

SPECIFICATIONS AND CONTRACT DOCUMENTS



BILL AND HILLARY
CLINTON NATIONAL AIRPORT
LITTLE ROCK

ABP FIRE SUPPRESSION IMPROVEMENTS

LIT PROJECT NO. 231000
GARVER PROJECT NO. 21A10111

ISSUED FOR BID

Prepared For:

Little Rock Municipal Airport Commission

May 2025



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00 00 01 CERTIFICATIONS

**ABP FIRE SUPPRESSION IMPROVEMENTS
GARVER PROJECT NO. 21A10111
LITTLE ROCK MUNICIPAL AIRPORT COMMISSION PROJECT NO. LIT PROJECT
NO. 231000**

I hereby certify that the applicable portions of this project plans and specifications were prepared by me or under my direct supervision and that I am a duly Licensed Engineer under the laws of the State of Arkansas.

SEAL AND SIGNATURE

**APPLICABLE DIVISION OR
PROJECT RESPONSIBILITY**



Joe Kaminski, P.E.





Digitally Signed: May 2, 2025

Fire Suppression Systems

Bill and Hillary Clinton National Airport (LIT)
ABP Fire Suppression Improvements

SEAL AND SIGNATURE	APPLICABLE DIVISION OR PROJECT RESPONSIBILITY
<p>Hilton Hoover, P.E.</p>  <p>Digitally Signed: May 2, 2025</p>	<p>Electrical Emergency Power Systems</p>
<p>Kim Koch, P.E.</p>  <p>Digitally Signed: May 2, 2025</p>	<p>Natural Gas Plumbing</p>

Bill and Hillary Clinton National Airport (LIT)
ABP Fire Suppression Improvements

SEAL AND SIGNATURE	APPLICABLE DIVISION OR PROJECT RESPONSIBILITY
<p>Nicholas Holland, P.E.</p>  <p>Digitally Signed: May 2, 2025</p>	<p>Electrical Emergency Power Systems Fire Alarm Systems</p>
<p>Wallie Sprick, A.I.A.</p>  <p>Digitally Signed: May 2, 2025</p>	<p>Architectural</p>

GARVER, LLC CERTIFICATE OF AUTHORIZATION:

AR ARCHITECTURAL COA NO. LL111



Expiration Date: December 31, 2025

ABP FIRE SUPPRESSION IMPROVEMENTS

00 01 10 TABLE OF CONTENTS

CONTRACT DOCUMENTS AND GENERAL REQUIREMENTS

BIDDING REQUIREMENTS

00 00 01	CERTIFICATIONS
00 01 10	TABLE OF CONTENTS
00 11 00	ADVERTISEMENT FOR BIDS
00 21 00	INSTRUCTIONS TO BIDDERS
00 22 13	BIDDER'S CHECKLIST OF REQUIRED ITEMS
00 41 00	BID FORM
00 43 13	BID BOND
00 43 36	LIST OF PROPOSED SUBCONTRACTORS
00 43 43	WAGE RATES
00 45 13	QUALIFICATIONS STATEMENT
00 45 39	DBE PARTICIPATION REPORTING

CONTRACT DOCUMENTS

00 51 00	NOTICE OF AWARD
00 52 00	CONTRACT BETWEEN OWNER AND CONTRACTOR FOR CONSTRUCTION
	CONTRACT
00 55 00	NOTICE TO PROCEED
00 61 13	PERFORMANCE BOND
00 61 16	PAYMENT BOND
00 65 16	CERTIFICATE OF SUBSTANTIAL COMPLETION

CONDITIONS OF THE CONTRACT

00 72 00	FAA GENERAL PROVISIONS
00 73 00	SPECIAL PROVISIONS

SUPPLEMENTAL SPECIFICATIONS

SS-302	ALLOWANCES
--------	------------

TECHNICAL SPECIFICATIONS

01 33 00	SUBMITTAL AND SUBSTITUTION PROCEDURES
01 73 29	CUTTING AND PATCHING
01 74 23	FINAL CLEANING
02 41 19	SELECTIVE STRUCTURE DEMOLITION
03 30 00	CAST-IN-PLACE CONCRETE
05 40 00	COLD FORMED METAL FRAMING
07 21 00	THERMAL INSULATION
07 84 00	FIRESTOPPING
07 92 00	JOINT SEALANTS
08 11 13	HOLLOW METAL DOORS AND FRAMES
08 33 00	COILING DOORS AND GRILLES
08 80 00	GLAZING
09 21 16	GYPSUM BOARD ASSEMBLIES
09 51 00	ACOUSTICAL CEILINGS
09 65 13	RESILIENT BASE AND ACCESSORIES
09 91 00	PAINTING
21 13 13	WET PIPE SPRINKLER SYSTEMS
21 13 16	PREACTION SPRINKLER SYSTEMS
21 13 39	LOW EXPANSION FOAM-WATER SYSTEMS
21 13 40	HIGH EXPANSION FOAM-WATER SYSTEMS
21 31 13	ELECTRIC-DRIVE, CENTRIFUGAL FIRE PUMPS
22 00 00	SUPPLEMENTARY PLUMBING GENERAL CONDITIONS
22 10 05	PLUMBING PIPING
26 00 00	SUPPLEMENTARY ELECTRICAL GENERAL CONDITIONS
26 05 19	LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES
26 05 26	GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS
26 05 29	HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS
26 05 33.13	CONDUIT FOR ELECTRICAL SYSTEMS
26 05 33.16	BOXES FOR ELECTRICAL SYSTEMS
26 05 48	VIBRATION AND SIESMIC CONTROLS FOR ELECTRICAL SYSTEMS
26 05 53	IDENTIFICATION FOR ELECTRICAL SYSTEMS
26 05 83	WIRING CONNECTIONS
26 22 00	LOW-VOLTAGE TRANSFORMERS
26 24 16	PANELBOARDS
26 27 26	WIRING DEVICES
26 28 16.16	ENCLOSED SWITCHES
26 32 13	ENGINE GENERATORS
26 36 00	TRANSFER SWITCHES
28 46 21.11	ADDRESSABLE FIRE-ALARM SYSTEMS

