General:

a. All pathways shall be designed, constructed, grounded and installed in accordance with all recommendations delineated within TIA 569-B and Standard TIA 942.

b. Prior to placing any cable pathways or cable, the contractor shall survey the site to determine job conditions will not impose any obstructions that would interfere with the safe and satisfactory placement of the cables. Field coordinate alternate pathway requirements with other trades onsite. New pathways shall not exceed distance limitations defined within this specification. Notify the Engineer of the changes for final approval prior to proceeding with the change.

c. Paint all electrical boxes and their covers for the telephone and data system green (Kwal Paint Java Green AC098N).

2. Cable Tray Within EF/ER/TR:

a. Wrapped around room (wall support is acceptable)

b. Along equipment rows leading to cross-connects.

c. Ground tray to TGB or TMGB (whichever is closer) utilizing #6CU bare wire.

d. Coordinate tray locations with lighting, air-handling systems, and fire extinguishing systems so that fully loaded trays will not obstruct or impede their operation.

i. Install cable tray under mechanical components for access for future cabling needs; coordinate the mounting height of the cable tray with Owner IT Representative prior to installation. Do not install cable tray at the top of a ceiling which is inaccessible due to the excessive height.

3. Racks / Cabinets:

a. Racks shall be securely attached to the concrete floor using minimum 3/8” hardware or as required by local codes.

b. Racks shall be placed with a 36-inch (minimum) clearance from the walls on all sides of the rack. When mounted in a row, maintain a minimum of 36 inches from the wall behind and in front of the row of racks and from the wall at each end of the row.

4. Conduits:

a. For any interior/exterior conduit 4” and larger, provide (3) 1.25” plenum-rated corrugated innerducts.

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b. Flexible conduit is not acceptable as cable tends to creep, shift, or have sheath damage.

c. Achieve the best direct route parallel with building lines with no single bend greater than 90 degrees or an aggregate of bends in excess of 180 degrees between pull points or pull boxes.

d. Conduit runs shall not have continuous sections longer than 100 feet without a pull box and may only be filled to 35% capacity.

e. Ream all conduit ends and fit with an insulated throat nylon bushing with non-indenter type malleable steel fittings to eliminate sharp edges.

f. Telecommunications conduits should not be routed over or adjacent to heat sources such as boilers, hot water lines, or steam lines. Neither should they be routed near large motors, generators, photocopy equipment, or electrical power cabling and transformers.

g. Conduits that enter an EF/ER/TR must terminate near the corners to allow for proper cable racking. Terminate these conduits as close as possible to the wall where the backboard is mounted to minimize the cable route.

h. Terminate conduits that protrude through the structural floor 1” to 3” above the surface within an EF/ER/TR.

i. After installation, conduits shall be clean, dry, unobstructed, capped for protection, labeled for identification, reamed and fitted with bushings.

j. A 200lb pull cord (nylon, 1/8” minimum) shall be installed in any empty conduit.

k. When the number of conduits requires more than one row, restrict the number of rows to two wherever practicable.

5. Open Top Cable Support Requirements:

a. Provide wide surface area open-top cable supports spaced 5 feet apart at the maximum to adequately support and distribute cable’s weight. Follow manufacturer specifications for cable loading. Provide supports that have a galvanized finish with wide base specifically for telecommunications cabling.

b. Non-continuous cable supports shall provide a bearing surface of sufficient width to comply with required bend radii of high-performance cables

c. Non-continuous cable supports shall have flared edges to prevent damage while installing cables.

d. Multi-tiered non-continuous cable support assemblies shall be used where separate cabling compartments are required. Assemblies shall consist of a steel angled hanger bracket holding up to six non-continuous cable supports.

e. Approved Equipment

i. Erico Caddy-Cat HP

6. Pull Box Requirements:

a. NEC sized pull boxes are not acceptable. Follow BICSI and EIA/TIA 569-B guidelines for pull box sizing.

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b. Provide pull boxes in sections of conduit that are 100 feet or longer, contain more than two 90-degree bends, or contain a reverse bend.

c. Conduits that enter the pull box from opposite ends should be aligned.

d. Pull boxes shall have a length 12 times the diameter of the largest conduit.

e. All pull boxes must be accessible.

C. Cabling System:

1. Follow T568B scheme for copper cabling terminations.

2. Life Safety Related Cabling:

a. Provide the specified category cabling in 1" conduit from elevators and or lifts. Cabling shall terminate at telephone service demarcation point. .

b. Provide the specified category cabling in 1" conduit for two phone lines to the fire alarm control panel back to telephone service demarcation point.

c. Provide the specified category cabling in 1" conduit for the two-way communication system Main Control Panel back to telephone service demarcation point.

3. Miscellaneous Related Cabling:

a. Provide the specified category cabling in 1" conduit for two data connections to Intrusion Detection System head-end back to EF or demarcation room. Refer plans for exact locations.

b. Provide the specified category cabling in 1" conduit for two data connections to Access Controls System head-end back to closest data rack. Refer to plans for exact locations.

c. Provide the specified category cabling in 1" conduit for one data connection to Intercom head-end back to closest data rack. Refer to plans for exact locations. Provide specified category cabling and conduit between intercom head-end and access control panel.

d. Provide the specified category cabling in 1" conduit for Main Building Management System (ATC Panels, etc) back to nearest ER/TR room. Refer to Mechanical plans for exact location.

e. Provide the specified category cabling in 1" conduit for Advanced Energy & Power Metering System back to Main Building Management System Panel. Refer to plans for main switchboard location.

4. Backbone cables shall be installed separately from horizontal distribution cables. Provide plenum rated innerduct if required, innerduct must be appropriate for the environment that it is installed in.

5. It is acceptable to install innerduct within cable tray as long as the fill ratio is not exceeded.

6. Fiber slack shall be neatly coiled within the fiber enclosure or cable tray. No slack loops shall be allowed external to the fiber panel. Each cable shall be individually attached to the respective fiber enclosure by mechanical means.

7. Provide a minimum of one balanced twisted pair cable to each voice outlet and one balanced twisted pair cable to each data outlet shown on the drawings unless noted otherwise on the drawings.

8. Service Loop Requirements

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a. Provide a minimum 6” service loop in each communications system junction box for balanced twisted pair. Cables shall be coiled in the in-wall boxes if adequate space is present to house the cable coil without exceeding manufacturers bend radius.

b. Provide a minimum 10’ service loop in each EF/ER/TR/TE.

c. Provide a minimum 2’ service loop at each stub-up or at each transition from conduit to cable tray.

d. Provide a 5’ service loop in the ceiling before the conduit travels down the wall and terminates into the communications junction box.

e. Provide a 25’ loop at all wireless access point (WAP) locations above the ceiling.

9. Provide modular jacks for each installed cable at outlets shown on drawings. Blank off all unused ports on faceplate.

10. Provide Velcro type ties for all cables and install in a neat and workmanlike manner. Where applicable, use plenum rated Velcro. Where cable is installed in cable tray, bundle a maximum of 25 cables in each Velcro tie. No zip ties are permitted whatsoever, even for temporarily hanging cables during the installation process

11. The bending radius and pulling strength requirements of all backbone and horizontal cables shall be observed during handling and after installation. Use pulling compound as recommended by manufacturer.

12. All horizontal cables, regardless of media type, shall not exceed 90 m (295 ft) from the telecommunications outlets in the work area to the horizontal cross connect.

13. The combined length of all patch cords in the EF/ER/TR and the work area shall not exceed 10m (33 ft)

14. No splices are allowed.

15. In a false ceiling environment, a minimum of 3 inches shall be observed between cable supports and false ceiling. At no point shall cable(s) rest on acoustic ceiling grids or panels.

16. Cable shall be installed above fire-sprinkler systems and shall not be attached to the system or any ancillary equipment or hardware. The cable system and support hardware shall be installed so that it does not obscure any valves, fire alarm conduit, boxes, or other control devices.

17. Cables shall not be attached to ceiling grid seismic support wires or lighting fixture seismic support wires. Where support for horizontal cable is required, the contractor shall install appropriate carriers to support the cabling.

18. Any cable damaged or exceeding recommended installation parameters during installation shall be replaced by the contractor prior to final acceptance at no cost to the Owner.

19. Pulling tension for balanced twisted pair shall not exceed 25lbf and for optical fiber shall not exceed 50lbf.

20. Pair untwist at the termination shall not exceed 0.125”. The cable jacket shall be maintained as close as possible to the termination point.

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21. Cables shall be neatly bundled and dressed to their respective panels or blocks. Each panel or block shall be fed by an individual bundle separated and dressed back to the point of cable entrance into the rack or frame.

22. Cable shall not be draped on, tied or otherwise secured to electrical conduit, plumbing, ventilation ductwork or any other equipment. Cable shall be secured to building supports or hangers or to additional blocks or anchors specifically installed for this purpose.

23. Copper Backbone Terminations:

    a. Terminate one single pair on pins 4, 5 at each patch panel port. Terminate all pairs on patch panel located on rack.

D. Grounding System:

1. All grounding and bonding shall be done according to ANSI J-STD-607-A, TIA 942, and NEC.

2. All cabinets/racks shall utilize paint piercing grounding washers, to be used where rack sections bolt together, on both sides, under the head of the bolt and between the nut and rack.

3. All racks shall further utilize a full-length rack ground strip attached to the rear of the side rail with the thread-forming screws provided to ensure metal-to-metal contact. Similar to Panduit RGS.

4. All active equipment from owner shall be bonded to ground. If the equipment manufacturer provides a location for mounting a grounding connection, that connection shall be utilized. All active equipment shall be bonded using the appropriate jumper for the equipment being installed using the thread-forming screws. Similar to Panduit RG.

5. Racks shall have individual, appropriately sized conductors bonded to the grounding backbone. Do not bond racks or cabinets serially – daisy-chained rack grounds will not be accepted.

6. Patch panels shall be bonded to racks using the appropriate bonding screws. Mounting rails may utilize cage nuts, threaded holes or thru hole mounting fasteners to secure patch panels to the rails.

7. Bond cable tray, raceway system, structural steel and all other metal equipment located within EF/ER/TR to the grounding bus bar utilizing copper conductors per the following schedule:

    a. ≤25’ - #34

    b. ≤50’ - #2

    c. ≤66’ - #2/0

    d. ≥67’ - #3/0

8. Provide 4” X 12” X ¼” CU Telecommunication Main Grounding Bus Bar (TMGB) with bonding conductor per schedule above to Intersystem Bonding Terminal (IBT) in each telecommunication room (EF/ER/TR) with a main cross-connect (MC). Provide 20% spare termination spaces on bus bar, provide additional bus bars as necessary to accommodate spare.

9. Provide 2” X 12” X ¼” CU Telecommunication Grounding Bus Bar (TGB) with bonding conductor per schedule above to TMGB in each room with a horizontal cross-connect (HC).

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10. Refer to electrical diagrams for additional ground connection requirements.

E. Electromagnetic Compatibility:

1. General:

a. Do not install power feeders above or within the telecommunications room. Do not install telecommunications conduits above electrical panelboards, switchboards, transformers, motor control centers, etc.

b. Where telecommunication cable is installed in grounded, metallic conduit near power cables, the power cables shall be kept physically separated from telecommunications cables:

i. Circuits Under 5kVA: 2” minimum separation.

ii. Circuits Over 5kVA: 6” minimum separation.

iii. Electrical motors/transformers: 48” minimum separation.

iv. Lighting ballasts: 6” minimum separation.

c. Where telecommunication cable is installed in cable tray or underground in non-metallic conduit near power cables, the power cables shall be kept physically separated from telecommunications cables by a minimum of 12”

F. EF/ER/TR Power Requirements:

1. General: Regardless of what is shown on drawings, the minimum requirements for providing power in the EF/ER/TR are as follows and shall be included in bid:

a. Two dedicated, nonswitched 120V/20A duplex receptacles, each on individual branch circuits.

b. 120V/20A Duplex receptacles located +6” A.F.F. placed at 6 foot intervals around perimeter walls. Up to 10 receptacles may be placed on a single circuit.

G. Firestopping and Smoke/Acoustical Pathways(See Also Division 7):

1. Provide firestop/smoke barrier solution equivalent to the wall/ceiling/floor rating.

2. Provide firestop labels next to each penetration with written date. Label both sides of the penetration.

3. Firestop systems shall be UL Classified to ASTM E814 (UL 1479). A drawing showing the proposed firestop system shall be provided to the Engineer prior to installing the Firestop system(s).

4. Utilize firestop pass-through type devices for medium to large penetrations into fire walls/floors.

5. Provide a minimum of (4) 4” trade size Hilti Speedsleeves (or STI EZPath) with at least one spare for each and every firewall penetration where cable tray meets the wall.

6. Provide the following products:

a. Fire Rated; STI EZ-Path Fire-Rated Pathways Series (or Hilti Speed Sleeve CP 653 BA)

b. Smoke/Acoustical Rated; STI EZ-Path Smoke & Acoustical Pathway Series (or Hilti Smoke and Acoustic Sleeve CS-SL SA)

H. Miscellaneous Equipment:

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1. Arrange all terminal blocks in a manner that allows natural wiring progression and minimizes crossing of wires.
2. Provide patch cords and cross connect cables as necessary for a complete operational telephone and data network system. Consult with owner to determine any special needs such as dedicated phone lines.

PART 4 – LABELING

4.1 GENERAL

A. The contractor shall develop and submit for approval a labeling system for the cable installation. The Owner will negotiate an appropriate labeling scheme with the successful contractor. At a minimum, the labeling system shall clearly identify all components of the system: racks, cables, panels and outlets. The labeling system shall designate the cables origin and destination and a unique identifier for the cable within the system. Racks and patch panels shall be labeled to identify the location within the cable system infrastructure. All labeling information shall be recorded on the as-built drawings and all test documents shall reflect the appropriate labeling scheme.

B. All telecommunications spaces, pathways, cables, connecting hardware, equipment, racks, patch panels, outlet/connectors, and grounding system shall be labeled in accordance with TIA/EIA 606-A.

C. All labels shall meet UL 969 requirements for legibility, defacement and adhesion requirements. Handwritten, Ink, or Laser Printing labels are not allowed. Provide labels using thermal transfer print. Heat shrinking or wraparound labels are required, flag style labels are not allowed.

4.2 TELECOMMUNICATION PATHWAYS

A. Identify each dedicated pathway (including inner ducts) for the voice and data system.

B. Label pathways at regular intervals and wherever they are accessible.

4.3 TELECOMMUNICATION CABLES

A. Identify cables at each end with a permanent label or physical/electronic tag.

1. The same alphanumeric identifiers should be used at both ends of the cable.
2. Identify cables at regular intervals throughout and wherever they are accessible.
3. Cables shall be identified in accordance with the System Documentation Section of this specification and ANSI/TIA/EIA-606-A. The cable label shall be applied to the cable behind the faceplate that can be accessed by removing the cover plate and to the cable behind the patch panel on a section of cable that can be viewed without removing the bundle support ties. Cables labeled within the bundle where the label is obscured from view shall not be acceptable.

4.4 CONNECTING HARDWARE

A. Identify connecting hardware items (termination blocks, cross-connects, racks, cabinets, patch panels, telecommunications outlet/connectors, ports) using alphanumeric identification such as the following three-level scheme:

1. First level—Termination field or patch panel. Color-coding or other labeling should be used to uniquely identify each termination field (e.g., voice and data) on a common mechanical assembly.

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2. Second level—Terminal block within a given field or patch panel that could be a row of insulation displacement connectors (IDCs), optical fiber connectors, or modular jacks.

3. Third level—Defines the individual position within a given terminal block or patch panel.

4.5 TELECOMMUNICATIONS GROUNDING SYSTEM

A. Identify each telecommunications grounding bus bar (TGB) and telecommunications main grounding bus bar (TMGB).

B. Identify each grounding conductor relating to the telecommunications system, including those connecting building steel, grounding electrodes, water pipes, and telecommunications structural components.

PART 5 - MISCELLANEOUS

5.1 TESTING:

A. General

1. Provide testing within 10 days of completion for all copper and fiber optic cable according to TIA/EIA standards and any other requirements of the manufacturer who will provide warranty.

2. Submit copy of current calibration of all testing equipment. Submit all test reports electronically to architect/engineer and include in O&M manuals to include test reports. Meter shall have been calibrated within the past 12 months.

3. Correct any malfunctions. Contractor shall re-terminate/replace any cable, connection, or equipment found to be defective or non-compliant with these specifications and referenced standards.

4. Invite Owner IT representative and Engineer to witness and/or review field testing. Notify five business days prior to commencing testing.

B. Copper Cable

1. Utilize Level IIIe, IV, V Tester to test all equipment and each outlet, horizontal cable, termination block, patch cords, etc. to verify compliance with requirements. Testing shall consist of industry accepted verification tests for the Category of cable installed and shall meet latest requirements of EIA/TIA cabling Standards.