LITTLE ROCK MUNICIPAL AIRPORT COMMISSION
Little Rock, Arkansas
ABP FIRE SUPPRESSION IMPROVEMENTS
LIT PROJECT NO. 231000

00 11 00 ADVERTISEMENT FOR BIDS

Sealed bids for **ABP FIRE SUPPRESSION IMPROVEMENTS**, to be constructed for **LITTLE ROCK MUNICIPAL AIRPORT COMMISSION** will be received at the Bill and Hillary Clinton National Airport, 1 Airport Road, Little Rock, Arkansas 72202, until **2:00PM** on **WEDNESDAY, JUNE 4, 2025**, at which time the bids shall be publicly opened and read aloud. Sealed bids submitted prior to the bid opening may be sent to the Bill and Hillary Clinton National Airport, ATTN: David Finnie, 1 Airport Road, Little Rock, Arkansas 72202.

An **Optional** Pre-Bid Conference will be held on **Thursday, May 15, 2025 at 2:00PM** in the **Clinton Conference Room**, located on the 2nd floor of the Bill and Hillary Clinton National Airport Terminal Building. If necessary, Information regarding the virtual meeting will be sent out to all plan holders one week prior to the meeting time. Each bidder shall be limited to three personnel per organization.

The Project consists of installation of new fire suppression systems for the existing Airport Business Park and Hangars, 200N, 200S, 300, 400, and 500, including new emergency systems backup natural gas generators, and fire alarm and architectural improvements to the buildings for the new suppression equipment. This project will also include replacement of pumps and electrical equipment in B1000 (pump house) serving sprinkler water to each hangar and electrical improvements for B100 office building adjacent to the hangars.

Bids will be received for a single prime contract. Bids shall be on a lump sum and unit price basis as indicated in the Bid Form.

Digital copies of the bid documents are available at <http://Planroom.GarverUSA.com> for a fee of \$22. These documents may be downloaded by selecting this Project from the "Plan Room" link, and by entering Quest Project Number 9674674 on the "Browse Projects" page. **Addendums to the bid package will be issued through the Garver online Plan Holders List; therefore, all Bidders shall be responsible for downloading the bid documents from the Garver online plan room to be included in the Plan Holders List. Bidders must enter the addenda numbers in Article 3.01 of the Bid Form to verify receipt.**

Bids shall be accompanied by a bid security in accordance with the Instructions to Bidders. The successful Bidder must furnish Performance and Payment Bonds in accordance with the Contract Documents.

All Bidders shall make good faith efforts, as defined by Appendix A of 49 CFR Part 26, Regulations of the Office of the Secretary of Transportation, to subcontract a minimum of 18% of the dollar value of the prime contract to small business concerns owned and controlled by socially and economically disadvantaged individuals DBE).

Bidders must be licensed to perform work within the state of **Arkansas**.

Civil Rights Title VI Assurance

The **LITTLE ROCK MUNICIPAL AIRPORT COMMISSION**, in accordance with the provisions of Title VI of the Civil Rights Act of 1964 (78 Stat. 252, 42 USC §§ 2000d to 2000d-4) and the Regulations, hereby notifies all Bidders that it will affirmatively ensure that any Contract entered into pursuant to this advertisement, disadvantaged business will be afforded full and fair opportunity to submit bids in response to this invitation and no businesses will be discriminated against on the grounds of race, color, national origin (including limited English proficiency), creed, age, or disability in consideration for an award.

Bill and Hillary Clinton National Airport (LIT)

ABP Fire Suppression Improvements

Bids must remain in effect for **90** days after the bid opening date. Within **90** days from the bid date, the Owner may award the contract to the lowest responsive, responsible Bidder or reject any or all Bids for the Project.

The **LITTLE ROCK MUNICIPAL AIRPORT COMMISSION** reserves the right to reject any or all Bids, to waive irregularities in the Bids and bidding deemed to be in the best interests of the **LITTLE ROCK MUNICIPAL AIRPORT COMMISSION**, and to reject nonconforming, nonresponsive, or conditional bids.

Owner: **LITTLE ROCK MUNICIPAL AIRPORT COMMISSION**

By: **David Finnie**

Title: **Manager of Design and Construction**

Date: **May 4, 2025**

This publication was paid for by the Little Rock Municipal Airport Commission. The amount to be paid for this publication is \$584.04.

END OF ADVERTISEMENT FOR BIDS

00 21 00 INSTRUCTIONS TO BIDDERS

ARTICLE 1 – DEFINED TERMS

- 1.01 Terms used in these Instructions to Bidders not otherwise defined have the meanings indicated in the General Provisions. Additional terms used in these Instructions to Bidders have the meanings indicated below which are applicable to both the singular and plural thereof:
- A. *Successful Bidder* – The lowest responsible Bidder submitting a responsive Bid to whom Owner (on the basis of Owner's evaluation as hereinafter provided) makes an award.
 - B. *Issuing Office* – The office from which the Bidding Documents are to be issued.

ARTICLE 2 – COPIES OF BIDDING DOCUMENTS

- 2.01 Complete sets of the Bidding Documents may be obtained from the Issuing Office in the number and format stated in the advertisement or invitation to bid.
- 2.02 Complete sets of Bidding Documents shall be used in preparing Bids; neither Owner nor Engineer assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.
- 2.03 Owner and Engineer, in making copies of Bidding Documents available on the above terms, do so only for the purpose of obtaining Bids for the Work and do not authorize or confer a license for any other use.

ARTICLE 3 – QUALIFICATIONS OF BIDDERS

- 3.01 To demonstrate Bidder's qualifications to perform the Work, Bidder shall submit written evidence establishing its qualifications such as financial data, previous experience, and present commitments, as detailed in Section 00 45 13 Qualifications Statement, which must be completed in ink and returned for evaluation with the Bid, along with any Owner required documentation.
- 3.02 The criteria which will be used to determine the lowest responsive and responsible Bidder are as follows:
- A. Responsive Bidder: Means a Bidder who has submitted a Bid which conforms in all material respects to the Bidding Documents.
 - B. Responsible Bidder: Means a Bidder who has the capacity and capability in all respects to perform fully the contract requirements and who has the integrity and reliability to assure good faith performance. Among factors to be considered in determining whether the Bidder meets these standards, are:
 - 1. financial, material, equipment, facility, and personnel resources and expertise necessary to meet contractual requirements;
 - 2. a record of integrity;
 - 3. a record of successful completion, defined as, completion of a project within a reasonable time and budget;
 - 4. qualified legally to contract with the Owner, and;
 - 5. has not failed to supply any necessary information in connection with the inquiry concerning responsibility.
- 3.03 A Bidder's failure to submit required qualification information within the times indicated may disqualify Bidder from receiving an award of the Contract.

- 3.04 No requirement in this Article 3 to submit information will prejudice the right of Owner to seek additional pertinent information regarding Bidder's qualifications.
- 3.05 Bidder is advised to carefully review those portions of the Bid Form requiring Bidder's representations and certifications.

ARTICLE 4 – SITE AND OTHER AREAS; EXISTING SITE CONDITIONS; EXAMINATION OF SITE; OWNER'S SAFETY PROGRAM; OTHER WORK AT THE SITE

4.01 *Site and Other Areas*

- A. The Project site is identified in the Bidding Documents. By definition, the "Site" includes rights-of-way, easements, and other lands furnished by Owner for the use of the Contractor. Any additional lands required for temporary construction facilities, construction equipment, or storage of materials and equipment, and any access needed for such additional lands, are to be obtained and paid for by Contractor.

4.02 *Existing Site Conditions*

- A. Subsurface and Physical Conditions; Hazardous Environmental Conditions
1. The Special Provisions identify:
 - a. those reports known to Owner of explorations and tests of subsurface conditions at or adjacent to the Site.
 - b. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities).
 - c. reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site.
 - d. Technical Data contained in such reports and drawings.
 2. Owner will make pdf digital copies of reports and drawings referenced above available to any Bidder on request. These reports and drawings are not part of the Contract Documents, but the Technical Data contained therein upon whose accuracy Bidder is entitled to rely, as provided in the General Provisions, has been identified and established in the Special Provisions. Bidder is responsible for any interpretation or conclusion Bidder draws from any Technical Data or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.
 3. If the Special Provisions do not identify Technical Data, the default definition of Technical Data set forth in Section 10 of the General Provisions will apply.
- B. Underground Facilities: Information and data shown or indicated in the Bidding Documents with respect to existing Underground Facilities at or contiguous to the Site are set forth in the Contract Documents and are based upon information and data furnished to Owner and Engineer by owners of such Underground Facilities, including Owner, or others.
- C. Adequacy of Data: Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to subsurface conditions, other physical conditions, and Underground Facilities, and possible changes in the Bidding Documents due to differing or unanticipated subsurface or physical conditions appear in the Special Provisions. Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to a Hazardous Environmental Condition at the Site, if any, and possible changes in the Contract Documents due to any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in the Plans or Specifications or identified in the Contract Documents to be within the scope of the Work, appear in the Special Provisions.

Bill and Hillary Clinton National Airport (LIT)
ABP Fire Suppression Improvements

4.03 *Site Visit and Testing by Bidders*

- A. Bidder shall conduct Site visit(s) by appointment, during normal working hours, and shall not disturb any ongoing operations at the Site.
- B. Bidder is not required to conduct any subsurface testing of Site conditions.
- C. On request, and to the extent Owner has control over the Site, and schedule permitting, the Owner will provide Bidder access to the Site to conduct such additional examinations, investigations, explorations, tests, and studies as Bidder deems necessary for preparing and submitting a successful Bid. Owner will not have any obligation to grant such access if doing so is not practical because of existing operations, security or safety concerns, or restraints on Owner's authority regarding the Site.
- D. Bidder shall comply with all applicable laws and regulations regarding excavation and location of utilities, obtain all permits, and comply with all terms and conditions established by Owner or by property owners or other entities controlling the Site with respect to schedule, access, existing operations, security, liability insurance, and applicable safety programs.
- E. Bidder shall fill all holes and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies.

4.04 *Owner's Safety Program*

- A. If applicable, Site visits and work at the Site will be governed by an Owner safety program. If an Owner safety program exists, it will be noted in the Special Provisions.

4.05 *Other Work at the Site*

- A. Reference is made to Section 70-04 of the General Provisions for the identification of the general nature of other work that is to be performed at the Site by Owner or others (such as utilities and other prime contractors) that relates to the Work for which a Bid is to be submitted. On request, Owner will provide to each Bidder for examination access to or copies of contract documents (other than portions thereof related to price) for such other work.