2. UTP Cable and Links: All UTP cabling channel must be tested at swept frequencies up to 250MHz for internal channel performance parameters as defined in IEEE 802.3an and ANSI/TIA/EIA-568C. Certifications shall include the following parameters for each pair of each cable installed:

a. Wire map (pin to pin connectivity)

b. Length

c. Insertion Loss

d. Near End Crosstalk (NEXT)

e. Attenuation to Crosstalk Ratio Far End (ACRF)

f. Return Loss

g. Propagation Delay

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h. Delay Skew

i. DC Loop Resistance

j. DC Resistance Unbalance

k. Power Sum Near-End Crosstalk (PS-NEXT)

l. Attenuation to Crosstalk Ratio Near-End (ACR-N)

m. Power Sum Attenuation to Crosstalk Ratio Near-End (PS-ACR-N)

n. Attenuation to Crosstalk Ratio Far-End (ACR-F)

o. Power Sum Attenuation to Crosstalk Ratio Far-End (PS-ACR-F)

p. Transverse Conversion Loss (TCL)

q. Equal Level Transverse Conversion Transfer Loss (ELTCTL)

3. All channels that fail testing parameters will be replaced at the Contractor's expense until all channels pass the performance parameters.

4. Provide Modular Plug Terminated Link (MPTL) test for all field terminated plugs (standard for cameras and WAPs).

   a. All installed cabling modular plug terminated links (MPTL) shall comply with the permanent link transmission requirements of the ANSI/TIA-568-2.D standard.

   b. The MPTL shall be tested with a Permanent Link Adapter on the Main Unit and a Patch Cord Adapter Suitable for Category 6A testing on the Far End or Remote Test Equipment.

   c. Modular plug terminated link test results, including the individual frequency measurements from the tester, shall be recorded in the test instrument upon completion of each test for subsequent uploading for reports to be generated.

5. Sampling is not acceptable. MPTL testing shall be performed on each cabling segment (connector to connector).

C. Fiber Optic Cable

1. Provide test results using an OTDR of all installed fiber optic links to demonstrate compliance with requirements. Testing shall consist of industry accepted verification tests for the type of cable installed and shall meet the latest requirements of EIA/TIA 455-53A standards. Test setup and performance shall be conducted in accordance with ANSI/TIA/EIA 526-14 Standard Method B.

2. Provide inspection of fiber end faces by using scope and test according to IEC 61300-3-35 standards. Correct scratched, pitted, or dirty connectors.

3. Provide bi-directional testing of cable for both cable rated wavelengths. Results shall show compliance of cable and shall include the following parameters:

   a. Attenuation

   b. Length

   c. Verification of Polarity

D. Owner reserves the right to hire an independent testing company to spot check the test results. If the results vary more than 10% from the results provided by the Contractor, the Contractor will be required to prove his results are correct or retest the entire system.

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5.2 WARRANTY:

A. Register installation with cable/connectivity manufacturer.

B. Provide and submit all test results to owner, engineer, and manufacturer and meet all other manufacturer requirements in order to provide minimum 20-year extended product link warranty for complete cabling/connectivity installation, including all copper and optical fiber utilized on the entire channel. The channel warranty shall be provided by the connectivity manufacturer. Include replacement material and installation for any defective product.

5.3 OPERATING AND MAINTENANCE MANUALS: Refer to Section 26 0502 for requirements.

5.4 TRAINING:

A. Provide four hours training on the operation and installation of the structured cabling system at job site, at no cost to owner.

5.5 RECORD DRAWINGS: Refer to Section 26 0502 for requirements.

END OF SECTION 27 1500

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SECTION 28 3111 - FIRE ALARM AND DETECTION SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

B. Division-26 Basic Materials and Methods sections apply to work specified in this section.

C. RELATED SECTIONS: See Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 DESCRIPTION OF WORK:

A. Extent of fire alarm and detection systems work is indicated by drawings, schedules and as specified herein.

B. Comply with NEC as applicable to construction and installation of fire alarm and detection system components and accessories. Provide components and systems that are UL-listed and labeled for fire alarm. Provide fire alarm and detection systems and accessories that are FM approved. Comply with State and local requirements as applicable.

C. Comply with applicable provisions of current NFPA Standards 72, National Fire Alarm Code, local building codes, and meet requirements of local authorities having jurisdiction.

D. Carefully review all Division 23 drawings for all fire/smoke dampers. Fire/smoke dampers are NOT shown on electrical plans. Electrical contractor is responsible for coordinating 120V power to all dampers and providing fire alarm connections to each one. See mechanical drawings for all locations.

1.3 SUBMITTALS: Refer to Section 26 0502 for requirements.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

A. MANUFACTURER: Subject to compliance with requirements, provide fire alarm and detection systems of one of the following:

1. Grinnell
2. EST
3. Gamewell - FCI
4. Simplex (Tyco Safety Products)
5. Mirtone
6. Mircom
7. Notifier
8. Silent Knight
9. Siemens Fire

B. The job foreman or lead technician shall be factory trained and certified on the system being installed. Individual shall have a minimum NICET II certification.

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2.2 FIRE ALARM AND DETECTION SYSTEMS:

A. GENERAL: Provide an electrically operated, electrically supervised fire alarm system as described herein. Include control units, power supplies, alarm initiating and indicating devices, conduit, wire, fittings and accessories required to provide a complete operating system. Enclose entire system in raceway. Provide basic wiring materials that comply with Division 26, Basic Materials and Methods Sections for raceways, conductors, boxes, fittings, supports, etc. Minimum wire size to be #14 AWG copper.

B. SYSTEM TYPE: Analog addressable, non-coded. Either manual activation of a fire alarm station or activation of an automatic initiating device energizes all fire alarm signaling devices, sounding a non-coded alarm and providing device identification on an annunciator panel.

C. SYSTEM OPERATION: Provide system such that any manual station or automatic initiating device annunciates all alarm indicating units (bells, horns, buzzers, chimes, visual alarm lamps, etc.) continuously until the manual station or initiating device is restored to normal and the fire alarm control unit reset. Annunciate alarm signals by device at the control panel and all remote annunciators. Provide all conductors, raceway, equipment and labor to accomplish the following:

D. For fans that are not part of the smoke evacuation system, deactivate air supply and return fan units simultaneously by means of a supervised master fan shutdown relay with slave relays as required. Restart air units automatically after panel has been reset. Provide a bypass switch for master fan shut down relay for drill purposes, and indicate by a locked-in lamp that the circuit has been bypassed.

E. Selectively activate and/or deactivate fan units as required.

F. Release all magnetic door holders upon activation of an alarm from any device by use of a master relay in the control panel.

G. Provide supervised circuits for the following:

1. Close dampers upon activation of an alarm from any device through the HVAC interface relays at the Fire Command Center.

2. Recall elevators, upon activation of an alarm, to the floor of building egress unless the alarm is on the egress floor, in that case recall elevator to the level designated by the Fire Marshall. Cooperate with the elevator supplier to ensure complete operable system. Provide shunt trip breaker(s) as required.

H. Central Station Monitoring. Provide a UL listed fire control communicator in accordance with NFPA 71 with a minimum of two reporting zones to the central station. Provide a communicator with dual phone lines for central station reporting by using BFSK or pulsed single round fast format. Provide integral trouble annunciator. Provide with compatibility for automatic test reports every 24 hours. Provide system and components that comply with UL 2635 and UL 864.

I. Provide fire alarm control panel with capability of shutting down individual initiating devices for maintenance purposes without affecting the continued operation of other initiating devices.

J. Provide manual fire alarm stations in boiler rooms, and main administrative office. Provide external alarm horns sufficient to be heard in all parking areas.

K. Sprinkler Supervision. Provide a signal initiating and supervisory circuit to each PIV (post indicator) valve, and to each sprinkler riser and subdivision. Provide continuous alarm signal upon actuation of any water flow signal initiating device. Sound alarm until the condition has been corrected and the panel manually reset as required by UL864. Provide

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separate alarm zones for: (1) alarm zones from “waterflow alarms”, (2) alarm zones from “supervisory alarm” indicating sprinkler system trouble. Provide power to all alarm bells furnished under Division 21 Review final fire sprinkler drawings and coordinate for panel, flow and tamper switch locations.

L. Provide relays, monitor modules and connections as required at control panel of kitchen hood suppression system for initiation of alarm signal to fire alarm control panel. Connect hood suppression control panel to shunt trip breakers as required.

M. Provide all required wiring from gas shut off valve to the hood suppression control panel. Make all connections to ensure a properly operating system. Verify with Mechanical Contractor.

2.3 SCOPE OF THE WORK:

A. Provide a new addressable fire alarm system with 08 ANALOG initiating loops/minimum of 1500 points.

B. Provide all fire alarm devices.

C. Provide duct smoke detectors and fan relays at all fan units 2000 CFM and over. Shut down all supply and return fans upon a general alarm signal.

D. Provide a fire alarm duct detector within 5-feet of any fire/smoke damper as required to comply with IMC 607.5.4.1. The duct detector shall be listed for the air velocity, temperature and humidity at the point where it is to be installed. A duct detector will not be required at a fire/smoke damper located on a corridor wall where the corridor has smoke detection devices installed. For dampers installed within an un-ducted opening in a wall, a spot-type detector listed for releasing service shall be installed within 5-feet horizontally of the damper. Provide a fire alarm relay at each fire/smoke damper. Provide a test switch at each location where the damper is located above an inaccessible ceiling or is located more than 10 feet above the finished floor. Coordinate the location of test switches with owner/architect.

E. All initiating devices connected to the fire alarm control panel shall be analog addressable.

F. All wiring shall be in conduit (3/4" minimum). All conduit and connectors, shall be made of steel. All conduit runs shall form a complete loop from the fire alarm control panel.

G. Provide vandal resistant cages to protect horn/strobes, smoke and heat detectors as indicated and, in gyms whether shown or not. Securely fasten security cages as required. Provide backing and bracing as required to ensure that attachment extends beyond the ceiling materials. Cages shall have two pieces, one backplate and one cover to attach to backplate.

H. Provide Carbon Monoxide Detectors in the first room downstream from a fuel burning Roof Top Unit and in spaces that have fuel burning appliances, ie: Kitchen Equipment, dryers, Boilers, water heaters, Kilns Etc.

2.4 FIRE ALARM CONTROL PANEL:

A. The fire alarm control panel shall be microprocessor-based. Each loop shall be capable of 99 analog addresses and 98 monitor and/or control addresses.

B. If the microprocessor fails, the system shall execute a default signaling program. This program will enable the panel to sound the audible signals and summon the Fire Department. In addition, a red LED shall light to indicate the device wherein the alarm originated. Inability of the system to sound signals or summon the fire department during microprocessor failure shall not be acceptable.

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C. The fire alarm control panel shall contain a 80 digit alphanumeric display and permit the user to perform all necessary functions including but not limited to the following:

1. Alarm/Trouble Acknowledge
2. Alarm Silence
3. Reset
4. Lamp Test
5. Control of Initiating Devices (on/off)
6. Control of output modules (on/off)
7. Change sensitivity of devices
8. Change time
9. Walk test
10. Check system on battery voltage and current

D. The fire alarm control panel shall be capable of alarm verification. The control panel shall indicate which smoke detector is in alarm during the pre-alarm window.

E. All alarm signals shall be locked in at the panel until the operated device is returned to it's normal condition and the control panel is manually reset.

F. Alarm or trouble activation of initiating points shall be represented in English on the alphanumeric display on both the remote operating panel and the fire alarm control panel indicating the address of the specific device, i.e. Device L4S76, Smoke Detector, 1st floor Rm. 17.

G. Each initiating and signal circuit shall be electrically supervised for opens, shorts, and ground faults in the wiring.

H. The occurrence of any fault shall activate the system trouble circuitry but shall not interfere with the proper operation of any circuit that does not have a fault condition.

I. The system communication loops shall be capable of being wired using Class "A" (Style 6) supervised circuits (a ground fault on either conductor or a break shall not prevent a device from operating on either side of the break)

J. The fire alarm control panel shall contain circuitry permitting the transmission of trouble and alarm signals over leased phone lines by the means of reverse polarity. There shall be a supervised disconnect switch to allow testing of the fire alarm control panel without transmitting an alarm to the central station.

K. The fire alarm control panel shall include the following features:

1. Auxiliary SPDT alarm actuated contacts.
2. Auxiliary SPDT trouble actuated contacts.
3. A solid-state power transfer circuit that shall switch to standby power automatically and instantaneously if normal power fails or falls below 15% of normal ("brown out" conditions). This electronic circuit shall allow the batteries to be effectively "floated" on the operating system to avoid upsetting the normal microprocessor scan and minimize resultant nuisance troubles and/or alarms.
4. A ground fault detector to detect positive or negative grounds on the initiating circuits, signal circuits, power circuits, and telephone line circuit. A ground fault code on the alphanumeric display shall provide indication of either a positive or negative ground fault and shall operate a general trouble but shall not cause an alarm to be sounded

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5. A short circuit error message shall be a standard feature of the fire alarm control panel. Each communication loop shall be monitored and shall have a distinctive error message.
6. Lightning protection shall be a standard feature of the fire alarm control panel and shall be incorporated in the power supply circuit, common control circuits, signal circuits, and telephone line circuit.
7. Individual circuit breakers shall be provided for the following: smoke detector power, main power supply, signal circuit #1, signal circuit #2, battery standby power, and auxiliary output.
8. The fire alarm control panel shall be of dead-front construction. One key shall allow access to all electronics or to the dead-front access to the operator functions
9. Opening the main door shall expose all components for inspection or adjustment without further dismantling of the cabinet, control unit, or wiring.
10. It shall be possible to check and adjust the sensitivity of all analog devices from the main fire alarm panel.

L. The fire alarm control panel shall have batteries capable of powering the system for (24) hours in standby condition and (5) minutes in alarm.

M. There shall be no special tools required for the programming of devices. A standard slot head screwdriver only.

2.5 REMOTE OPERATING PANEL:

A. Remote Operating Panel (Provide color as selected by Architect)

B. The Remote Operating Panel shall contain 80 digit alphanumeric display providing status of all devices including the fire alarm control panel.

C. The Remote Operating Panel shall permit the user to perform all necessary functions including but not limited to the following:

1. Alarm/Trouble Acknowledge
2. Alarm Silence
3. Reset
4. Lamp Test
5. Control of Initiating Devices (on/off)
6. Control of Output Modules (on/off)
7. Change sensitivity of devices
8. Change time
9. Walk test
10. Check System on battery voltage and current

2.6 MONITOR MODULE (FCI AMM-2):

A. Remote identification module devices shall be attached to any single normally open initiating device (heat detector, waterflow switch, duct detectors, sprinkler, tamper switches, kitchen hood, pull station, etc.). The modules shall supply addressing and status information to the Fire Alarm Control Panel through the dual loop module.

2.7 CONTROL POINT MODULE (FCI AOM):

A. The control point module shall be connected to the same loop as the initiating devices, and

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shall provide a relay output (Form "C" 2 Amp @ 24 VDC, resistive only).

B. This relay output shall be used to perform auxiliary functions.

C. When the AOM is activated, the red "ACTIVE" LED shall be on solid. Under normal conditions, the red "ON LINE" LED shall flash.

2.8 DOOR HOLDER (FCI FM-988):

A. The door holder shall be wall mounted, semi-recessed; be powered at 120 VAC; and have 35 lbs. of holding force and be of a brushed aluminum finish.

2.9 MANUAL FIRE ALARM STATION (FCI, MS-2, W/AMM-2):

A. Provide red enclosure, manual fire alarm stations with the following features:

1. Aluminum construction, for flush mounting.
2. Addressable alarm type electrically compatible with system requirements.
3. Double Action
4. Dual-Action design requiring unit to be opened for resetting, and requiring resetting before closing. Key reset, keyed like fire control panel.

2.10 PHOTOELECTRIC DETECTORS (FCI ASD-P W/ADB-F BASE):

A. All photoelectric detectors shall be capable of being replaced without disconnecting any wires or wire connectors from the base of the detector. Each detector shall be installed on a separate base. The detector base shall be capable of receiving a photoelectric, ionization, or electronic thermal detector. All photoelectric detectors shall be UL 268 listed. All detectors shall have (2) viewable LEDs to indicate the status of the device.

2.11 DUCT FIRE DETECTORS (FCI DH500AC/DC WITH SAMPLING TUBE):

A. Provide ionization type with UL 268A listings. Each detector shall be equipped with a remote light. Each detector shall have (2) form "c" alarm contacts rated at 10 amps (at 120VAC).

2.12 CARBON MONOXIDE (CO):

A. Provide a System Sensor CO1224T carbon monoxide detector with Realtest Technology. Provide detectors with the following features:

1. Compliance with UL2075.
2. Trouble relay.
3. Wiring supervision with SEMS Terminals.
4. A six year end-of-life timer.
5. Sounder base for sound audible alarm.

2.13 THERMAL DETECTORS (FCI ATD WITH/ADB-F BASE):

A. Thermal detectors shall operate on the Rate-of-Rise principal. The detectors shall have a fixed temperature rating of 135 degrees Fahrenheit. Exception: in Boiler rooms, provide temperature rating of 200 degrees Fahrenheit.

1. The heat detector shall consist of a base and a head.
2. The base shall be capable of accepting either a smoke detector or a 135 (or 200) degree heat detector.

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3. The head shall automatically restore to its normal standby condition when the temperature returns to its normal range.

2.14 AUDIOVISUAL ALARM HORNS (FCI, HMF/STS SEMI-FLUSH MOUNTED OR EQUAL):

A. Provide audio-visual alarm horns with the following features:

1. Die cast or stamped steel construction, finished in red/white (color by Architect) enamel, suitable for indoor or outdoor application.
2. Capable of 90 db (UL rating) sound level at 10 feet.
3. Flush mounted
4. Integrally mounted flashing light unit, with Lexan lens with block letters “FIRE”, and minimum flash rate of ONE per second, and 110 candela minimum.
5. Electrically compatible with system requirements.
6. Horns shall sound the temporal pattern (code 3) until silenced.
7. Audiovisual alarm horns shall have the ability to silence horns while maintaining the strobe flash, until reset.
8. Mechanical horn mechanism only, electronic horns are not acceptable.
9. Maximum 24 horns per circuit, maximum 8 strobes per circuit.

B. Strobes shall be synchronized when there are three or more within sight and less than 55 feet of viewer.

2.15 STROBES (FCI Model STS, FLUSH MOUNT):

A. Provide strobe with flashing light unit, with Lexan lens with block letters “FIRE”, and minimum flash rate of ONE per second, and high intensity 110 candela minimum. Strobes shall be synchronized when there are three or more within sight and less than 55 feet of viewer. Furnish in Red/White (color by Architect).

2.16 CEILING MOUNT STROBES (WHEELOCK RSS24100C-FW, FLUSH MOUNT, WHITE):

A. Provide strobe UL listed for ceiling mounting, flush mounted in ceiling or concrete vaulted ceiling. Provide strobe with flashing light unit, with Lexan lens with block letters “FIRE”, and minimum flash rate of ONE per second, and 110 candela minimum.

B. Strobes shall be synchronized when there are three or more within sight and less than 55 feet of viewer.

C. Furnish in Red/White (color by Architect).

2.17 AUXILIARY RELAY (FCI, ARB-C):

A. Remote auxiliary relay boards shall be rated at 10 AMPS @ 120 VAC. A red LED shall light to indicate relay activation. All relays shall transfer on general alarm and latch on until reset. All relays shall be supervised. The control output provided can be used in conjunction with fire alarm applications (i.e. fan controls, dampers, doors, and any other general alarm control).

2.18 INITIATING MODULES:

A. Provide style "6" initiating modules capable of receiving and annunciating an alarm from any detector, even with a single fault condition on any initiating circuit.

B. Power all smoke detectors from the "Style 6" initiating loop wiring. For systems that power smoke detectors separately from the "Style 6" loop, provide monitoring for both the power

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source and the independent initiating wiring, so that complete trouble and alarm indication is achieved by loop. Provide capability to operate all smoke detectors, even with a single fault condition on the smoke detector power wiring. Provide one spare initiating circuit.

2.19 SIGNALING MODULES:

A. Provide signaling as required. Provide power adequate to sound all signaling devices concurrently. Provide supervised indicating circuits for polarized 24V D.C. alarm signaling devices. Provide 2 spare signaling circuits.

B. Each signal circuit shall have a separate disconnect switch for servicing the fire alarm system. Each and every indicating circuit shall have a distinct location description. Power supply shall be at fire alarm control panel. Remote power supplies and indicating circuits will not be acceptable.

2.20 SUPPLEMENTAL NOTIFICATION CIRCUITS (FCI SNAC-4):

A. Provide supplementary notification appliance circuit panel(s) as required. The ‘SNAC’ shall be capable of supplying up to four, Class A, Style Z notification appliance circuits. The panel shall contain its own battery charger, regulated power supply, and shall be supervised for ground fault, overcurrent, open circuits and low battery conditions. Ground fault, battery and circuit trouble conditions shall transmit a trouble signal to the main fire alarm control panel.

2.21 SYSTEM CONFIGURATION PROGRAMMING:

A. To help the owner in programming, system changes, and servicing, the fire alarm system shall have the following functions.

1. The FACP shall be capable of an auto-configuration, that via a password, all analog devices and panel modules are automatically programmed into the system. At this point the system will operate as a general alarm system without any other programming.
2. If any two devices are addressed the same, the LED's on both devices will light steady and the panel will read "extra address and the address number”.
3. If any device is installed and not programmed into the system the LED will light steady and the panel will read the same as above.

2.22 BATTERIES/POWER SUPPLIES:

A. Provide standby batteries capable of operating fire alarm system for minimum of 24 hours, then operating all indicating units for at least five minutes. Locate batteries in fire alarm control unit, or in similar type enclosure located as directed. Provide all interconnecting wiring. Place batteries that vent hydrogen gas in separate enclosure. Provide 30 percent spare capacity.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS:

A. Approved Plans: A copy of the approved and stamped plans shall be on site during the installation and at the time of inspection to verify that the system is installed according to the approved plans.

B. Install fire alarm and detection systems as indicated, in accordance with equipment manufacturer’s written instructions and complying with applicable portions of NEC and NECA’s “standard of installation”.

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C. Install wiring, raceways, and electrical boxes and fittings in accordance with Division 26 Basic Materials and Methods section, “Raceways”, “Wires and Cables”, and “Electrical Boxes and Fittings”, and in accordance with other sections, as applicable.

D. All wire used on the fire alarm system shall be U.L. Listed as fire alarm protective signaling circuit cable per NEC, Article 760.

E. If twisted or shielded wire is required or recommended by the manufacturer it must be used.

F. Review proper installation procedure for each type of device with equipment supplier before installation.

G. Provide a minimum of one 3/4" conduit with (2) Cat 5e telephone cables from FACP to main telephone terminal.

H. Where smoke or heat detectors are specified, install device a minimum of three feet from adjacent air supply diffusers to ensure proper operation of device.

I. Refer to NFPA for spacing and exact placement of fire alarm devices.

J. Electrical Identification: Refer to Section 260553 for requirements.

PART 4 - FINAL ACCEPTANCE AND GUARANTEE

4.1 GUARANTEE:

A. Furnish a three-year guarantee for all equipment, materials and installation, including all labor, transportation, and equipment.

B. Emergency Response. The fire alarm equipment supplier shall provide an emergency response within four hours of any reported system failure to resolve the problem on a continuous basis.

4.2 PRE-TEST:

A. The contractor shall with a representative of the manufacturer conduct a test 3 days before the final test to verify operation of all devices. Any problems must be corrected before the final test.

4.3 FINAL TEST:

A. Before the installation shall be considered completed and acceptable, a test on the system shall be performed as follows:

1. The contractor's job foreman, a representative of the manufacturer, a representative of the owner, shall operate every building fire alarm device to ensure proper operation and correct annunciation at the control panel. Fan shutdown and door holder circuits shall operate.

2. Conduct a full 24 hour test of battery operation. System shall be put on the batteries for a full 24 hours and all notification appliances shall be operational for a period of 5 minutes.

The supervisory circuitry of the initiating and indicating circuits shall also be verified.

4.4 SPARE PARTS: Refer to Section 26 0502 for requirements.

PART 5 - AS BUILT DRAWINGS AND OPERATION AND MAINTENANCE MANUALS:

5.1 LABELING:

A. All devices shall be labeled with their appropriate address. The labels shall be 18 point

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pressure sensitive labels.

B. All initiating devices shall be programmed to include the device address and a complete user text English location description, i.e. Device L4S76, Smoke Detector, 1st floor Rm.17

5.2 RECORD DRAWINGS: Refer to Section 26 0502 for requirements.

5.3 OPERATING AND MAINTENANCE MANUALS: Refer to Section 26 0502 for requirements.

5.4 TRAINING:

A. Provide four (4) hours training on the operation and installation of fire alarm system, at job site, at no cost to owner. Provide programming training and software sub-licensing in owner's name. Sub-licensing agreement shall include the U.L. requirement to allow the owner to do any programming that the supplier is allowed to do during commissioning, testing, service and field additions or deletions to the fire alarm system. The fire alarm supplier shall provide this training and licensing at no cost to the owner, including transportation, lodging, meals, and training manuals.

END OF SECTION 28 3111

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283111 FIRE ALARM AND DETECTION SYSTEM

ELECTRONIC SAFETY AND SECURITY

division 28

SAA

SANDERS ASSOCIATES ARCHITECTS

SECTION 28 3111 - FIRE ALARM AND DETECTION SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

B. Division-26 Basic Materials and Methods sections apply to work specified in this section.

C. RELATED SECTIONS: See Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 DESCRIPTION OF WORK:

A. Extent of fire alarm and detection systems work is indicated by drawings, schedules and as specified herein.

B. Comply with NEC as applicable to construction and installation of fire alarm and detection system components and accessories. Provide components and systems that are UL-listed and labeled for fire alarm. Provide fire alarm and detection systems and accessories that are FM approved. Comply with State and local requirements as applicable.

C. Comply with applicable provisions of current NFPA Standards 72, National Fire Alarm Code, local building codes, and meet requirements of local authorities having jurisdiction.

D. Carefully review all Division 23 drawings for all fire/smoke dampers. Fire/smoke dampers are NOT shown on electrical plans. Electrical contractor is responsible for coordinating 120V power to all dampers and providing fire alarm connections to each one. See mechanical drawings for all locations.

1.3 SUBMITTALS: Refer to Section 26 0502 for requirements.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

A. MANUFACTURER: Subject to compliance with requirements, provide fire alarm and detection systems of one of the following:

1. Grinnell
2. EST
3. Gamewell - FCI
4. Simplex (Tyco Safety Products)
5. Mirtone
6. Mircom
7. Notifier
8. Silent Knight
9. Siemens Fire

B. The job foreman or lead technician shall be factory trained and certified on the system being installed. Individual shall have a minimum NICET II certification.

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2.2 FIRE ALARM AND DETECTION SYSTEMS:

A. GENERAL: Provide an electrically operated, electrically supervised fire alarm system as described herein. Include control units, power supplies, alarm initiating and indicating devices, conduit, wire, fittings and accessories required to provide a complete operating system. Enclose entire system in raceway. Provide basic wiring materials that comply with Division 26, Basic Materials and Methods Sections for raceways, conductors, boxes, fittings, supports, etc. Minimum wire size to be #14 AWG copper.

B. SYSTEM TYPE: Analog addressable, non-coded. Either manual activation of a fire alarm station or activation of an automatic initiating device energizes all fire alarm signaling devices, sounding a non-coded alarm and providing device identification on an annunciator panel.

C. SYSTEM OPERATION: Provide system such that any manual station or automatic initiating device annunciates all alarm indicating units (bells, horns, buzzers, chimes, visual alarm lamps, etc.) continuously until the manual station or initiating device is restored to normal and the fire alarm control unit reset. Annunciate alarm signals by device at the control panel and all remote annunciators. Provide all conductors, raceway, equipment and labor to accomplish the following:

D. For fans that are not part of the smoke evacuation system, deactivate air supply and return fan units simultaneously by means of a supervised master fan shutdown relay with slave relays as required. Restart air units automatically after panel has been reset. Provide a bypass switch for master fan shut down relay for drill purposes, and indicate by a locked-in lamp that the circuit has been bypassed.

E. Selectively activate and/or deactivate fan units as required.

F. Release all magnetic door holders upon activation of an alarm from any device by use of a master relay in the control panel.

G. Provide supervised circuits for the following:

1. Close dampers upon activation of an alarm from any device through the HVAC interface relays at the Fire Command Center.

2. Recall elevators, upon activation of an alarm, to the floor of building egress unless the alarm is on the egress floor, in that case recall elevator to the level designated by the Fire Marshall. Cooperate with the elevator supplier to ensure complete operable system. Provide shunt trip breaker(s) as required.

H. Central Station Monitoring. Provide a UL listed fire control communicator in accordance with NFPA 71 with a minimum of two reporting zones to the central station. Provide a communicator with dual phone lines for central station reporting by using BFSK or pulsed single round fast format. Provide integral trouble annunciator. Provide with compatibility for automatic test reports every 24 hours. Provide system and components that comply with UL 2635 and UL 864.

I. Provide fire alarm control panel with capability of shutting down individual initiating devices for maintenance purposes without affecting the continued operation of other initiating devices.

J. Provide manual fire alarm stations in boiler rooms, and main administrative office. Provide external alarm horns sufficient to be heard in all parking areas.

K. Sprinkler Supervision. Provide a signal initiating and supervisory circuit to each PIV (post indicator) valve, and to each sprinkler riser and subdivision. Provide continuous alarm signal upon actuation of any water flow signal initiating device. Sound alarm until the condition has been corrected and the panel manually reset as required by UL864. Provide

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separate alarm zones for: (1) alarm zones from “waterflow alarms”, (2) alarm zones from “supervisory alarm” indicating sprinkler system trouble. Provide power to all alarm bells furnished under Division 21 Review final fire sprinkler drawings and coordinate for panel, flow and tamper switch locations.

L. Provide relays, monitor modules and connections as required at control panel of kitchen hood suppression system for initiation of alarm signal to fire alarm control panel. Connect hood suppression control panel to shunt trip breakers as required.

M. Provide all required wiring from gas shut off valve to the hood suppression control panel. Make all connections to ensure a properly operating system. Verify with Mechanical Contractor.

2.3 SCOPE OF THE WORK:

A. Provide a new addressable fire alarm system with 08 ANALOG initiating loops/minimum of 1500 points.

B. Provide all fire alarm devices.

C. Provide duct smoke detectors and fan relays at all fan units 2000 CFM and over. Shut down all supply and return fans upon a general alarm signal.

D. Provide a fire alarm duct detector within 5-feet of any fire/smoke damper as required to comply with IMC 607.5.4.1. The duct detector shall be listed for the air velocity, temperature and humidity at the point where it is to be installed. A duct detector will not be required at a fire/smoke damper located on a corridor wall where the corridor has smoke detection devices installed. For dampers installed within an un-ducted opening in a wall, a spot-type detector listed for releasing service shall be installed within 5-feet horizontally of the damper. Provide a fire alarm relay at each fire/smoke damper. Provide a test switch at each location where the damper is located above an inaccessible ceiling or is located more than 10 feet above the finished floor. Coordinate the location of test switches with owner/architect.

E. All initiating devices connected to the fire alarm control panel shall be analog addressable.

F. All wiring shall be in conduit (3/4" minimum). All conduit and connectors, shall be made of steel. All conduit runs shall form a complete loop from the fire alarm control panel.

G. Provide vandal resistant cages to protect horn/strobes, smoke and heat detectors as indicated and, in gyms whether shown or not. Securely fasten security cages as required. Provide backing and bracing as required to ensure that attachment extends beyond the ceiling materials. Cages shall have two pieces, one backplate and one cover to attach to backplate.

H. Provide Carbon Monoxide Detectors in the first room downstream from a fuel burning Roof Top Unit and in spaces that have fuel burning appliances, ie: Kitchen Equipment, dryers, Boilers, water heaters, Kilns Etc.

2.4 FIRE ALARM CONTROL PANEL:

A. The fire alarm control panel shall be microprocessor-based. Each loop shall be capable of 99 analog addresses and 98 monitor and/or control addresses.

B. If the microprocessor fails, the system shall execute a default signaling program. This program will enable the panel to sound the audible signals and summon the Fire Department. In addition, a red LED shall light to indicate the device wherein the alarm originated. Inability of the system to sound signals or summon the fire department during microprocessor failure shall not be acceptable.

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C. The fire alarm control panel shall contain a 80 digit alphanumeric display and permit the user to perform all necessary functions including but not limited to the following:

1. Alarm/Trouble Acknowledge
2. Alarm Silence
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4. Lamp Test
5. Control of Initiating Devices (on/off)
6. Control of output modules (on/off)
7. Change sensitivity of devices
8. Change time
9. Walk test
10. Check system on battery voltage and current

D. The fire alarm control panel shall be capable of alarm verification. The control panel shall indicate which smoke detector is in alarm during the pre-alarm window.

E. All alarm signals shall be locked in at the panel until the operated device is returned to it's normal condition and the control panel is manually reset.

F. Alarm or trouble activation of initiating points shall be represented in English on the alphanumeric display on both the remote operating panel and the fire alarm control panel indicating the address of the specific device, i.e. Device L4S76, Smoke Detector, 1st floor Rm. 17.

G. Each initiating and signal circuit shall be electrically supervised for opens, shorts, and ground faults in the wiring.

H. The occurrence of any fault shall activate the system trouble circuitry but shall not interfere with the proper operation of any circuit that does not have a fault condition.

I. The system communication loops shall be capable of being wired using Class "A" (Style 6) supervised circuits (a ground fault on either conductor or a break shall not prevent a device from operating on either side of the break)

J. The fire alarm control panel shall contain circuitry permitting the transmission of trouble and alarm signals over leased phone lines by the means of reverse polarity. There shall be a supervised disconnect switch to allow testing of the fire alarm control panel without transmitting an alarm to the central station.

K. The fire alarm control panel shall include the following features:

1. Auxiliary SPDT alarm actuated contacts.
2. Auxiliary SPDT trouble actuated contacts.
3. A solid-state power transfer circuit that shall switch to standby power automatically and instantaneously if normal power fails or falls below 15% of normal ("brown out" conditions). This electronic circuit shall allow the batteries to be effectively "floated" on the operating system to avoid upsetting the normal microprocessor scan and minimize resultant nuisance troubles and/or alarms.
4. A ground fault detector to detect positive or negative grounds on the initiating circuits, signal circuits, power circuits, and telephone line circuit. A ground fault code on the alphanumeric display shall provide indication of either a positive or negative ground fault and shall operate a general trouble but shall not cause an alarm to be sounded

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5. A short circuit error message shall be a standard feature of the fire alarm control panel. Each communication loop shall be monitored and shall have a distinctive error message.
6. Lightning protection shall be a standard feature of the fire alarm control panel and shall be incorporated in the power supply circuit, common control circuits, signal circuits, and telephone line circuit.
7. Individual circuit breakers shall be provided for the following: smoke detector power, main power supply, signal circuit #1, signal circuit #2, battery standby power, and auxiliary output.
8. The fire alarm control panel shall be of dead-front construction. One key shall allow access to all electronics or to the dead-front access to the operator functions
9. Opening the main door shall expose all components for inspection or adjustment without further dismantling of the cabinet, control unit, or wiring.
10. It shall be possible to check and adjust the sensitivity of all analog devices from the main fire alarm panel.