ARTICLE 5 – BIDDER'S REPRESENTATIONS

5.01 It is the responsibility of each Bidder before submitting a Bid to:

- A. Examine and carefully study the Bidding Documents, and any data and reference items identified in the Bidding Documents;
- B. Visit the Site, conduct a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and satisfy itself as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work;
- C. Become familiar with and satisfy itself as to all laws and regulations that may affect cost, progress, and performance of the Work;
- D. Carefully study all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Special Provisions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Special Provisions, especially with respect to Technical Data in such reports and drawings;
- E. Consider the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods,

- techniques, sequences, and procedures of construction to be employed by Bidder; and (3) Bidder's safety precautions and programs;
- F. Agree, based on the information and observations referred to in the preceding paragraph, that at the time of submitting its Bid no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of its Bid for performance of the Work at the price bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents;
 - G. Become aware of the general nature of the work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents;
 - H. Promptly give Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder discovers in the Bidding Documents and confirm that the written resolution thereof by Engineer is acceptable to Bidder;
 - I. Determine that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance and furnishing of the Work; and
 - J. Agree that the submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents and applying any specific means, methods, techniques, sequences, and procedures of construction that may be shown or indicated or expressly required by the Bidding Documents, that Bidder has given Engineer written notice of all conflicts, errors, ambiguities, and discrepancies that Bidder has discovered in the Bidding Documents and the written resolutions thereof by Engineer are acceptable to Bidder, and that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work.

ARTICLE 6 – PRE-BID CONFERENCE

- 6.01 An optional pre-Bid conference will be held at the date and time identified in the Advertisement for Bids and addenda as appropriate. Representatives of Owner and Engineer will be present to discuss the Project. Bidders should attend and participate in the conference. Engineer will transmit to all prospective Bidders of record such addenda as Engineer considers necessary in response to questions arising at the conference. Oral statements may not be relied upon and will not be binding or legally effective.

ARTICLE 7 – INTERPRETATIONS AND ADDENDA

- 7.01 All questions about the meaning or intent of the Bidding Documents are to be submitted to Engineer in writing. Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by addenda delivered to all parties recorded as having received the Bidding Documents. Questions received less than forty-eight (48) hours prior to the date for opening of Bids may not be answered. Only questions answered by addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.
- 7.02 Addenda may be issued to clarify, correct, supplement, or change the Bidding Documents. The final addenda shall be issued at a minimum of twenty-four (24) hours prior to the opening of bids' date and time.

ARTICLE 8 – BID SECURITY

- 8.01 A Bid must be accompanied by bid security made payable to Owner in an amount of **5 percent** of Bidder's maximum Bid price (determined by adding the base bid and all alternates) and in the form of a cashier's or certified check, or a Bid bond (on the form included in the Bidding Documents) issued by a surety meeting requirements acceptable to the owner.

- 8.02 The Bid security of the apparent Successful Bidder will be retained until Owner awards the Contract to such Bidder, and such Bidder has executed the Contract Documents, furnished the required Contract security, and met the other conditions of the Notice of Award, whereupon the Bid security will be released. If the Successful Bidder fails to execute and deliver the Contract Documents and furnish the required Contract security within 15 days after the Notice of Award, Owner may consider Bidder to be in default, annul the Notice of Award, and the Bid security of that Bidder will be forfeited. Such forfeiture shall be Owner's exclusive remedy if Bidder defaults as set forth in this Section 8.02.
- 8.03 The Bid security of other Bidders that Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of seven days after the Effective Date of the Contract or **61** days after the Bid opening, whereupon Bid security furnished by such Bidders will be released.
- 8.04 Bid security of other Bidders that Owner believes do not have a reasonable chance of receiving the award will be released within seven days after the Bid opening.

ARTICLE 9 – CONTRACT TIMES

- 9.01 The number of days within which, or the dates by which, milestones are to be achieved and the Work is to be substantially completed and ready for final payment are set forth in the Contract.

ARTICLE 10 – LIQUIDATED DAMAGES

- 10.01 Provisions for liquidated damages, if any, for failure to timely attain a milestone, substantial completion, or completion of the Work in readiness for final payment, are set forth in the Contract.

ARTICLE 11 – SUBSTITUTE AND “OR-EQUAL” ITEMS

- 11.01 See Section 60-03 of the General Provisions.
- 11.02 All prices that Bidder sets forth in its Bid shall be based on the presumption that the Contractor will furnish the materials and equipment specified or described in the Bidding Documents, as supplemented by addenda. Any assumptions regarding the possibility of post-Bid approvals of “or-equal” or substitution requests are made at Bidder's sole risk.

ARTICLE 12 – SUBCONTRACTORS, SUPPLIERS, AND OTHERS

- 12.01 Bidders shall submit Section 00 43 36, List of Proposed Subcontractors with the Bid, for prior approval of the Owner.
- If requested by Owner, before executing any subcontract, and within three (3) days after Bid opening, the apparent Successful Bidder, and any other Bidder so requested, shall submit an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such subcontractor, supplier, or other individual or entity. If Owner or Engineer, after due investigation, has reasonable objection to any proposed subcontractor, supplier, individual, or entity, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit an acceptable substitute, in which case apparent Successful Bidder shall submit a substitute, Bidder's Bid price will be increased (or decreased) by the difference in cost occasioned by such substitution, and Owner may consider such price adjustment in evaluating Bids and making the Contract award. Declining to make requested substitutions will **not** constitute grounds for forfeiture of the Bid security of any Bidder.
- 12.02 If apparent Successful Bidder declines to make any such substitution, Owner may award the Contract to the next lowest Bidder that proposes to use acceptable subcontractors, suppliers, or other individuals or entities.

- 12.03 The quantities of work or material stated in unit price items of the Bid are supplied only to give an indication of the general scope of the Work; the Owner does not expressly or by implication agree that the actual amount of work or material will correspond therewith.