L. The fire alarm control panel shall have batteries capable of powering the system for (24) hours in standby condition and (5) minutes in alarm.

M. There shall be no special tools required for the programming of devices. A standard slot head screwdriver only.

2.5 REMOTE OPERATING PANEL:

A. Remote Operating Panel (Provide color as selected by Architect)

B. The Remote Operating Panel shall contain 80 digit alphanumeric display providing status of all devices including the fire alarm control panel.

C. The Remote Operating Panel shall permit the user to perform all necessary functions including but not limited to the following:

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8. Change time
9. Walk test
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2.6 MONITOR MODULE (FCI AMM-2):

A. Remote identification module devices shall be attached to any single normally open initiating device (heat detector, waterflow switch, duct detectors, sprinkler, tamper switches, kitchen hood, pull station, etc.). The modules shall supply addressing and status information to the Fire Alarm Control Panel through the dual loop module.

2.7 CONTROL POINT MODULE (FCI AOM):

A. The control point module shall be connected to the same loop as the initiating devices, and

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shall provide a relay output (Form "C" 2 Amp @ 24 VDC, resistive only).

B. This relay output shall be used to perform auxiliary functions.

C. When the AOM is activated, the red "ACTIVE" LED shall be on solid. Under normal conditions, the red "ON LINE" LED shall flash.

2.8 DOOR HOLDER (FCI FM-988):

A. The door holder shall be wall mounted, semi-recessed; be powered at 120 VAC; and have 35 lbs. of holding force and be of a brushed aluminum finish.

2.9 MANUAL FIRE ALARM STATION (FCI, MS-2, W/AMM-2):

A. Provide red enclosure, manual fire alarm stations with the following features:

1. Aluminum construction, for flush mounting.
2. Addressable alarm type electrically compatible with system requirements.
3. Double Action
4. Dual-Action design requiring unit to be opened for resetting, and requiring resetting before closing. Key reset, keyed like fire control panel.

2.10 PHOTOELECTRIC DETECTORS (FCI ASD-P W/ADB-F BASE):

A. All photoelectric detectors shall be capable of being replaced without disconnecting any wires or wire connectors from the base of the detector. Each detector shall be installed on a separate base. The detector base shall be capable of receiving a photoelectric, ionization, or electronic thermal detector. All photoelectric detectors shall be UL 268 listed. All detectors shall have (2) viewable LEDs to indicate the status of the device.

2.11 DUCT FIRE DETECTORS (FCI DH500AC/DC WITH SAMPLING TUBE):

A. Provide ionization type with UL 268A listings. Each detector shall be equipped with a remote light. Each detector shall have (2) form "c" alarm contacts rated at 10 amps (at 120VAC).

2.12 CARBON MONOXIDE (CO):

A. Provide a System Sensor CO1224T carbon monoxide detector with Realtest Technology. Provide detectors with the following features:

1. Compliance with UL2075.
2. Trouble relay.
3. Wiring supervision with SEMS Terminals.
4. A six year end-of-life timer.
5. Sounder base for sound audible alarm.

2.13 THERMAL DETECTORS (FCI ATD WITH/ADB-F BASE):

A. Thermal detectors shall operate on the Rate-of-Rise principal. The detectors shall have a fixed temperature rating of 135 degrees Fahrenheit. Exception: in Boiler rooms, provide temperature rating of 200 degrees Fahrenheit.

1. The heat detector shall consist of a base and a head.
2. The base shall be capable of accepting either a smoke detector or a 135 (or 200) degree heat detector.

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3. The head shall automatically restore to its normal standby condition when the temperature returns to its normal range.

2.14 AUDIOVISUAL ALARM HORNS (FCI, HMF/STS SEMI-FLUSH MOUNTED OR EQUAL):

A. Provide audio-visual alarm horns with the following features:

1. Die cast or stamped steel construction, finished in red/white (color by Architect) enamel, suitable for indoor or outdoor application.
2. Capable of 90 db (UL rating) sound level at 10 feet.
3. Flush mounted
4. Integrally mounted flashing light unit, with Lexan lens with block letters “FIRE”, and minimum flash rate of ONE per second, and 110 candela minimum.
5. Electrically compatible with system requirements.
6. Horns shall sound the temporal pattern (code 3) until silenced.
7. Audiovisual alarm horns shall have the ability to silence horns while maintaining the strobe flash, until reset.
8. Mechanical horn mechanism only, electronic horns are not acceptable.
9. Maximum 24 horns per circuit, maximum 8 strobes per circuit.

B. Strobes shall be synchronized when there are three or more within sight and less than 55 feet of viewer.

2.15 STROBES (FCI Model STS, FLUSH MOUNT):

A. Provide strobe with flashing light unit, with Lexan lens with block letters “FIRE”, and minimum flash rate of ONE per second, and high intensity 110 candela minimum. Strobes shall be synchronized when there are three or more within sight and less than 55 feet of viewer. Furnish in Red/White (color by Architect).

2.16 CEILING MOUNT STROBES (WHEELOCK RSS24100C-FW, FLUSH MOUNT, WHITE):

A. Provide strobe UL listed for ceiling mounting, flush mounted in ceiling or concrete vaulted ceiling. Provide strobe with flashing light unit, with Lexan lens with block letters “FIRE”, and minimum flash rate of ONE per second, and 110 candela minimum.

B. Strobes shall be synchronized when there are three or more within sight and less than 55 feet of viewer.

C. Furnish in Red/White (color by Architect).

2.17 AUXILIARY RELAY (FCI, ARB-C):

A. Remote auxiliary relay boards shall be rated at 10 AMPS @ 120 VAC. A red LED shall light to indicate relay activation. All relays shall transfer on general alarm and latch on until reset. All relays shall be supervised. The control output provided can be used in conjunction with fire alarm applications (i.e. fan controls, dampers, doors, and any other general alarm control).

2.18 INITIATING MODULES:

A. Provide style "6" initiating modules capable of receiving and annunciating an alarm from any detector, even with a single fault condition on any initiating circuit.

B. Power all smoke detectors from the "Style 6" initiating loop wiring. For systems that power smoke detectors separately from the "Style 6" loop, provide monitoring for both the power

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source and the independent initiating wiring, so that complete trouble and alarm indication is achieved by loop. Provide capability to operate all smoke detectors, even with a single fault condition on the smoke detector power wiring. Provide one spare initiating circuit.

2.19 SIGNALING MODULES:

A. Provide signaling as required. Provide power adequate to sound all signaling devices concurrently. Provide supervised indicating circuits for polarized 24V D.C. alarm signaling devices. Provide 2 spare signaling circuits.

B. Each signal circuit shall have a separate disconnect switch for servicing the fire alarm system. Each and every indicating circuit shall have a distinct location description. Power supply shall be at fire alarm control panel. Remote power supplies and indicating circuits will not be acceptable.

2.20 SUPPLEMENTAL NOTIFICATION CIRCUITS (FCI SNAC-4):

A. Provide supplementary notification appliance circuit panel(s) as required. The ‘SNAC’ shall be capable of supplying up to four, Class A, Style Z notification appliance circuits. The panel shall contain its own battery charger, regulated power supply, and shall be supervised for ground fault, overcurrent, open circuits and low battery conditions. Ground fault, battery and circuit trouble conditions shall transmit a trouble signal to the main fire alarm control panel.

2.21 SYSTEM CONFIGURATION PROGRAMMING:

A. To help the owner in programming, system changes, and servicing, the fire alarm system shall have the following functions.

1. The FACP shall be capable of an auto-configuration, that via a password, all analog devices and panel modules are automatically programmed into the system. At this point the system will operate as a general alarm system without any other programming.
2. If any two devices are addressed the same, the LED's on both devices will light steady and the panel will read "extra address and the address number”.
3. If any device is installed and not programmed into the system the LED will light steady and the panel will read the same as above.

2.22 BATTERIES/POWER SUPPLIES:

A. Provide standby batteries capable of operating fire alarm system for minimum of 24 hours, then operating all indicating units for at least five minutes. Locate batteries in fire alarm control unit, or in similar type enclosure located as directed. Provide all interconnecting wiring. Place batteries that vent hydrogen gas in separate enclosure. Provide 30 percent spare capacity.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS:

A. Approved Plans: A copy of the approved and stamped plans shall be on site during the installation and at the time of inspection to verify that the system is installed according to the approved plans.

B. Install fire alarm and detection systems as indicated, in accordance with equipment manufacturer’s written instructions and complying with applicable portions of NEC and NECA’s “standard of installation”.

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C. Install wiring, raceways, and electrical boxes and fittings in accordance with Division 26 Basic Materials and Methods section, “Raceways”, “Wires and Cables”, and “Electrical Boxes and Fittings”, and in accordance with other sections, as applicable.

D. All wire used on the fire alarm system shall be U.L. Listed as fire alarm protective signaling circuit cable per NEC, Article 760.

E. If twisted or shielded wire is required or recommended by the manufacturer it must be used.

F. Review proper installation procedure for each type of device with equipment supplier before installation.

G. Provide a minimum of one 3/4" conduit with (2) Cat 5e telephone cables from FACP to main telephone terminal.

H. Where smoke or heat detectors are specified, install device a minimum of three feet from adjacent air supply diffusers to ensure proper operation of device.

I. Refer to NFPA for spacing and exact placement of fire alarm devices.

J. Electrical Identification: Refer to Section 260553 for requirements.

PART 4 - FINAL ACCEPTANCE AND GUARANTEE

4.1 GUARANTEE:

A. Furnish a three-year guarantee for all equipment, materials and installation, including all labor, transportation, and equipment.

B. Emergency Response. The fire alarm equipment supplier shall provide an emergency response within four hours of any reported system failure to resolve the problem on a continuous basis.

4.2 PRE-TEST:

A. The contractor shall with a representative of the manufacturer conduct a test 3 days before the final test to verify operation of all devices. Any problems must be corrected before the final test.

4.3 FINAL TEST:

A. Before the installation shall be considered completed and acceptable, a test on the system shall be performed as follows:

1. The contractor's job foreman, a representative of the manufacturer, a representative of the owner, shall operate every building fire alarm device to ensure proper operation and correct annunciation at the control panel. Fan shutdown and door holder circuits shall operate.

2. Conduct a full 24 hour test of battery operation. System shall be put on the batteries for a full 24 hours and all notification appliances shall be operational for a period of 5 minutes.

The supervisory circuitry of the initiating and indicating circuits shall also be verified.

4.4 SPARE PARTS: Refer to Section 26 0502 for requirements.

PART 5 - AS BUILT DRAWINGS AND OPERATION AND MAINTENANCE MANUALS:

5.1 LABELING:

A. All devices shall be labeled with their appropriate address. The labels shall be 18 point

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pressure sensitive labels.

B. All initiating devices shall be programmed to include the device address and a complete user text English location description, i.e. Device L4S76, Smoke Detector, 1st floor Rm.17

5.2 RECORD DRAWINGS: Refer to Section 26 0502 for requirements.

5.3 OPERATING AND MAINTENANCE MANUALS: Refer to Section 26 0502 for requirements.

5.4 TRAINING:

A. Provide four (4) hours training on the operation and installation of fire alarm system, at job site, at no cost to owner. Provide programming training and software sub-licensing in owner's name. Sub-licensing agreement shall include the U.L. requirement to allow the owner to do any programming that the supplier is allowed to do during commissioning, testing, service and field additions or deletions to the fire alarm system. The fire alarm supplier shall provide this training and licensing at no cost to the owner, including transportation, lodging, meals, and training manuals.

END OF SECTION 28 3111

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311000 SITE CLEARING
312000 EARTH MOVING

EARTHWORK

division 31

SAA
SANDERS ASSOCIATES ARCHITECTS

SECTION 31 10 00 - SITE CLEARING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Protecting existing vegetation to remain.
2. Removing existing vegetation.
3. Clearing and grubbing.
4. Stripping and stockpiling topsoil.
5. Removing above- and below-grade site improvements.
6. Disconnecting and capping or sealing site utilities.

B. Related Sections:

1. **Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.**

1.2 MATERIAL OWNERSHIP

A. Except for stripped topsoil or other materials indicated to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.3 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

B. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.

C. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.

D. Do not commence site-clearing operations until temporary erosion and sedimentation control measures are in place. See Division 31 Section "Erosion and Sedimentation Control (Includes SWPPP)."

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. Satisfactory Soil Materials: Requirements for satisfactory soil materials are specified in Division 31 Section "Earth Moving."

1. Obtain approved borrow soil materials off-site when satisfactory soil materials are not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Locate and clearly flag trees and vegetation to remain or to be relocated.

C. Protect existing site improvements to remain from damage during construction.

1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. Refer to Division 31 Section "Erosion and Sedimentation Controls."

3.3 TREE PROTECTION

A. Erect and maintain temporary fencing around tree protection zones before starting site clearing. Remove fence when construction is complete.

B. Do not excavate within tree protection zones, unless otherwise indicated.

C. Repair or replace trees and vegetation indicated to remain that are damaged by construction operations, in a manner approved by the Owner’s Representative.

3.4 UTILITIES

A. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed.

1. Arrange with utility companies to shut off indicated utilities.

B. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Owner's Representative not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without written permission of Owner's Representative.

3.5 CLEARING AND GRUBBING

A. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.

1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches (200 mm), and compact each layer to a density of 98 percent standard proctor.

3.6 TOPSOIL STRIPPING

A. Remove sod and grass before stripping topsoil.

B. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.

C. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Temporarily stabilize per the SWPPP and Division 31 Section "Erosion and Sedimentation Control."

3.7 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.

3.8 DISPOSAL

A. Disposal: Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

1. Submit schedule for recycling operations (if any) and obtain approval in writing from Owner's Representative. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities.

3.9 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent geotechnical engineering testing agency to witness filling operations of depressions caused by clearing and grubbing. Coordinate scheduled filling operations with the Owner's testing agency.

END OF SECTION 31 10 00

SECTION 31 20 00 - EARTH MOVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Preparing subgrades for slabs-on-grade, walks, pavements, lawns and grasses, and exterior plants.
2. Excavating and backfilling for buildings and structures.
3. Drainage course for slabs-on-grade.
4. Subbase course for concrete walks and pavements.
5. Subbase and base course for asphalt paving.
6. Excavating and backfilling for utility trenches.

B. Related Sections:

1. **Section 016001 “Buy American Preference Requirements” for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100**

1.2 SUBMITTALS

A. Building pad certification.

1.3 DEFINITIONS

A. Backfill: Soil material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Course placed between the subbase course and hot-mix asphalt paving.

C. Bedding Course: Course placed over the excavated subgrade in a trench before laying pipe.

D. Borrow Soil: Satisfactory soil imported from off-site or on site borrow pit for use as fill or backfill.

E. Drainage Course: Course supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Owner's Representative. Authorized additional excavation and replacement material will be paid for according to Contract provisions changes in the Work.
2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Owner's Representative. Unauthorized excavation, as well as remedial work directed by Owner's Representative, shall be without additional compensation.

G. Fill: Soil materials used to raise existing grades.

H. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

I. Subbase Course: Course placed between the subgrade and base course for hot-mix asphalt pavement, or course placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

J. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

K. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.4 QUALITY ASSURANCE

A. Imported (borrow) soil must be tested and certified, by the Owner's testing agency, as suitable material, free of any environmental contaminates. Coordinate imported materials and their source with Division 31 Section "Erosion and Sedimentation Control" and the Storm Water Pollution Prevention Plan. The Contractor will be liable for any and all clean-up costs associated with unapproved, imported materials.

1.5 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by the Owner's Representative and then only after arranging to provide temporary utility services according to requirements indicated.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Provide ASTM D 2487 or AASHTO M 145 classified soil materials according to geotechnical engineer's written recommendations in Division 00 Section "Geotechnical Data."

C. Satisfactory Soils: Recommended materials free of rock or gravel larger than 3 inches (75 mm) in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

1. Satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction will be considered unsatisfactory soil materials.

D. Provide granular soils materials according to the project soils report, local department of transportation (DOT) regulations or as follows (the project soils report takes precedence):

1. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 12 percent passing a No. 200 (0.075-mm) sieve.
2. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 95 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.
3. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 12 percent passing a No. 200 (0.075-mm) sieve.
4. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch (25-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.
5. Drainage Course: Narrowly graded mixture of washed crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch (37.5-mm) sieve and 0 to 5 percent passing a No. 8 (2.36-mm) sieve.

2.2 ACCESSORIES

A. Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of the utility.

PART 3 - EXECUTION

3.1 PREPARATION

A. Comply with geotechnical engineer's written recommendations in Division 00 Section "Geotechnical Data."

B. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

C. Preparation of subgrade is specified in Division 31 Section "Site Clearing."

D. Protect and maintain erosion and sedimentation controls, which are specified in Division 31 Section "Erosion and Sedimentation Control (Includes SWPPP)" during earthwork operations.

3.2 EXCAVATION

A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. No changes in the Contract Sum or the Contract Time will be authorized except for rock excavation or removal of obstructions not specifically indicated in the Contract Documents.

1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
2. Authorized additional excavation and replacement material will be paid for according to Contract provisions as specified in Division 00 Section "General Conditions."

B. Excavation for Structures: Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch (25 mm). If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections

C. Excavation for Walks and Pavements: Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

D. Excavation for Utility Trenches: Excavate trenches to indicated gradients, lines, depths, and elevations or as required by authorities having jurisdiction.

1. Trench Width: Provide a clearance of 12 inches (300 mm) on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches (300 mm) higher than top of pipe or conduit, unless otherwise indicated.
2. Trench Bottoms: Provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.

    a. Excavate trenches 6 inches (150 mm) deeper than elevation required in rock or other unyielding bearing material, 4 inches (100 mm) deeper elsewhere, to allow for bedding course as required by authorities having jurisdiction.

3.3 SUBGRADE INSPECTION

A. Proof-roll subgrade below the building slabs and pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades. Proof-roll in presence of Owner’s testing agency.

B. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Owner’s testing agency, without additional compensation.

3.4 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations, wall footings, utility pipe, or other construction as approved by the Owner's testing agency.

3.5 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover or temporarily stabilize as specified in Division 31 Section "Erosion and Sedimentation Control (Includes SWPPP)."

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.6 UTILITY TRENCH BACKFILL

A. General: Backfill trenches as indicated on Drawings.

B. Place backfill on subgrades free of mud, frost, snow, or ice.

C. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

D. Backfill trenches excavated under footings and within 18 inches (450 mm) of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings. Concrete is specified in Division 03 Section "Cast-in-Place Structural Concrete."

E. Provide concrete encasement for piping or conduit less than 24 inches (610 mm) below surface of roadways only when indicated on the Drawings or as required by authorities having jurisdiction.

F. Place and compact initial backfill of subbase material or satisfactory soil.

1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing and Owner's testing agency.

G. Place and compact final backfill as indicated on Drawings to final subgrade elevation.

H. Install warning tape directly above utilities, 12 inches (300 mm) below finished grade, except 6 inches (150 mm) below subgrade under pavements and slabs.

3.7 SOIL FILL

A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

B. Place and compact fill material in layers to required elevations. Comply geotechnical engineer's written recommendations in Division 00 Section "Geotechnical Data."

3.8 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content or as directed by Owner's Testing Agency.

1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
2. Remove and replace, or scarify and air dry, at no additional cost to the Owner, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight. See Division 31 Section "Dewatering"

3.9 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 8 inches (200 mm) in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches (100 mm) in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698, Standard Proctor:

1. Under structures, building slabs, future expansion areas, steps, walkways, and pavements, scarify and recompact top 8 inches (203 mm) of existing subgrade and each layer of backfill or fill soil material at 98 percent.
2. Under lawn or unpaved areas, scarify and recompact top 6 inches (150 mm) below subgrade and compact each layer of backfill or fill soil material at 85 percent.

3.10 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:

1. Lawns, Unpaved Areas, and Walks: Plus or minus 1 inch (25 mm).
2. Pavements: Plus or minus 1/2 inch (13 mm).

C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch (13 mm) when tested with a 10-foot (3-m) straightedge.

3.11 SUBBASE AND BASE COURSES

A. Place subbase and base course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place subbase and base course under pavements and walks as follows:

1. Shape subbase and base course to required crown elevations and cross-slope grades.
2. Compact subbase and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 98 percent of maximum dry unit weight according to ASTM D 698, Standard Proctor.

3.12 DRAINAGE COURSE

A. Place drainage course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:

1. Place drainage course that exceeds 6 inches (150 mm) in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches (150 mm) thick or less than 3 inches (75 mm) thick.
2. Compact each layer of drainage course to required cross sections and thicknesses to not less than 98 percent of maximum dry unit weight according to ASTM D 698.

3.13 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing. Coordinate scheduled earth moving work with the Owner's testing agency.

B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.

C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by the Owner's testing agency.

D. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable.

E. Provide other field tests, such as bearing ratio of subgrades, subbases, and bases for paving, as required by authorities having jurisdiction.

F. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest, at the Contractor's cost, until specified compaction is obtained.

3.14 BUILDING PAD CERTIFICATION

A. Submit two signed copies of the Building Pad Certification Form for each building pad at the end of this Section once each building pad is complete and ready for turnover to the building contractor. Form must be completed by the Owner's testing agency, professional surveyor, and both the Site Contractor and the Building Contractor.

3.15 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

C. Where settling occurs before Project warranty period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

3.16 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

END OF SECTION 31 20 00

321216 ASPHALT PAVING
321313 CONCRETE PAVING
321373 PAVING JOINT SEALANTS
321700 PAVING SPECIALTIES
323119 DECORATIVE METAL FENCES AND GATES
328400 IRRIGATION
329000 PLANTING

EXTERIOR IMPROVEMENTS

division 32

SAA
SANDERS ASSOCIATES ARCHITECTS

SECTION 32 12 16 - ASPHALT PAVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes

1. Hot-mix asphalt paving.
2. Pavement Marking

B. Related Sections:

1. **Section 016001 “Buy American Preference Requirements” for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.**

1.2 SUBMITTALS

A. Job-Mix Designs: Certification, by authorities having jurisdiction, of approval of each job mix proposed for the Work.
B. Material Certificates: For each paving material, from manufacturer.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer shall be registered with and approved by authorities having jurisdiction or the DOT of the state in which Project is located.

B. Regulatory Requirements: Comply with state or local DOT for asphalt paving work.

C. Asphalt-Paving Publication: Comply with AI MS-22, "Construction of Hot Mix Asphalt Pavements," unless more stringent requirements are indicated.

1.4 PROJECT CONDITIONS

A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp or if the following conditions are not met:

1. Tack Coat: Minimum surface temperature per requirements of asphalt course.
2. Asphalt Base and Surface Course: Minimum surface temperature of 40 deg F (4.4 deg C) and rising at time of placement.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Use locally available materials and gradations which exhibit a satisfactory record of previous installations.

B. Base Course Aggregate: Sound, non-expansive angular crushed stone, crushed gravel, or crushed slag, sand, stone or slag screenings, 1" Gradation.

0. Uncrushed gravel may be used in base course mixture if required to suit local material availability.

C. 1" Gradation Table

Sieve Size	Ideal Gradation (Percent Passing)	Ideal Gradation Tolerance (Percent)
1"	100	
1/2"	85	+/- 6
No. 4	55	+/- 6
No. 16	31	+/- 4
No. 50	19	+/- 4
No. 200	9	+/- 2

D. Asphaltic Concrete: All materials used in the asphaltic concrete paving work shall be obtained from the same source and/or manufacturer throughout the entirety of the project.

E. The aggregate for the asphaltic concrete shall consist of crushed stone or gravel (slag of any type will not be permitted) meeting the requirements of ASTM D-448 for coarse aggregate, ASTM D-1073 for fine aggregate and ASTM D-242 for mineral filler.

1. The gradation of the crushed aggregate shall be a mixture of coarse aggregate, retained on a No. 8 sieve, fine aggregate, passing a No. 8 sieve and mineral filler passing the No. 200 sieve conforming to the following "Master Job Mix Formula".

MASTER JOB MIX FORMULA		
Sieve Size	Percent Passing By Weight	Job Mix Tolerances
1/2"	100	±0
No. 4	70	±10
No. 16	37	±7
No. 50	17	±6
No. 200	7	±2

2. Local or State Highway department specifications closely conforming to the above "Master Job Mix Formula" and approved by the Soils Engineer may be substituted; however, job mix tolerances shall be maintained.
3. Maximum aggregate size shall be no greater than one-half of the design thickness of the binder or wearing course. Gradation percentages shall closely parallel the median wherever possible.

C. Asphalt cement for asphaltic concrete mixture shall be Penetration Grade 60-70 or 85-100 conforming to AASHTO designation M20 or Viscosity Grade AC-20 conforming to AASHTO designation M-226.
1. Mix shall contain 4.5% to 7% by weight of mixture of asphalt cement.

D. Asphalt for tack coat shall be slow setting emulsified asphalt SS-1 or SS-1h conforming to AASHTO designation M-140.

2.2 MIXES

A. Hot-Mix Asphalt: Dense, hot-laid, hot-mix asphalt plant mixes approved by authorities having jurisdiction; designed according to procedures in AI MS-2, "Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types"; and complying with the following requirements:
1. Plant mixed asphaltic concrete mixture shall meet the following requirements when tested by the Marshall Method, ASTM D-1559. The requirements are based on the asphaltic concrete being compacted with 50 blows and tested at 140 degrees F.

Physical Test	Binder Course
Stability (min.)	1500 psi
Flow (1/100")	6 - 18
Total Voids (%)	2 - 5

2. Asphalt cement content shall be 4.5 - 7.0 percent by weight of total mix. Upper limit may be raised when using absorbent aggregate.
A. Optimum asphalt cement content shall be determined by the Marshall Method test property curve. The amount of asphalt cement shall be selected to meet specified stability and flow requirements. A 1% tolerance in air voids is permitted.
B. Use dry material to avoid foaming. Mix uniformly and thoroughly.

PART 3 - EXECUTION

3.1 COLD MILLING

A. Clean existing pavement surface of loose and deleterious material immediately before cold milling. Remove existing asphalt pavement by cold milling to grades and cross sections indicated.

3.2 PATCHING

A. Hot-Mix Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches (300 mm) into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.

B. Tack Coat: Apply uniformly to vertical surfaces abutting or projecting into new, hot-mix asphalt paving at a rate of 0.05 to 0.15 gal./sq. yd. (0.2 to 0.7 L/sq. m).

C. Patching: Fill excavated pavements with hot-mix asphalt base mix and, while still hot, compact flush with adjacent surface.

3.3 SURFACE PREPARATION

A. Proof-roll subbase as specified in Division 31 Section "Earth Moving."

B. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.

C. Herbicide Treatment: Apply herbicide according to manufacturer's recommended rates and written application instructions. Apply to dry, prepared subgrade or surface of compacted-aggregate base before applying paving materials.

D. Tack Coat: Apply when overlaying existing pavement, on adjacent horizontal surfaces such as curbs, and between base and surface courses when the two courses are not installed in a continuous installation.

1. Apply at a rate of 0.05 to 0.15 gal./sq. yd. (0.2 to 0.7 L/sq. m).
2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.4 HOT-MIX ASPHALT PLACING

A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.

1. Spread mix at minimum temperature of 250 deg F (121 deg C).
2. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.

B. Place paving in consecutive strips not less than 10 feet (3 m) wide unless infill edge strips of a lesser width are required.

C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.5 JOINTS

A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.

3.6 COMPACTION

A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.

1. Complete compaction before mix temperature cools to 185 deg F (85 deg C).
2. Install and compact longitudinal joints to achieve a uniform density of pavement.

B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.

C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:

1. Average Density: 92 percent of reference maximum theoretical density according to ASTM D 2041, but not less than 90 percent nor greater than 96 percent.

D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.

E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.

F. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

G. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.7 INSTALLATION TOLERANCES

A. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:

1. Base Course: Plus or minus 1/2 inch (13 mm).
2. Surface Course: Plus 1/4 inch (6 mm), no minus.

B. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot (3-m) straightedge applied transversely or longitudinally to paved areas:

1. Base Course: 1/4 inch (6 mm).
2. Surface Course: 1/8 inch (3 mm).

3.8 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections. Coordinate Work with the Owner's testing agency.

B. Replace and compact hot-mix asphalt where core tests were taken.

C. Additional testing and inspection work to correct or repair unsatisfactory work will be at the expense of the Contractor.

D. Remove and replace or install additional hot-mix asphalt, at the Contractor's expense, where test results or measurements indicate that it does not comply with specified requirements.

3.9 DISPOSAL

A. Except for material indicated to be recycled, remove excavated materials from Project site and legally dispose of them in an EPA-approved landfill.

END OF SECTION 32 12 16

SECTION 32 13 13 - CONCRETE PAVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Exterior cement concrete pavement for the following:

a. Parking lots.
b. Curbs and gutters.
c. Walkways.
d. Concrete pads

B. Related Sections:

1. **Section 016001 “Buy American Preference Requirements” for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.**

1.2 SUBMITTALS

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

B. Design Mixtures: For each concrete pavement mixture.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products who complies with ASTM C 94/C 94M requirements for production facilities and equipment.

B. ACI Publications: Comply with ACI 301, "Specification for Structural Concrete," unless modified by requirements in the Contract Documents.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

A. Plain-Steel Welded Wire Reinforcement: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.

B. Deformed-Steel Welded Wire Reinforcement: ASTM A 497, flat sheet.

C. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420); deformed.

D. Plain Steel Wire: ASTM A 82, as drawn.

E. Deformed-Steel Wire: ASTM A 496.

F. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice."

2.2 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source throughout the Project:

1. Portland Cement: ASTM C 150, Type II. Supplement, if desired, with fly ash, ASTM C 618, Class C or F with maximum not to exceed 25% of cement content by weight.

B. Normal Weight Aggregates: ASTM C 33, and as herein specified. Provide aggregates from a single source for exposed concrete.

1. For exterior exposed surfaces, do not use fine or coarse aggregates containing spalling-causing deleterious substances.

2. Fine Aggregates shall comply with the following gradations:

Sieve	Percent passing
3/8"	100
No. 4	95 to 100
No. 16	50 to 85
No. 50	10 to 30
No. 100	2 to 10

3. Course Aggregates shall comply with the following gradations:

Sieve	Percent passing
1-1/2"	100
3/4"	90 to 100
3/8"	25 to 55
No. 4	0 to 10
No. 8	0 to 5
No. 200	Not to exceed 1.75 percent by weight in the combined course and fine aggregate.

C. Air-Entraining Admixture: ASTM C 260.

D. Water-Reducing Admixture: ASTM C-494, Type A.

2.3 RELATED MATERIALS

A. Clear Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

B. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber not greater than 1/2 inch (13 mm).

C. Color Pigment: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, nonfading, and resistant to lime and other alkalis.

2.4 CONCRETE MIXTURES

A. Prepare design mixtures, proportioned according to ACI 301, with the following properties:

1. Compressive Strength (28 Days): 4000 psi.
2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.50.
3. Slump Limit: 4-6 inches (100-150 mm) except 8 inches (200 mm) acceptable for concrete having HRWR admixture (super-plasticizer).
4. Air Content: 5.0 to 7.0 percent.

B. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Furnish batch certificates for each batch discharged and used in the Work.

C. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Proof-roll subbase as specified in Division 31 Section "Earth Moving."

3.2 PAVEMENT SUBBASE COURSE:

A. Place aggregate base course material on prepared subgrade as specified in Division 31 Section “Earth Moving.”

3.3 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

3.5 JOINTS

A. General: Form construction, isolation, and contraction joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated.

B. Construction Joints: Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour unless pavement terminates at isolation joints.

C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.

D. Contraction Joints: Sawcut joints, 1/8 inch (3 mm) wide sectioning concrete into areas as indicated. Sawcut contraction joints for a depth equal to at least one-fourth of the concrete thickness.

E. Edging: Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an edging tool to a 1/4-inch (6-mm) radius. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.

3.6 CONCRETE PLACEMENT

A. Moisten subbase to provide a uniform dampened condition at time concrete is placed.

B. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.

C. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

D. Screed pavement surfaces with a straightedge and strike off.

E. Commence initial floating using bull floats or darbies to impart an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

3.7 FLOAT FINISHING

A. General: Do not add water to concrete surfaces during finishing operations.

B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.

1. Medium-to-Fine-Textured Broom Finish: Draw a soft bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.

3.8 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

B. Comply with ACI 306.1 for cold-weather protection.

C. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

D. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound or a combination of these methods.

3.9 PAVEMENT TOLERANCES

A. Comply with tolerances of ACI 117 and as follows:

1. Elevation: 1/4 inch (6 mm).
2. Thickness: Plus 3/8 inch (10 mm), no minus.
3. Surface: Gap below 10-foot- (3-m-) long, unleveled straightedge not to exceed 1/4 inch (6 mm).
4. Joint Spacing: 3 inches (75 mm).
5. Contraction Joint Depth: Plus 1/4 inch (6 mm), no minus.
6. Joint Width: Plus 1/8 inch (3 mm), no minus.

3.10 REPAIRS AND PROTECTION

A. Remove and replace concrete pavement that is broken, damaged, or defective or that does not comply with requirements in this Section.

B. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement.

C. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 32 13 13

SECTION 32 13 73 - PAVING JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Expansion and contraction joints within pavement, walks and curbs.
2. Joints between cement concrete and asphalt pavement.
3. Joints between concrete or asphalt and building walls, columns or structures.

B. Related Sections:

1. **Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.**

1.2 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples: For each type and color of joint sealant required.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backing materials, 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.

1. Primers: Product 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.

2.2 JOINT SEALANTS

A. Sealant for Expansion and Contraction Joints within Cement Concrete Pavement and Between Concrete Walks, Pads, Paving, and Building Walls, Columns, and Structures: Cold applied two-part pourable urethane joint sealant, Type M, Grade P, Class 25, Use T

1. Products:

    a. Sonneborn, Div. of ChemRex, Inc.; Sonoborn SL 2
    b. Pecora Corporation; Dynatrol II-SG.
    c. Tremco; Vulkem 245
    d. Sika Corporation; Sikaflex - 2c SL

2. Color: Match Concrete.

B. Sealant for Joints Larger Than 1/4 inch (6 mm) Between Cement Concrete and Asphalt Pavement or Within Asphalt Pavement (Including Longitudinal Joints, Cracks or Butt Joints.): Polymeric hot applied single-component formulation complying with ASTM D 3405.