ARTICLE 13 – PREPARATION OF BID

- 13.01 The Bid Form is included with the Bidding Documents.
- A. All blanks on the Bid Form shall be completed either in ink or type and the Bid Form signed in ink. Erasures or alterations shall be initialed in ink by the person signing the Bid Form. A Bid price shall be indicated for each section, Bid item, alternate, adjustment unit price item, and unit price item listed therein.
 - B. If the Bid Form expressly indicates that submitting pricing on a specific alternate item is optional, and Bidder elects to not furnish pricing for such optional alternate item, then Bidder may enter the words “No Bid” or “Not Applicable.”
 - C. A conditional Bid will not be considered.
- 13.02 A Bid by a corporation or partnership shall be executed in the corporate or partnership name by an officer (whose title must appear under the signature), accompanied by evidence of authority to sign. The corporate or partnership address and state of incorporation shall be shown. The corporate seal shall be affixed and attested by the corporate secretary or an assistant corporate secretary.
- 13.03 A Bid by a limited liability company shall be executed in the name of the firm by a member or other authorized person and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm shall be shown.
- 13.04 A Bid by an individual shall show the Bidder’s name and official address.
- 13.05 A Bid by a joint venture shall be executed by an authorized representative of each joint venture partner in the manner indicated on the Bid Form. The official address of the joint venture shall be shown.
- 13.06 All names shall be printed in ink below the signatures.
- 13.07 The Bid shall contain an acknowledgment of receipt of all addenda, the numbers of which shall be filled in on the Bid Form.
- 13.08 Postal and e-mail addresses and telephone number for communications regarding the Bid shall be shown.
- 13.09 The Bid shall contain evidence of Bidder’s authority and qualification to do business in the state where the Project is located, or Bidder shall covenant in writing to obtain such authority and qualification prior to award of the Contract and attach such covenant to the Bid. Bidder’s state contractor license number, if any, shall also be shown on the Bid Form.

ARTICLE 14 – BASIS OF BID

- 14.01 Lump Sum
- A. Bidders shall submit a Bid on a lump sum basis as set forth in the Bid Form.
- 14.02 Allowances
- A. For cash allowances the Bid price shall include such amounts as the Owner deems proper for Contractor’s overhead, costs, profit, and other expenses on account of cash allowances, if any, named in the Contract Documents.

ARTICLE 15 – SUBMITTAL OF BID

- 15.01 The Bid Form is to be completed and submitted with the Bid security and the other documents required to be submitted under the terms of Article 7 of the Bid Form.
- 15.02 A Bid shall be received no later than the date and time prescribed and at the place indicated in the advertisement or invitation to bid and shall be enclosed in a plainly marked package with the Project title and number(s) (and, if applicable, the designated portion of the Project for which the Bid is submitted), the name and address of Bidder, and shall be accompanied by the Bid security and other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid shall be enclosed in a separate package plainly marked on the outside with the notation "BID ENCLOSED." The Bidders name and return address shall be plainly marked on the package. Mailed Bid shall be addressed to The Bill and Hillary Clinton National Airport, ATTN: David Finnie, 1 Airport Drive, Little Rock, Arkansas 72202.
- 15.03 Bids received after the date and time prescribed for the opening of bids, or not submitted at the correct location or in the designated manner, will not be accepted and will be returned to the Bidder unopened.

ARTICLE 16 – MODIFICATION AND WITHDRAWAL OF BID

- 16.01 A Bid may be withdrawn by an appropriate document duly executed in the same manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids. Upon receipt of such notice, the unopened Bid will be returned to the Bidder.
- 16.02 If a Bidder wishes to modify its Bid prior to Bid opening, Bidder must withdraw its initial Bid in the manner specified in Paragraph 16.01 and submit a new Bid prior to the date and time for the opening of Bids.
- 16.03 If within 24 hours after Bids are opened any Bidder files a duly signed written notice with Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that there was a material and substantial mistake in the preparation of its Bid, that Bidder may withdraw its Bid, and the Bid security will be returned. Thereafter, if the Work is rebid, that Bidder may be disqualified from further bidding on the Work, at the discretion of the Owner.

ARTICLE 17 – OPENING OF BIDS

- 17.01 Bids will be opened at the time and place indicated in the Advertisement to bid and, unless obviously non-responsive, read aloud publicly. An abstract of the amounts of the base Bids and major alternates, if any, will be made available to Bidders after the opening of Bids.

ARTICLE 18 – BIDS TO REMAIN SUBJECT TO ACCEPTANCE

- 18.01 All Bids will remain subject to acceptance for the period of time stated in the Bid Form, but Owner may, in its sole discretion, release any Bid and return the Bid security prior to the end of this period.

ARTICLE 19 – EVALUATION OF BIDS AND AWARD OF CONTRACT

- 19.01 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner will reject the Bid of any Bidder that Owner finds, after reasonable inquiry and evaluation, to not be responsible. If Bidder purports to add terms or conditions to its Bid, takes exception to any provision of the Bidding Documents, or attempts to alter the contents of the Contract Documents for purposes of the Bid, then the Owner will reject the Bid as nonresponsive. Owner also reserves the right to waive technicalities, if such waiver is in the best interest of the Owner and is in conformance with applicable state and local laws or regulations

Bill and Hillary Clinton National Airport (LIT)
ABP Fire Suppression Improvements

pertaining to the letting of construction contracts; advertise for new Bids; or proceed with the work otherwise.