1. Products:

    a. Carlisle Coatings and Waterproofing; CCW MiraSEAL EJS
    b. Meadows, W. R., Inc.; Sealtight Hi-Spec.

2. Color: Black

2.3 JOINT-SEALANT BACKER MATERIALS

A. General: Provide joint-sealant backer materials as required that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by joint-sealant manufacturer based on field experience and laboratory testing.

B. Provide one of the following types of backer materials as applicable:

1. Round Backer Rods for Cold- and Hot-Applied Sealants: ASTM D 5249, Type 1, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.
2. Backer Strips for Cold- and Hot-Applied Sealants: ASTM D 5249; Type 2; of thickness and width required to control sealant depth, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.
3. Round Backer Rods for Cold-Applied Sealants: ASTM D 5249, Type 3, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.

B. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience.

C. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

D. Install backer materials to support sealants during application and at position required to produce optimum sealant movement capability. Do not leave gaps between ends of backer materials. Do not stretch, twist, puncture, or tear backer materials. Remove absorbent backer materials that have become wet before sealant application and replace them with dry materials.

E. Install sealants at the same time backings are installed to completely fill recesses provided for each joint configuration and to produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Clean off excess sealants or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

G. Protect applied sealant from traffic and other damage until sealants cured enough not to track. Provide temporary barricades or other protective measures recommended by the manufacturer.

END OF SECTION 32 13 73

SECTION 32 17 00 – PAVING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pavement markings
2. Tactile warning surfacing

B. Related Sections:

1. **Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.**

1.2 SUBMITTALS

A. Product Data: Manufacturer's printed product data for each product specified.

B. Samples: For each product specified to match color as specified in Division 01 Sections.

1.3 QUALITY ASSURANCE

A. Americans with Disabilities Act (ADA): Title III Regulations, 28 CFR Part 36 ADA Standards For Accessible Design, Appendix A, Section 4.29.2 Detectable Warnings On Walking Surfaces.

B. California Code of Regulations (CCR): Provide only approved DSAAC detectable warning products as provided in the California Code of Regulations (CCR) Title 24, Part 2, Section 205 definition of "Detectable Warning". Section 1117A.4 and 1127B.5 for "Curb Ramps" and Section 1133B.8.5 for "Detectable Warnings at Hazardous Vehicular Areas"

1.4 JOB CONDITIONS

A. Environmental Requirements: Apply marking paint in dry weather when temperature is 50 deg F (10 deg C) or above and anticipated to remain above 50 deg F (10 deg C) for four hours after completing application.

PART 2 - PRODUCTS

2.1 PAVEMENT MARKING PAINT

A. Marking paint: High solids, water based acrylic paint containing ultraviolet resistant pigments.

1. Products:

a. ICI Paints; Traffic Marking Paint, #4800
b. M.A.B. Paints; Zone Marking Latex Traffic Paint, #072 Line
c. Benjamin Moore and Co.; Safety and Zone Marking Latex, M58
d. Pittsburgh Paints; Zone & Traffic Marking Paint, #11-23
e. Porter Paint Co.; PorterGuard Acrylic Traffic Paint, #2408
f. The Sherwin Williams Co.; Promar Traffic Marking Paint, B29 Series

2. Colors:

a. Parking: Yellow or White.
b. Traffic Lanes, Directions, Lettering, etc.: Yellow or White.
c. Handicapped Emblems: Blue.
d. Fire Lane: Red.

2.2 TACTILE WARNING SURFACE

A. Basis of Design Product: Engineered Plastics Inc.; “Armor-Tile.”

B. Configuration: Cast-in Place.

C. Material: Vitrified polymer composite (VPC) epoxy polymer composition with an ultra violet stabilized coating employing aluminum oxide particles in the truncated domes.

D. Slip Resistance: ASTM C 1028-96, not to be less than 0.80 on top of domes and field area.

E. Fire Resistance: ASTM E 84-05 flame spread – less than 15.

F. Pattern: In-line pattern of truncated domes measuring nominal 0.2 inch (5 mm) height, 0.9 inch (23 mm) base diameter, and 0.45 inch (11 mm) top diameter, spaced center-to-center 2.35 inch (60 mm) as measured on a diagonal and 1.67 inch (42 mm) as measured side by side.

G. Field Area: Non-slip surface with a minimum of 40 – 90 degree raised points 0.045 inches (11 mm) high, per square inch;

H. Dimensions: As indicated on Drawings.

I. Color: Red.

PART 3 - EXECUTION

3.1 PAVEMENT MARKING

A. Verify that new asphalt is complete and has been accepted by Owner's Representative.

B. Thoroughly clean surfaces free of dirt, sand, gravel, oil, and other foreign matter. Protect adjacent curbs, walks, and other items from paint application.

C. Sweep and clean surface to eliminate loose material and dust.

D. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates.

E. Apply stripes straight and even in accordance with Drawings.

F. Remove overspray, spills, or drips from surfaces other than those requiring marking paint.

G. Barricade marked areas until paint is dried and ready for traffic.

3.2 TACTILE WARNING SURFACE

A. Install tactile warning surface as recommended by manufacturer and as follows:

1. Pour concrete true and smooth to the required dimensions and slope prior to the tactile warning surface placement. Immediately after finishing concrete, the electronic level should be used to check that the required slope is achieved.
2. Place tile true and square to the curb edge in accordance with the Drawings.
3. Tamp or vibrate tactile warning surface tile into the fresh concrete so that the field level of the tactile warning surface is flush to the adjacent concrete surface. Do not embed by stepping on tactile warning surface tile.
4. Immediately after placement, check the tactile warning surface tile elevation to adjacent concrete. Ensure that the field surface of the tile is flush with the surrounding concrete and back of curb so that no ponding is possible on the tile at the back side of curb.
5. Keep traffic from tactile warning surface tile until concrete has set.

END OF SECTION 32 17 00

SECTION 323119 - DECORATIVE METAL FENCES AND GATES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Decorative steel fences.
2. Swing Gates.

B. Related Sections:

1. Section 016001 “Buy American Preference Requirements” for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

B. Product test reports.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.6 QUALITY ASSURANCE

A. Installer Qualifications:

1. Installer experienced in performing work of this section who has specialized in installation work similar to that required for this project. The following are approved installers. Any installer that is not on this list will be required to submit qualifications and written manufacturers application approvals for review. Acceptance by manufacturer and architect will be required before bidding.

a) American Fence, 801-487-7431
b) Mountain States, 801-261-4224
c) Custom Fence, 801-546-2161

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Wind Loading: Comply with ASCE/SEI 7 requirements for fence height, wind exposure, design wind speed, and design wind pressure.

B. Lightning-Protection System: Maximum grounding-resistance value of 25 ohms under normal dry conditions.

2.2 DECORATIVE STEEL FENCES

A. Decorative Steel Fences: Fences made from steel tubing bars and shapes, hot-dip galvanized.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
2. Style: **Ameristar: Montage II rackable Genesis style metal fence or approved equal.**
3. Fence Height: 8 **feet typical. 8 feet wide.**
4. Color: **Black.**

B. Posts: Square steel tubing. 3 by 3 inches (64 by 64 mm) with 12 ga. wall thickness.

C. Post Caps: Formed from steel sheet and hot-dip galvanized after forming.

D. Rails:

1. Three Steel Tube Rails: Square steel tubing 1 3/4 inches by 1 3/4 inch with 12 gauge wall thickness.

E. Pickets: 1 inch square steel bars 14 gauge wall thickness

F. Fasteners: Stainless-steel carriage bolts and tamperproof nuts.

G. Fabrication: Assemble fences into sections by welding pickets to rails.

H. Galvanizing: For items other than hardware that are indicated to be galvanized, hot-dip galvanize to comply with ASTM A 123/A 123M. For hardware items, hot-dip galvanize to comply with ASTM A 153/A 153M.

1. Hot-dip galvanize posts and rails.
2. Hot-dip galvanize rail and picket assemblies after fabrication.

I. Finish : Organic coating complying with requirements in ASTM F 2408.

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2.3 SWING GATES

A. Galvanized-Steel Frames and Bracing: Fabricate members from 1.75" x 14 gauge forerunner double channel rail, 2" sq. x 12ga. gate ends, and 1" sq. x 14ga. pickets. All rail and upright intersections shall be joined by welding. All picket and rail intersections shall also be joined by welding. Gusset plates will be welded at each upright to rail intersection.

B. Swing Gate Hardware.

1. Swing gates shall be self closing. Integrated hinge-closer set (2 qty) shall be ADA compliant, less that or equal to 5 lb opening force, that shall include a variable speed and final snap adjustment with compact design. Hinge-closer set (2 qty) shall be tested to a minimum of 500,000 cycles and capable of self-closing gates up to a maximum gate weight of 260 lbs. and maximum weight load capacity of 1,500 lbs. Hinge-closer device shall be externally mounted with tamper-resistant security fasteners, with full range of adjustability, horizontal (.5" - 1.375") and vertical (0 - .5"). Maintenance free hinge-closer set shall be tested to operate in temperatures of negative 20 F to 200 F degrees, and swings to negative 2 degrees to ensure reliable final lock engagement. The hinge-closer shall be weatherproof for exterior use.

   a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
   a. Style: **LOCINOX: Mammoth,** heavy duty 180 degree closer and **DINO** hinge, or approved equal.
   b. Color: Black (RAL 9005)

2. Swing gate shall be provided with electromagnetic lock including handle pair tested to 550 lbs (300kg). Lock shall be tested to 500,000 movements. Powder coated aluminum housing to withstand 500 hours of salt spray and UV-resistance to discoloration. Lock shall be fully weather and dustproof (IP68).

   a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
   b. Style: **LOCINOX: MAG 2500 with handles,** surface mounted electromagnetic lock, or approved equal.
   c. Color: Black, (RAL 9005)
   d. Power: 12V or 24V, connected to emergency generator circuit. **LOCINOX: PB-1,** Powerbox with transformer. Black color, (RAL 9005)
   e. Card Reader with keypad, each side of gate. **(Provided by Ogden City IT).**

2.4 MISCELLANEOUS MATERIALS

A. Concrete: Normal-weight, air-entrained, ready-mix concrete complying with requirements in Section 033000 "Cast-in-Place Concrete" with a minimum 28-day compressive strength of 3000 psi (20 MPa), 3-inch (75-mm) slump, and 1-inch (25-mm) maximum aggregate size.

PART 3 - EXECUTION

3.1 DECORATIVE FENCE INSTALLATION

A. Install fences according to manufacturer's written instructions.

B. Install fences by setting posts as indicated and fastening rails to posts. Peen threads of bolts after assembly to prevent removal.

C. Post Excavation: Drill or hand-excavate holes for posts in firm, undisturbed soil. Excavate holes to a diameter of not less than 4 times post size and a depth of not less than 24 inches (600 mm) plus 3 inches (75 mm) for each foot (300 mm) or fraction of a foot (300 mm) that fence height exceeds 4 feet (1.2 m).

D. Post Setting: Set posts in concrete at indicated spacing into firm, undisturbed soil.

1. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.
2. Concrete Fill: Place concrete around [posts] [and] [sleeves] and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.
3. Posts Set in Concrete: Extend post to within 6 inches (150 mm) of specified excavation depth, but not closer than 3 inches (75 mm) to bottom of concrete.
4. Space posts uniformly at 6 feet (1.83 m) o.c.

END OF SECTION 323119

SECTION 32 84 00 - IRRIGATION

PART 1 - GENERAL

1.1 SUMMARY

A. The sprinkling system will be constructed using the sprinkler heads, drip irrigation, control valves, piping, fittings, controller(s), wiring, etc., of sizes specified.

B. It is the intention of these specifications, together with the accompanying drawings to accomplish the work of installing an irrigation system which will operate in an efficient and satisfactory manner according to the workmanlike standards established for the irrigation industry.

C. Related Sections:

1. **Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.**

1.2 PERFORMANCE REQUIREMENTS

A. The work consists of furnishing and installing a complete underground irrigation system as shown on the drawings and specifications. Include all labor, equipment and materials and perform all operations in connection with the construction of the irrigation system.

B. It will be the Contractor's responsibility to report to the Architect any deviations between the drawings, specifications and the site. Failure to do so prior to the installing of equipment, and resulting in replacing, and/or relocating, will be done at the Contractor's expense.

C. Existing Utilities: Before any trenching, excavating or digging below the surface for any reason is begun, the Contractor shall have the area "Blue Staked" in order to determine as close as possible the location of all underground utilities. The Contractor will conduct his work in such a manner to protect all utilities from damage. It is the responsibility of the Contractor to repair or replace any damage incurred by the Contractor or his/her employees at no expense to the Owner.

D. Site Inspection: Installer shall acquaint themselves with all site conditions. Should utilities not shown on the plans be found during excavations notify the Architect. Failure to do so will make installer liable for any and all damage thereto arising from their operations subsequent to discovery of such utilities not shown on plans.

E. Protection of Existing Site Conditions: The Installer shall take necessary precautions to protect site conditions to remain. Should damage be incurred, the Installer shall repair the damage to its original condition at his own expense.

1.3 SUBMITTALS

A. Product Data: Submit copies of manufacturer's technical data and installation instructions for landscape irrigation system.

B. Record Irrigation Drawings: Prepare a record drawing which shall show deviations from the contract documents made during construction affecting the main line pipe, lateral pipe, controller locations, remote control valves, manual drain valves, and all sprinkler heads. The drawings shall also indicate and show approved substitutions of size, materials and manufacturer's name and catalog name and catalog number. The Contractor will keep a record of all departures from the working drawings that occur during construction. These shall be kept on a clean set of prints of the working drawings. Two sets of completed record drawings indicated above shall be supplied to the Owner by the Contractor.

C. Laminated Wall mounted map indicating location of all controls, piping, heads (including type), valves and connection to water service. (8 ½" x 11" or 11" x 17")

D. Maintenance Manuals; indicating proper operation/maintenance of irrigation system.

1.4 QUALITY ASSURANCE

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

1.5 WARRANTY

A. Special Warranty: The Contractor shall make good any deficiencies at the time he is notified of any faults, and place in satisfactory condition any damage to the buildings or grounds without cost to the Owner within specified warranty period.

1. Warranty Periods from Date of Opening or Final Project Acceptance (whichever is longer): 12 months.

1.6 MAINTENANCE SERVICE

A. Provide full maintenance by skilled employees of planting irrigation Installer. Maintain as required in Part 3. Maintenance cost to be included in the overall base bid pricing with a breakout amount provided. Include breakout amount in Contractor's Schedule of Values.

PART 2 - PRODUCTS

2.1 GENERAL

A. All materials throughout the system shall be new and in perfect condition.

2.2 PIPES AND FITTINGS

A. All mainline and lateral pipe shall be Schedule 40, Polyvinyl Chloride (PVC) pipe. Piping shall be free from cracks, holes, foreign material, blisters, inside bubbles, wrinkles and dents. Pipe ratings shall be printed on the pipe and no pipe shall be less than ¾" diameter. All joints shall be solvent welded per manufacturer's recommendations, using both primer and glue. All joints must be allowed to set for a minimum of 24 hours prior to pressure testing.

B. All mainline fittings to be Schedule 80 Polyvinyl Chloride (PVC) and all lateral lines to be Schedule 40 Polyvinyl Chloride (PVC) standard weight as manufactured by Sloan or Lasco, as shown in details.

2.3 SLEEVES

A. All new sleeves shall be PVC Schedule 40 of sizes shown. Install sleeves in locations as shown on the drawings and at the depths specified for lateral and mainlines.

2.4 VALVE BOXES

A. Valve boxes shall be of sufficient size to fit 1 (one) electric remote control valves and still allow room for maintenance without having to excavate or perform similar operations. Boxes shall be as manufactured by Carson or Brooks Industries.

B. Valve boxes shall be set flush with the finished grade. Valve manifolds shall be set 4" below the top of the box including ball valves and quick couplers where called for. All valves must have ample room and access for repair. Include weed barrier and a 3" gravel base within entire base area of all valve boxes.

2.5 VALVES

A. Electronic Remote Control Valve: All valves shall be of the size and type as specified on the drawings.
1. Rain Bird PEB & PESB Series for all lawn control zones
2. Rain Bird XCZ-100-PRB-COM for all shrub control zones

B. Quick-Coupler: All valves shall be of the size and type as specified on the drawings.
1. Rain Bird 44RC: 1" Locking Rubber Cover with 2 piece body
2. Rain Bird 44-NP: 1" Locking Rubber Cover with 2 piece body Non-potable
3. Rain Bird 44-DK: 1 Quick Coupling Key
4. Rain Bird SH-0: 1" Hose Swivel

C. Brass Ball Valve: All valves shall be of the size and type as specified on the drawings.
1. NIBCO Series as shown on the drawings

D. Bronze Stop and Waste Valve: All valves shall be of the size and type as specified on the drawings.
1. Mueller Oriseal as shown on the drawings

E. Manual Drain Valve: All valves shall be of the size and type as specified on the drawings.
   1. 1/2" Conbraco as shown on the drawings. To be installed on mainlines only.

F. Backflow Preventer:
   1. Manufacturer: Febco 825Y or Wilkins 375XL Series as shown on the drawings. Installed in Backflow preventer as specified on drawings.

G. Secondary Water Filter

H. Manufacturer: Amiad Series as shown in irrigation schedule. See plan for size. Filter to be plastic w/ a min. of 300 Micron screen filter element.

2.6 SPRINKLERS AND ACCESSORIES

A. Sprinkler Heads: All heads shall be of the size and type as specified on the drawings. Nozzle patterns are indicated as shown. However specific site conditions may require a different nozzle pattern to be used.
   1. Rain Bird 1800 Series

B. Drip Tubing/Accessories: All drip components shall be of the size and type as specified on the drawings.
   1. Rain Bird XBS-940 – 3/4" Distribution Tubing
   2. Rain Bird XQ-100 – 1/4" Distribution Tubing
   3. Rain Bird XB-20PC - Xeri-Bug Emitters (2 Gal/Hr.)
   4. Rain Bird TS025 - Tie Down Stakes
   5. Rain Bird DBC-025 – Diffuser Bug Cap
   6. Rain Bird MDCFCAP – Flush Cap
   7. Rain Bird XBT-05-06 – Multi-Outlet Xeri-Bug
   8. Rain Bird SXB-360-SPYK – Xeri-Spray 360 on 5" Stake
   9. Rain Bird PSI-L30X-075 – Inline Pressure Regulator
   10. Netafim Techline CV Dripline with inline Emitters – See schedule for spacing

2.7 CONTROLLERS

A. Automatic Control: All controllers shall be of the type as specified on the drawings.
   1. Rain Bird ESP Series.
   2. Transformers as required for low voltage system.
   3. Wires shall be UF direct burial type and as sized on the drawings. No wire shall be smaller than #14. Ground or neutral wires shall be white, grass areas shall be green, drip-shrubbery areas shall be red, and all spare(s) wires shall be blue.
   4. Splices in electric control wires shall be fitted with a #M DBY Direct Bury Splice Kit. All splices shall be contained in a valve box, preferably in the same box as the electric remote control valves. Do not run short pieces of wire. Failure to do so will result in the replacement of the wire at the Contractor's expense.
   5. Circuit Control with switch for manual or automatic control of each circuit.

6. Timing Device: 24 hour, 7 day and even/odd interval watering adjustment, with provision for manual or semi-automatic operation and hard wired rain sensor which will suspend watering when ground is wet from rain.

PART 3 - EXECUTION

3.1 WORKMANSHIP

A. Lay out irrigation as accurately as possible to the drawings. The drawings are drawn diagrammatic to the extent that swing joints, offsets and all fittings are not shown. Install all irrigation components within landscape areas. All irrigation lines shall be installed in common trenches where possible.

B. If for any reason full and complete coverage of all irrigation areas does not occur, irrigation Contractor shall be responsible to contact the Architect before continuing with his work.

3.2 EXCAVATION AND TRENCHING

A. Install piping and wiring in sleeves under sidewalks, roadways, parking lots.

B. Backfill with rock free clean fill around pipes, valves, drains, or any irrigation system components. Water settle all trenches and excavations. Restore all surfaces, existing and underground installations, etc., damaged or cut as a result of the excavations to their original condition

C. Provide minimum cover over top of underground piping according to the following:
1. Irrigation Main Piping: Minimum depth of 24 inches below finished grade.
2. Lateral Piping: 12 inches.
3. Drain Piping: 12 inches.
4. Sleeves: 28 inches from the top of the pipe for mainline and 16 inches for laterals

D. All trenches are to be 12” away from all curbs, buildings, and sidewalks.

E. Grade and lay all piping such that the entire system will drain. Where possible, drain the main line to the valve manifold and install the drain in the valve box. All lateral lines beyond the valve manifold should be laid in such a manner as to drain by gravity to a single low point with automatic drains.

F. Run all electrical wires in mainline trench as shown in detail on drawings. Where it becomes necessary for wires to leave the mainline trench, the trench for all electrical wires shall be treated as a mainline trench and run in specified on conduit.

3.3 INSTALLATION

A. Install automatic control valves where shown and group together where practical. Place no closer than 12 inches to walk edges, building, and walls. Install in valve box, arranged for easy

adjustment and removal. Allow sufficient space around entire valve assembly. Adjust automatic control valves to provide flow rate of rated operating pressure required for each sprinkler circuit. See irrigation schedule.

B. Plastic pipe and fittings shall be solvent welded using solvents and methods as recommended by manufacturer of the pipe, except where screwed connections are required. Pipe and fittings shall be thoroughly cleaned of dirt, dust, and moisture before applying solvent with a non-synthetic bristle brush.

C. Install PVC pipe in dry weather when temperature is above 40 degrees F in strict accordance with manufacturer's instructions.

D. Pipe may be assembled and welded on the surface. Snake pipe from side to side of trench bottom to allow for expansion and contraction. Install piping free of sags and bends.

E. Irrigation head and valve locations are shown on the drawings diagrammatically. It will be the Contractor's responsibility to determine the exact location of each irrigation head and valve to accommodate the conditions as found on the site in order to provide complete coverage of all areas. Avoid installing valves in areas where curbs and sidewalks come together or at any intersection of two or more walkways. All control valves shall not be located within 3 feet of any driveway, traffic aisle, island, etc., where they could be damaged by vehicles driving over the curbs. Do NOT exceed the spacing as recommended by the manufacturer and as shown on the drawings for the irrigation heads. Minor adjustments in the system will be permitted to clear existing fixed obstructions subject to the approval of the Landscape Architect. All deviances from the drawings shall be noted on the record drawings.

F. All irrigation heads will be set perpendicular to the finished grade unless otherwise designated on the drawings or specified.

G. Install the quick couplers, isolation valves, manual drains as shown on drawings.

3.4 AUTOMATIC CONTROL SYSTEM INSTALLATION

A. All controllers shall be as a specified on the drawings and installed according to the details. The owner shall determine exact location of the clock.

B. Place copy of zone map, with all zone valve locations shown and approved irrigation plan, in protective jacket, with the main irrigation control panel.

C. Control cable to be taped to underside of main piping every ten feet

D. Install cable in separate sleeve under paved areas if irrigation piping is installed in sleeve.

3.5 FLUSHING AND TESTING

A. After installation of all new pipes and risers for a given circuit and after completion of all division work and before the installation of any irrigation head, the control valve shall be opened fully and a full head of water be used to flush out the system.

B. Testing shall be performed after completion of each circuit and after completion of the entire system. At this time any necessary repair work will be done at the Contractor's expense and the entire system will be in good working order prior to the issuance of the Certificate of Substantial Completion.

3.6 PIPE INSPECTION

A. Before any pipes are covered, the Landscape Architect and a representative of the Owner shall inspect the system for compliance with specifications and drawings. Any required changes will be made at this time at the expense of the Contractor.

3.7 FIELD QUALITY CONTROL

A. Observation: Allow irrigation designer, Owner, or Owner's inspector/agent to inspect the ongoing work at any time for proper materials and workmanship.

B. Tests and inspections by Installer:

1. Perform leak and operational testing with proper adjustments prior to the final designer walk-through. Notify the irrigation designer at least 3 days in advance of testing. Correct deficient work within five days of written notice.
2. Prior to final completion, conduct a walkthrough inspection of the complete irrigation system to allow the irrigation designer to certify that the work meets contract requirements and operates correctly. Utilize the manufacturer's technical support for the proper installation of sensors and programming of the smart controller. The installer will be held responsible for all costs associated with re-inspecting work that is not substantially complete at the time of the final walk through.
3. The irrigation designer shall provide written documentation of the final walk through and acceptance via email to the Owner, Contractor, and installer.
4. All heads will be adjusted to their proper coverage and set to the proper depth at this time.

3.8 ADJUSTING

A. Adjust settings of controllers.

B. Adjust automatic control valves to provide flow rate of rated operating pressure required for each sprinkler circuit.

C. Adjust sprinklers so they will be flush with, or not more than 1/2 inch above, finish grade.

3.9 CLEANING

A. Flush dirt and debris from piping before installing sprinklers and other devices.

3.10 DEMONSTRATION AND TRAINING

A. The Installer shall conduct a training/demonstration session with the Owner or the Owner's operations personnel, and the irrigation designer. The training must include any required winterization procedures. The Contractor shall document the training session with appropriate minutes and sign-in sheet.

3.11 MAINTENANCE

A. Winterization: In applicable climates within the warranty period, installer to schedule and perform proper winterization procedure in coordination with Owner's personnel.

B. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of planting irrigation Installer. Include monthly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

1. Perform maintenance during normal working hours.

END OF SECTION 32 84 00

SECTION 32 90 00 - PLANTING

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install landscaping materials as shown on the landscape plan and detail sheet and also according to the following specifications.

B. Related Sections:

1. **Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.**

1.2 SUBMITTALS

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

B. Samples for Verification: For each of the following:

1. 5 lb sample of specified mulch in labeled plastic bags.

2. Landscape boulders or photos of boulder type, before delivery to site.

C. Certification of Native Grass Seed.

D. Topsoil Analysis

E. As-Built Drawings: Indicate species, size, and location. Drawings must be certified by the landscape design professional, who created the landscape drawings.

1.3 QUALITY ASSURANCE

A. USA Standard for Nursery Stock shall govern the quality of plant materials.

B. Topsoil Analysis: Furnish soil analysis by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; sodium absorption ratio**;** deleterious material; pH; and mineral and plant-nutrient content of topsoil.

1. Report suitability of topsoil for plant growth. State-recommended quantities of nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory topsoil.

C. Turf and plants are subject to the approval of the Owner's Representative. Approval of plants at the nursery does not alter the right of rejection at the project site.

1.4 WARRANTY

A. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by Owner, or incidents that are beyond Contractor's control.
b. Structural failures including plantings falling or blowing over.

2. Warranty Periods from Date of Opening or Final Project Acceptance (whichever is longer): 12 months.

1.5 MAINTENANCE SERVICE

A. Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after turf and plants are installed and continue until plantings are acceptably healthy and well established but for not less than the warranty period. Maintenance cost to be included in the overall base bid pricing with a breakout amount provided. Include breakout amount in Contractor's Schedule of Values.

PART 2 - PRODUCTS

2.1 SEED

A. Grass Seed: Fresh, clean, dry, new-crop seed complying with ASOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances.

2.2 TURFGRASS SOD

A. Certified Sod:
1. Superior sod grown from certified, high quality, seed of known origin or from plantings of certified grass seedlings or stolons:
a. Assure overall high quality and free of noxious weeds or an excessive amount of other drop and weedy plants at time of harvest.
2. Sod shall be Tall Fescue blend from a local source.

2.3 PLANT MATERIAL

A. General: Furnish plants as indicated on Drawings, nursery-grown, true to genus, species, variety, cultivar, stem form, shearing, and other features complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.

B. Provide trees and shrubs of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of trees and shrubs required. Trees and shrubs of a larger size may be used if acceptable to Architect, with a proportionate increase in size of roots or balls.

C. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which shall begin at root flare according to ANSI Z60.1. Root flare shall be visible before planting.

D. Ground Cover: Provide ground cover of species indicated, established and well rooted in pots or similar containers, and complying with ANSI Z60.1.

E. Perennials: Provide healthy, disease-free plants of species and variety shown or listed, with well-established root systems reaching to sides of the container to maintain a firm ball, but not with excessive root growth encircling the container. Provide only plants that are acclimated to outdoor conditions before delivery and that are in bud but not yet in bloom.

F. Topsoil: Existing Topsoil to be stripped and stockpiled from site for landscape use. Contractor shall verify existing topsoil amounts and quality with the general contractor. The landscape contractor shall perform a soil analysis on existing and/or imported topsoil and amend per soil analysis recommendations. Soil analysis to be done by a certified soil testing agency. Provide new imported topsoil as needed from a local source. Imported topsoil must be a premium quality dark sandy loam, free of rocks, clods, roots, and plant matter. Topsoil to be installed in all landscaping areas.
   1. Imported Topsoil Criteria:
      a. Chemical Characteristics:
         1) PH range of 5.5 to 8.0
         2) Soluble Salts: less than 3.0 mmhos/cm
         3) Sodium Absorption Ratio (SAR): less than 6.0
      b. Physical Characteristics:
         1) Sand: 15 to 60 percent
         2) Silt: 10 to 60 percent
         3) Clay: 5 to 30 percent

G. Planting Backfill Mix: Mixture shall be composed of three parts topsoil to one part soil conditioner.

H. Tree Stakes: 2” Dia. x 6’ Long Lodgepole Pine

I. Tree Staking Ties: 32” Cinch-Tie tree ties by V.I.T. Products Inc. or equal as approved by Architect

J. Pre-Emergent Herbicide: Elanco XL, Ronstar, Surflan or approved equal

K. Weed Barrier: Dewitt Pro 5 weed barrier or approved equal

L. Mulches:
1. Organic: Shredded Bark Mulch - see material schedule & notes for size, color, type, & depth
   a. Available from:
      1) See material schedule for specified suppliers.
2. Inorganic: Decorative Stone - see material schedule & notes for size, color, type, & depth
   a. Available from:
      1) See material schedule for specified suppliers.

M. Landscape Decorative Boulder:
1. 2’ to 4’ diameter boulders as indicated in material schedule. Submit photos/sample for approval
   a. Available from:
      1) See material schedule for specified suppliers.

N. Landscape Edging:
1. 4” x 6” Concrete landscape curbing
2. 3/16” x 4” Steel Edging by Sure-Loc
3. Shovel Cut Edge – Use between lawn and tree 36” tree ring

PART 3 - EXECUTION

3.1 EXAMINATION

A. Before proceeding with work, check and verify dimensions and quantities. Report variations between drawings and site to Architect before proceeding with work.

B. Plant totals on landscape plan are for convenience only and are not guaranteed. Verify amounts shown on drawings. All planting indicated on drawing is required unless indicated otherwise.

C. Landscape Contractor must examine the site conditions under which the work is to be performed and notify the Project Manager in writing of unsatisfactory conditions. Do not proceed until conditions have been corrected.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities, and lawns and existing exterior plants from damage caused by planting operations.

B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

C. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain Architect's acceptance of layout before planting. Make minor adjustments as required.

D. Trunk Wrapping: Inspect tree trunks for injury, improper pruning, and insect infestation; take corrective measures required before wrapping. Wrap trees of 2-inch caliper and larger with trunk-wrap tape. Start at base of trunk and spiral cover trunk to height of first branches. Overlap wrap, exposing half the width, and securely attach without causing girdling.

E. Apply antidesiccant to trees and shrubs using power spray to provide an adequate film over trunks (before wrapping), branches, stems, twigs, and foliage to protect during digging, handling, and transportation.

1. If deciduous trees or shrubs are moved in full leaf, spray with antidesiccant at nursery before moving and again two weeks after planting.

F. Wrap trees and shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation.

3.3 INSTALLATION

A. All debris and compacted subsoil shall be removed from the planter area to a minimum depth of 12 inches below the top of walkway and curb.

B. Loosen subgrade to a minimum depth of 6 inches Remove stones larger than 1-1/2 inches in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

1. Spread existing or imported topsoil to a depth of 12 inches in parking islands and 8 inches in all planting beds but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if topsoil or subgrade is frozen, muddy, or excessively wet.

C. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in the immediate future.

D. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

E. Before planting, obtain Owner's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.4 TREE AND SHRUB PLANTING

A. Planting Pits and Trenches: Excavate circular planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are not acceptable. Trim perimeter of bottom

leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.

1. Excavate approximately twice diameter of the rootball.
2. Excavate at least 12 inches deeper than the root ball to accommodate vertical roots for bare-root stock.

B. Before planting, verify that root flare is visible at top of root ball according to ANSI Z60.1.

C. Set stock plumb and in center of planting pit or trench with root flare 1 inch above adjacent finish grades.

1. Add specified plant backfill.
2. Balled and Burlapped: After placing some backfill around root ball to stabilize plant, carefully cut and remove burlap, rope, and wire baskets from tops of root balls and from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.
3. Balled or Container-Grown: Carefully remove root ball from container without damaging root ball or plant.
4. Fabric Bag-Grown Stock: Carefully remove root ball from fabric bag without damaging root ball or plant. Do not use planting stock if root ball is cracked or broken before or during planting operation.
5. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
6. Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts recommended in soil reports from soil-testing laboratory. Place tablets beside the root ball about 1 inch from root tips; do not place tablets in bottom of the hole. Apply according to manufacturer's recommendations.
7. Continue backfilling process. Water again after placing and tamping final layer of soil.

D. Bare-Root Stock: Set and support bare-root stock in center of planting pit or trench with root flare 1 inch above adjacent finish grade.

1. Add specified plant backfill.
2. Spread roots without tangling or turning toward surface, and carefully work backfill around roots by hand. Puddle with water until backfill layers are completely saturated. Plumb before backfilling, and maintain plumb while working backfill around roots and placing layers above roots.

E. Provide new supports for trees noted on the drawings to be staked.
1. Remove nursery stakes delivered with and attached to tree.
2. Tree support shall consist of two stakes drive into holes base before backfill so roots are not damaged. Place stakes vertically and run parallel to tree trunk. Install stakes so three feet of stake length is below finish grade.
3. Place tree ties 6 to 12 inches below crotch of main tree canopy.

4. Remove tops of tree stakes so top of stake is 6 inches below main tree canopy to prevent damage to tree branches and canopy growth.