- 19.02 If Owner awards the contract for the Work, such award shall be to the responsible Bidder submitting the lowest responsive Bid.
- 19.03 Evaluation of Bids
- A. In evaluating Bids, Owner will consider whether or not the Bids comply with the prescribed requirements, and such alternates, unit prices, and other data, as may be requested in the Bid Form or prior to the Notice of Award.
 - B. For the determination of the apparent low Bidder when unit price bids are submitted, Bids will be compared on the basis of the total of the products of the estimated quantity of each item and unit price Bid for that item, together with any lump sum items.
- 19.04 In evaluating whether a Bidder is responsible, Owner will consider the qualifications of the Bidder and may consider the qualifications and experience of subcontractors and suppliers proposed for those portions of the Work for which the identity of subcontractors and suppliers must be submitted as provided in the Bidding Documents.
- 19.05 Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders and any proposed subcontractors or suppliers.
- 19.06 More than one Bid for the same Work from an individual or entity under the same or different names will not be considered. Reasonable grounds for believing that any Bidder has an interest in more than one Bid for the Work may be cause for disqualification of that Bidder and the rejection of all Bids in which that Bidder has an interest.
- 19.07 If the Contract is to be awarded, Owner will award the Contract to the Bidder whose Bid is in the best interests of the Owner.
- 19.08 Unless otherwise indicated, a single award will not be made for less than all the Bid Items of an individual Bid schedule. In the event the Work is contained in more than one Bid schedule, the Owner may award schedules individually or in combination. In the case of two or more Bid schedules which are alternative to each other, only one of such alternative schedules will be awarded.

ARTICLE 20 – BONDS AND INSURANCE

- 20.01 Section 30-05 of the General Provisions, as may be modified by the Special Provisions, sets forth Owner's requirements as to performance, payment, bonds and insurance. When the Successful Bidder delivers the Contract (executed by Successful Bidder) to Owner, it shall be accompanied by required bonds and insurance documentation.

ARTICLE 21 – SIGNING OF CONTRACT

- 21.01 When Owner issues a Notice of Award to the Successful Bidder, it shall be accompanied by the unexecuted counterparts of the Contract along with the other Contract Documents as identified in the Contract. Within 15 days thereafter, Successful Bidder shall execute and deliver the required number of counterparts of the Contract (and any bonds and insurance documentation required to be delivered by the Contract Documents) to Owner. The Owner shall deliver one fully executed counterpart of the Contract to Successful Bidder, together with printed and electronic copies of the Contract Documents as stated in Section 50-05 of the General Provisions.

ARTICLE 22 – SALES AND USE TAXES

- 22.01 The project **Owner** is not exempt from Arkansas state sales and use taxes on materials and equipment to be incorporated in the Work. Said taxes shall be included in the Bid.

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ABP Fire Suppression Improvements

ARTICLE 23 – RETAINAGE

23.01 Provisions concerning Contractor's rights to deposit securities in lieu of retainage are set forth in the Section 90-06 of the General Provisions.

ARTICLE 24 – CONTRACTS TO BE ASSIGNED

24.01 Not Used

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END OF INSTRUCTIONS TO BIDDERS

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00 22 13 BIDDER'S CHECKLIST OF REQUIRED ITEMS

This Bidder's Checklist is provided to ensure all required forms are completed and returned as part of the Bid submission. All forms must be included as indicated for a Bid to be considered a complete, responsive Bid. Appropriate signatures and date are required on each document. If an item is missing, the Bid may be declared unresponsive and therefore rejected as further set forth in the Instructions to Bidders. **This sheet will serve as the cover sheet for the Bid submission.**

	Completed*	Spec. Section
Acknowledgement of All Addenda	<input type="checkbox"/>	00 41 00
Bid contains the following forms:		
1. Bid Form/Proposal	<input type="checkbox"/>	00 41 00
2. Bid Bond	<input type="checkbox"/>	00 43 13
3. List of Proposed Subcontractors	<input type="checkbox"/>	00 43 36
4. Qualifications Statement	<input type="checkbox"/>	00 45 13
5. DBE Participation Reporting	<input type="checkbox"/>	00 45 39
6. Bidder Certifications	<input type="checkbox"/>	00 45 46
*Check when filled out, signed, and included with submission of bid packet.		

Within three (3) days after Bid Opening:

Bidder acknowledges to provide within three (3) days after Bid Opening (Low Bidder Only):

1. Bidder's Qualifications of Subcontractor (if requested)
2. Bidder's Safety Records (if requested)

Within fifteen (15) days after Notice of Award:

Bidder acknowledges that within fifteen (15) days after Notice of Award, Successful Contractor is required to complete the following before execution and award of the Contract:

1. Section 00 52 00, Agreement (all pages and supporting documents)
2. Section 00 61 13, Performance Bond
3. Section 00 61 16, Payment Bond
4. Completed Certificates of Insurance

Prior to Construction (Awarded Contractor):

1. Construction Schedule - before preconstruction conference
2. Contractor Safety Plan Compliance Documents (SPCD)

Bill and Hillary Clinton National Airport (LIT)

ABP Fire Suppression Improvements

Seal (if incorporated)

Bidder Name: _____

Address: _____

City, State, Zip Code: _____

Contractor Number: _____

Contact Name: _____

Title: _____

Contact Number: _____

Contact Email: _____

Signature of Authorized Agent for Bidder: _____

Date: _____

00 41 00 BID FORM

ARTICLE 1 – BID RECIPIENT

1.01 This Bid is submitted to:

**LITTLE ROCK MUNICIPAL AIRPORT COMMISSION
1 AIRPORT DRIVE, LITTLE ROCK, ARKANSAS 72202**

1.02 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 2 – BIDDER'S ACKNOWLEDGEMENTS

2.01 Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for **90** days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

2.02 In submitting this Bid, Bidder acknowledges and accepts Contractor's representations as more fully set forth in the Contract.

2.03 In submitting this Bid, Bidder certifies Bidder is qualified to do business in the State of Arkansas as required by laws, rules and regulations or, if allowed by statute, covenants to obtain such qualification prior to contract award.

ARTICLE 3 – BIDDER'S REPRESENTATIONS

3.01 In submitting this Bid, Bidder represents that:

A. Bidder has examined and carefully studied the Bidding Documents, and any data and reference items identified in the Bidding Documents, and hereby acknowledges receipt of the following addenda:

Addendum No.