F. Landscape concrete curbing shall be used between all lawns and planting areas. See plan for specified areas. Curbing to be continuous and not be interrupted. Contact Architect if problems arise for modification of curbing alignment.

3.5 PLANTING AREA MULCHING

A. Areas shall be free of existing weed growth prior to application of herbicide.

B. Prior to mulching, treat planting areas with pre-emergent weed killer, applied according to the manufacturer's directions.

C. After planting and application of herbicide in planting areas, install weed barrier fabric with the fuzzy side down. Achieve 100 percent coverage over ground areas. Overlap seams 6 inches minimum. Staple at 5 feet on center using triangular spacing with two at each corner. Staple within 3 inches of all edges.

D. Install specified stone in all planting areas at specified depths. See materials schedule for details.

E. At base of trees in lawn areas, leave 24 inch diameter tree ring and add a layer of soil pep. See tree planting details and landscape notes.

3.6 SOD INSTALLATION

A. Sod area preparation:
1. Moisten sod area to a depth of 6" prior to laying sod.
2. Allow sufficient time between watering and sod application for soil to become workable and walkable without compromising the quality of the finish grade.

B. Laying Sod:
1. Soil in sod area to be moist at time sod is layed.
2. Final grade of soil after sodding of lawn areas is complete shall be one inch below top of adjacent pavement of any kind.
3. Lay sod during growing season.
4. Lay sod within 36 hours of being lifted.
5. Lay sod in rows with joints staggered. Butt sections closely without overlapping or leaving gaps between sections. Cut out irregular or thin sections.
6. Lay sod flush with adjoining existing sodded surfaces.
7. Do not sod slopes steeper than 3:1.

C. After Sodding is Complete:
1. Water sodded areas immediately after laying sod to obtain moisture penetration through sod into top six inches of topsoil.

3.7 MAINTENANCE

A. Tree and Shrub Maintenance: Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, restoring planting saucers, adjusting and repairing stakes and guy supports and root-ball stabilization, and resetting to proper grades or vertical position, as required to establish healthy, viable plantings. Spray or treat as required to keep trees and shrubs free of insects and disease. Restore or replace damaged tree wrappings.

B. Ground Cover, Perennial, and Orn. Grass Maintenance: Maintain and establish plantings by watering, weeding, fertilizing, mulching, and other operations as required to establish healthy, viable plantings.

C. Turf Maintenance: Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain height appropriate for species without cutting more than 1/3 of grass height. Remove no more than 1/3 of grass-leaf growth in initial or subsequent mowings.

3.8 SATISFACTORY TURF

A. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. (0.92 sq. m) and bare spots not exceeding 5 by 5 inches (125 by 125 mm).

B. Satisfactory Sodded Turf: At end of maintenance period, a healthy, well-rooted, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.

C. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory.

END OF SECTION 329000

331100 WATER UTILITY DISTRIBUTION PIPING
333100 SANITARY UTILITY SEWERAGE PIPING
334100 STORM UTILITY DRAINAGE PIPING

UTILITIES

division 33

SAA
SANDERS ASSOCIATES ARCHITECTS

SECTION 33 11 00 - WATER UTILITY DISTRIBUTION PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Domestic water and fire suppression lines.

a. Terminate as indicated on the Drawings.

B. Related Sections:

1. **Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.**

1.2 SUBMITTALS

A. Product Data: For each material specified.

1.3 QUALITY ASSURANCE

A. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Domestic Water and Fire Suppression Lines: Provide piping manufactured from the following materials list. Materials must also meet City Specifications. Do not provide domestic water and fire suppression lines in materials outside of size limits specified:

1. Polyethylene (PE) Water Pipe (Up to 3 inches diameter), AWWA C901 "Polyethylene (PE) Pressure Pipe and Tubing, 1/2-inch through 3-inch for Water Service.", PE 3408, SDR 9 (200 psi)

2. Copper Pipe (Up to 3 inches diameter): Type "K."

a. Joints: Sweat silver soldered on 2 inch and above.

3. Polyvinyl Chloride (PVC) (4 inches to 12 inches diameter): AWWA C900, Class 200

    a. Fittings: Mechanical and Flanged joints of ductile iron per ANSI/AWWA C110/A21.10 and ANSI/AWWA C111/A21.11.

4. Ductile Iron (DI) (3 inches to 12 inches diameter): AWWA C150 for a minimum 150 psi working pressure plus 100 psi surge pressure. Manufacture DI pipe per AWWA C151 with standard asphaltic coating on the exterior and cement-mortar lining on the interior.

    a. Fittings: Mechanical and Flanged joints of ductile iron per ANSI/AWWA C110/A21.10 and ANSI/AWWA C111/A21.11.

B. Water meter: Local utility company standard.

C. Valves

1. Gate Valves: UL-listed, 175 psi working pressure for 12" and smaller, 150 psi for sizes larger than 12". Threaded, flanged, hub, or other end configurations to suit size of valve and piping connection. Inside screw type for use with indicator post, iron body bronze mounted, non- rising stem, solid wedge disc.

2. Check Valves: UL-listed, 175 psi working pressure for 2" through 12", 150 psi for sizes larger than 12". Swing type, iron body bronze mounted with metal-to-metal or rubber-faced checks. Threaded, flanged, or hub end, to suit size and piping connections.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Before commencing pipe installation, field verify building tie-in locations/inverts, tap locations/inverts, and all utilities crossings. Notify owner's representative of any conflicts.

3.2 INSTALLATION

A. Install materials and systems in accordance with manufacturer's instructions and approved submittals and in proper relation with adjacent construction. Coordinate with work of other sections.

B. Excavate and backfill utility trenches as specified in Division 31 Section "Earth Moving" and the trench detail on the Drawings.

C. Clean and sterilize system in accordance with local authorities. Test for proper operation. Backfill and protect work from damage.

3.3 FIELD QUALITY CONTROL

A. Test new piping systems and parts of existing systems (that have been altered, extended, or repaired) for leaks and defects per pipe manufacturer's recommendations and requirements of local authorities having jurisdiction.

1. Do not enclose, cover, or put into service any piping systems before inspection and approval is obtained from the Engineer and the City.
2. Replace any defective areas found during inspections and testing and repeat the process until results are acceptable.
3. Project Completion Reports: Provide copies of test reports to the Owner's Representative, for each system or line, witnessed by either local authorities having jurisdiction or the Owner's testing agency per the test requirements.

END OF SECTION 33 11 00

SECTION 33 31 00 - SANITARY UTILITY SEWERAGE PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Operating underground, exterior sanitary sewer collection system including cleanouts, sewer conduits, manholes, frames, covers and gratings.

B. Related Sections:

1. **Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.**

1.2 SUBMITTALS

A. Product Data, Shop Drawings, and manufacturer's test reports.

B. Field Quality Control Test Repots.

1.3 QUALITY ASSURANCE

A. Provide products of acceptable manufacturers, which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Gravity Piping; Provide piping manufactured to the following materials list. Materials must also meet City Specifications:

1. Polyvinyl Chloride (PVC): ASTM. D-3034, SDR-35. (SDR-26 if required by local authority) utilizing elastomeric gasket joints.
2. Reinforced Concrete Pipe (RCP): AASHTO M-170 with bell and spigot rubber gasket type joints or ASTM C76 Class 3 (up to 15 feet diameter).

B. Pressure Piping:

1. Polyvinyl Chloride (PVC) (4 inches to 12 inches diameter): AWWA C900, DR 18 150 PSI rated.

    a. Basis of Design Product: Blue Brute.

C. Manholes: Precast concrete, ASTM C 478.

D. Manhole frames, covers, gratings, and steps: Grey cast-iron with service type cast in covers and gratings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Before commencing pipe installation, field verify building tie-in locations/inverts, tap locations/inverts, and all utilities crossings. Notify owner's representative of any conflicts.

3.2 INSTALLATION

A. Install materials and systems in accordance with manufacturer's instructions and approved submittals and in proper relation with adjacent construction. Coordinate with work of other sections.

B. Excavate and backfill utility trenches as specified in Division 31 Section "Earth Moving" and the trench detail on the Drawings.

C. Provide 12-inch (305-mm) thick, 12-inch (305-mm) by 5-inch (127-mm) concrete pad at cleanouts set in paving.

D. Test for proper operation. Clean out system and protect work from damage.

3.3 FIELD QUALITY CONTROL

A. Test new piping systems and parts of existing systems (that have been altered, extended, or repaired) for leaks and defects per pipe manufacturer's recommendations and requirements of local authorities having jurisdiction.

1. Do not enclose, cover, or put into service any piping systems before inspection and approval is obtained from the Engineer and the City.
2. Replace any defective areas found during inspections and testing and repeat the process until results are acceptable.
3. Project Completion Reports: Provide copies of test reports to the Owner's Representative, for each system or line, witnessed by either local authorities having jurisdiction or the Owner's testing agency per the test requirements.

B. Visual Inspection

1. After approximately 24 inches (610 mm) of backfill and after completion of final grade (paving or landscaping installed), inspect the interior pipe runs for alignment and deflection (less than 7-1/2 percent). Utilize lamps and mirrors if necessary.

C. Mandrel Testing

1. Conduct for all pipes under 30 inches (762 mm) in diameter and provide project completion reports witnessed by local authorities having jurisdiction or the Owner's testing agency.
2. Install and backfill pipe runs to subgrade elevation (preferably to final grade elevation) at least 30 days prior to mandrel testing.
3. Flush and clean lines prior to utilizing a 5-point mandrel of a size not less than 92.5 percent of the pipe diameter.

D. Pressure, Infiltration, or Exfiltration Testing

1. Preform tests as required by local authorities having jurisdiction or manufacturer and provide test reports witnessed by the local authority having jurisdiction or the Owner's testing agency.
2. For low pressure piping, at no time should the internal pipe pressure exceed PSI rating of pipe.
3. For pressure piping, do not exceed manufacturer's recommendations.

END OF SECTION 33 31 00

SECTION 334100 - STORM UTILITY DRAINAGE PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Gravity-flow, nonpressure storm drainage outside the building, with the following components:

   a. Precast catch basins / junction boxes.
   b. Precast concrete manholes.
   c. Cast in place inlet / outlet structures.

B. Related Sections:

1. **Section 016001 "Buy American Preference Requirements" for special product requirements. All equipment and materials must comply with 49 U.S.C. Section 50100.**

1.2 PERFORMANCE REQUIREMENTS

A. Gravity-Flow, Nonpressure, Drainage-Piping Pressure Rating: 10-foot head of water (30 kPa).

1.3 SUBMITTALS

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

B. Shop Drawings: For manholes and catch basins. Include plans, elevations, sections, details, and frames and covers.

C. Field quality-control test reports.

1.4 QUALITY ASSURANCE

A. Storm Sewer piping and installation shall conform to the standard specifications of the local water district requirements.

PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS

A. Polyvinyl Chloride (PVC): ASTM D 3034, SDR-35 (SDR-26 if required by local authority having jurisdiction) utilizing elastomeric gasket joints.

B. Reinforced Concrete Pipe (RCP): AASHTO M-170 with bell and spigot rubber gasket type joints or ASTM C76 (confirm class type with depth of pipe and traffic loads). Provide heavy duty RCP in paved areas when less than 2 feet of cover is available.

2.2 NONPRESSURE-TYPE PIPE COUPLINGS

A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined and corrosion-resistant-metal tension band and tightening mechanism on each end.

B. Sleeve Materials:

1. For Cast-Iron Soil Pipes: ASTM C 564, rubber.
2. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
3. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

C. Unshielded Flexible Couplings: Elastomeric sleeve with corrosion-resistant-metal tension band and tightening mechanism on each end.

D. Shielded Flexible Couplings: ASTM C 1460, elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.

E. Ring-Type Flexible Couplings: Elastomeric compression seal with dimensions to fit inside bell of larger pipe and for spigot of smaller pipe to fit inside ring.

2.3 CLEANOUTS

A. Gray-Iron Cleanouts: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.

1. Top-Loading Classification(s): Heavy duty.
2. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.

2.4 MANHOLES

A. Standard Precast Concrete Manholes: ASTM C 478 (ASTM C 478M), precast, reinforced concrete, of depth indicated, with provision for sealant joints.

2.5 CONCRETE

A. General: Cast-in-place concrete according to ACI 318/318R, ACI 350R, and the following:

1. Cement: ASTM C 150, Type II.
2. Fine Aggregate: ASTM C 33, sand.
3. Coarse Aggregate: ASTM C 33, crushed gravel.
4. Water: Potable.

B. Ballast and Pipe Supports: Portland cement design mix, 3000 psi (20.7 MPa) minimum, with 0.58 maximum water-cementitious materials ratio.

1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60 (420 MPa), deformed steel.

2.6 CATCH BASINS

A. Standard Precast Concrete Catch Basins: ASTM C 478 (ASTM C 478M), precast, reinforced concrete, of depth indicated, with provision for sealant joints.

B. Frames and Grates: ASTM A 536, Grade 60-40-18, ductile iron designed for A-16, structural loading. Include 24-inch (610-mm) ID by 7- to 9-inch (178- to 229-mm) riser with 4-inch (102-mm) minimum width flange, and 26-inch- (660-mm-) diameter flat grate with small square or short-slotted drainage openings.

1. Grate Free Area: Approximately 50 percent, unless otherwise indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Before commencing pipe installation, field verify building tie-in locations/inverts, tap locations/inverts, and all utilities crossings. Notify owner's representative of any conflicts.

3.2 PIPING INSTALLATION

A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.

B. Excavate and backfill utility trenches as specified in Division 31 Section "Earth Moving" and the trench detail on the Drawings.

C. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements.

D. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.

E. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.

F. Install gravity-flow, nonpressure drainage piping according to the following:

1. Install piping pitched down in direction of flow, at minimum slope of 2 percent, unless otherwise indicated.
2. Install piping NPS 6 (DN 150) and larger with restrained joints at tee fittings and at changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place-concrete supports or anchors.
3. Install piping below frost line.
4. Install hub-and-spigot, cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook."
5. Install PVC sewer piping according to ASTM D 2321 and ASTM F 1668.

G. Clear interior of piping and manholes of dirt and superfluous material as work progresses.

3.3 PIPE JOINT CONSTRUCTION

A. Where specific joint construction is not indicated, follow piping manufacturer's written instructions.

B. Join gravity-flow, nonpressure drainage piping according to the following:

1. Join hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.
2. Join hub-and-spigot, cast-iron soil piping with calked joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead and oakum calked joints.
3. Join PVC sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-gasket joints.
4. Join dissimilar pipe materials with nonpressure-type flexible couplings.

3.4 CLEANOUT INSTALLATION

A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts and cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.

1. Use heavy-duty, top-loading classification cleanouts in all areas.

B. Set cleanout frames and covers in earth in cast-in-place-concrete block, 18 by 18 by 12 inches (450 by 450 by 300 mm) deep.

C. Set cleanout frames and covers in concrete pavement with tops flush with pavement surface.

3.5 MANHOLE INSTALLATION

A. General: Install manholes, complete with appurtenances and accessories indicated.

B. Install precast concrete manhole sections with sealants according to ASTM C 891.

C. Set tops of frames and covers flush with finished surface of manholes that occur in pavements.

3.6 CATCH BASIN INSTALLATION

A. Set frames and grates to elevations indicated.

3.7 CONNECTIONS

A. Make connections to existing piping and underground manholes.

1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye fitting, plus 6-inch (150-mm) overlap, with not less than 6 inches (150 mm) of concrete with 28-day compressive strength of 3000 psi (20.7 MPa).

3.8 FIELD QUALITY CONTROL

A. Test new piping systems and parts of existing systems (that have been altered, extended, or repaired) for leaks and defects per pipe manufacturer's recommendations and requirements of local authorities having jurisdiction.

1. Do not enclose, cover, or put into service any piping systems before inspection and approval is obtained.
2. Replace any defective areas found during inspections and testing and repeat the process until results are acceptable.
3. Project Completion Reports: Provide copies of test reports to the Owner's Representative, for each system or line, witnessed by either local authorities having jurisdiction or the Owner's testing agency per the test requirements.

B. Visual Inspection

1. After approximately 24 inches (610 mm) of backfill and after completion of final grade (paving or landscaping installed), inspect the interior pipe runs for alignment and deflection (less than 7-1/2 percent). Utilize lamps and mirrors if necessary.
2. For pipes 30 inches (762 mm) in diameter and greater, project completion reports may consist of visual and interior measurements (conducted under proper safety guidelines) that are witnessed by local authorities or the owner's testing agency. Reports must indicate that any pipe deflection is less than 7-1/2 percent of the pipe diameter.

C. Mandrel Testing

1. Conduct for all pipes under 30 inches (762 mm) in diameter and provide project completion reports witnessed by local authorities having jurisdiction or the Owner's testing agency.
2. Install and backfill pipe runs to subgrade elevation (preferably to final grade elevation) at least 30 days prior to mandrel testing.
3. Flush and clean lines prior to utilizing a 5-point mandrel of a size not less than 92.5 percent of the pipe diameter.

D. Pressure, Infiltration, or Exfiltration Testing

1. Preform tests as required by local authorities having jurisdiction or manufacturer and provide test reports witnessed by the local authority having jurisdiction or the Owner's testing agency.
2. For low pressure piping, at no time should the internal pipe pressure exceed PSI rating of pipe.

E. For pressure piping, do not exceed manufacturer's recommendations.

END OF SECTION 33 41 00