Addendum, Date

B. Bidder has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and satisfied itself as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

C. Bidder is familiar with and has satisfied itself as to all laws and regulations that may affect cost, progress, and performance of the Work.

D. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Special Provisions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site

that have been identified in the Special Provisions, especially with respect to Technical Data in such reports and drawings.

- E. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and any Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder; and (3) Bidder's safety precautions and programs.
- F. Bidder agrees, based on the information and observations referred to in the preceding paragraph, that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.
- G. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
- H. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and confirms that the written resolution thereof by Engineer is acceptable to Bidder.
- I. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance and furnishing of the Work.
- J. The submission of this Bid constitutes an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, and that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.
- K. The submission of the Bid constitutes that applicable sales taxes are included in the stated Bid prices for the work, unless provision is made herein for the bidder to separately itemize the estimated amount of sales tax.
- L. By submitting a bid/proposal under this solicitation, the Bidder understands that the bid/proposal is subjected to the Davis-Bacon Act, including prevailing wage rates, and the Contract Work hours and Safety Standards Act.
- M. By submitting a bid/proposal, the Bidder understands that the bid/proposal is subjected to the Federal Aviation Administration requirements referenced in the Special Provisions..

ARTICLE 4 – BIDDER'S CERTIFICATION

4.01 Bidder certifies that:

- A. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation;
- B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid;
- C. Bidder has not solicited or induced any individual or entity to refrain from bidding; and
- D. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 4.01.D:
 - 1. "corrupt practice" means the offering, giving, receiving, or soliciting of any thing of value likely to influence the action of a public official in the bidding process;

ABP Fire Suppression Improvements

2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels; and
4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

ARTICLE 5 – BASIS OF BID

- 5.01 Bidder acknowledges that (1) each Bid unit price includes an amount considered by Bidder to be adequate to cover Contractor's overhead and profit for each separately identified item, and (2) estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all unit price Bid items will be based on actual quantities, determined as provided in the Contract Documents.
- 5.02 Bidder will complete the Work in accordance with the Contract Documents for the enclosed prices.
- 5.03 BID ALTERNATES
 - A. Not used.
- 5.04 BID SCHEDULES
 - A. Not used.

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ABP Fire Suppression Improvements

BILL AND HILLARY CLINTON NATIONAL AIRPORT
ABP FIRE SUPPRESSION IMPROVEMENTS
UNIT PRICES

ITEM NO.	SPEC. NO.	DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE	BID AMOUNT
1	DIV 26	Electrical Modifications - Building 100	LS	100%		
2	DIV 09	Architectural Modifications - Building 200 North	LS	100%		
3	DIV 26	Electrical Modifications - Building 200 North	LS	100%		
4	DIV 21	Fire Suppression Modifications - Building 200 North	LS	100%		
5	DIV 28	Fire Alarm Allowance - Building 200 North	Allow	100%		
6	DIV 09	Architectural Modifications - Building 200 South	LS	100%		
7	DIV 26	Electrical Modifications - Building 200 South	LS	100%		
8	DIV 21	Fire Suppression Modifications - Building 200 South	LS	100%		
9	DIV 28	Fire Alarm Allowance - Building 200 South	Allow	100%		
10	DIV 09	Architectural Modifications - Building 300	LS	100%		
11	DIV 26	Electrical Modifications - Building 300	LS	100%		
12	DIV 21	Fire Suppression Modifications - Building 300	LS	100%		
13	DIV 28	Fire Alarm Allowance - Building 300	Allow	100%		
14	DIV 09	Architectural Modifications - Building 400	LS	100%		
15	DIV 26	Electrical Modifications - Building 400	LS	100%		
16	DIV 21	Fire Suppression Modifications - Building 400	LS	100%		
17	DIV 28	Fire Alarm Allowance - Building 400	Allow	100%		
18	DIV 09	Architectural Modifications - Building 500	LS	100%		
19	DIV 26	Electrical Modifications - Building 500	LS	100%		
20	DIV 21	Fire Suppression Modifications - Building 500	LS	100%		
21	DIV 28	Fire Alarm Allowance - Building 500	Allow	100%		
22	DIV 26	Electrical Modifications - Building 1000	LS	100%		
23	DIV 21	Fire Suppression Modifications - Building 1000	LS	100%		
24	DIV 28	Fire Alarm Allowance - Building 1000	Allow	100%		

Total Bid _____

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ARTICLE 6 – TIME OF COMPLETION

- 6.01 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Section 90-09 of the General Provisions on or before the dates or within the number of calendar days indicated in the Contract.
- 6.02 Bidder accepts the provisions of the Agreement as to liquidated damages.

ARTICLE 7 – ATTACHMENTS TO THIS BID

- 7.01 The following documents are submitted with and made a condition of this Bid:
- A. Required Bid security (00 43 13);
 - B. List of Proposed Subcontractors (00 43 36)
 - C. Evidence of authority to do business in the state of the Project; or a written covenant to obtain such license within the time for acceptance of Bids;
 - D. Contractor's License No.: _____ or Evidence of Bidder's ability to obtain a State Contractor's License and a covenant by Bidder to obtain said license within the time for acceptance of Bids;
 - E. Required Bidder Qualifications Statement (00 45 13) with supporting data; and
 - F. DBE Participation Reporting (00 45 39)
 - G. Bidder Certifications (00 45 46)

ARTICLE 8 – DEFINED TERMS

- 8.01 The terms used in this Bid with initial capital letters have the meanings stated in the Instructions to Bidders, the General Provisions, and the Special Provisions.

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ARTICLE 9 – BID SUBMITTAL

BIDDER: *[Indicate correct name of bidding entity]*

By:

[Signature]

[Printed name]

(If Bidder is a corporation, a limited liability company, a partnership, or a joint venture, attach evidence of authority to sign.)

Attest:

[Signature]

[Printed name]

Title:

Submittal Date:

Address for giving notices:

Telephone Number:

Fax Number:

Contact Name and e-mail address:

Bidder's License No.:

(where applicable)

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00 43 13 BID BOND

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

BIDDER (*Name and Address*):

SURETY (*Name, and Address of Principal Place of Business*):

OWNER (*Name and Address*):

BID

Bid Due Date:

Description:

BOND

Bond Number:

Date:

Penal sum

\$

(Words)

(Figures)

Surety and Bidder, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Bid Bond to be duly executed by an authorized officer, agent, or representative.

BIDDER

SURETY

Bidder's Name and Corporate Seal (Seal)

Surety's Name and Corporate Seal (Seal)

By:

Signature

By:

Signature (Attach Power of Attorney)

Print Name

Print Name

Title

Title

Attest:

Signature

Attest:

Signature

Title

Title

Note: Addresses are to be used for giving any required notice.

Provide execution by any additional parties, such as joint ventures, if necessary.

Bill and Hillary Clinton National Airport (LIT)
ABP Fire Suppression Improvements

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Owner upon default of Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of Bidder's and Surety's liability. Recovery of such penal sum under the terms of this Bond shall be Owner's sole and exclusive remedy upon default of Bidder.
2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any Performance bond and Payment bonds required by the Bidding Documents.
3. This obligation shall be null and void if:
 - 3.1 Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or
 - 3.2 All Bids are rejected by Owner, or
 - 3.3 Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).
4. Payment under this Bond will be due and payable upon default of Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.
5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions shall not in the aggregate exceed 120 days from the Bid due date without Surety's written consent.
6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety and in no case later than one year after the Bid due date.
7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the state in which the Project is located.
8. Notices required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.
9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.
10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.
11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

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00 43 36 LIST OF PROPOSED SUBCONTRACTORS

I, the undersigned Bidder, hereby certify that proposals from the following subcontractors were used in the preparation of my Bid. I agree that if I am the successful Bidder and if the following subcontracts are approved, I will not enter into contracts with others for these divisions of the work without prior written approval from the Engineer and the Owner.

If the responses below do not clearly indicate that the contract goal for DBE participation has been achieved, documentation shall be attached to clearly demonstrate to the satisfaction of the Owner that a *good faith effort* has been made as defined and described in Appendix A of 49 CFR Part 26. Firms qualified as a DBE for this project shall be certified by the Arkansas DOT. Firms qualified as a small business enterprise (SBE) shall be certified by the US Small Business Administration or the Arkansas Economic Development Commission.

For Annual Gross Receipts:

- Enter 1 for Less than \$1 Million
- Enter 2 for More than \$1 Million, Less than \$5 Million
- Enter 3 for More than \$5 Million, Less than \$10 Million
- Enter 4 for More than \$10 Million, Less than \$15 Million
- Enter 5 for More than \$15 Million

Type of Work:

Subcontractor's Name:

Arkansas License No.:

Address:

DBE: Yes / No (circle one) Contract Amount:

SBE: Yes / No (circle one)

Date Firm Established:

Annual Gross Receipts (enter the range only):

Type of Work:

Subcontractor's Name:

Arkansas License No.:

Address:

DBE: Yes / No (circle one) Contract Amount:

SBE: Yes / No (circle one)

Date Firm Established:

Annual Gross Receipts (enter the range only):

Type of Work:

Subcontractor's Name:

Arkansas License No.:

Bill and Hillary Clinton National Airport (LIT)

ABP Fire Suppression Improvements

Address:

DBE: Yes / No (circle one) Contract Amount:

SBE: Yes / No (circle one)

Date Firm Established:

Annual Gross Receipts (enter the range only):

Type of Work:

Subcontractor's Name:

Arkansas License No.:

Address:

DBE: Yes / No (circle one) Contract Amount:

SBE: Yes / No (circle one)

Date Firm Established:

Annual Gross Receipts (enter the range only):

Bidder (General Contractor):

Arkansas License No.:

Address:

DBE: Yes / No (circle one)

SBE: Yes / No (circle one)

Date Firm Established:

Annual Gross Receipts (enter the range only):

By: *

Title:

Percent of Contract to be Completed by DBE:

*Signature must be the same as on the Bid form.

Notes:

- (1) This form must be completed and submitted with *good faith effort* documentation provided in the sealed Bid to be considered responsive at the time of the bid opening.
- (2) Bidder and subcontractors shall have evidence of authority to do business in the state of the Project; or a written covenant to obtain such license within the time for acceptance of Bids.

00 43 43 WAGE RATES

"General Decision Number: AR20250032 01/03/2025

Superseded General Decision Number: AR20240032

State: Arkansas

Construction Type: Building

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

County: Pulaski County in Arkansas.

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:	<ul style="list-style-type: none">. Executive Order 14026 generally applies to the contract.. The contractor must pay all covered workers at least \$17.75 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 2025.
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:	<ul style="list-style-type: none">. Executive Order 13658 generally applies to the contract.. The contractor must pay all covered workers at least \$13.30 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 2025.

ABP Fire Suppression Improvements

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	01/03/2025

BOIL0069-002 01/01/2021

	Rates	Fringes
BOILERMAKER.....	\$ 30.49	23.13

CARP0216-003 01/01/2024

	Rates	Fringes
MILLWRIGHT.....	\$ 31.65	11.83

ELEC0295-010 01/01/2024

	Rates	Fringes
ELECTRICIAN (Includes Low Voltage Wiring).....	\$ 28.94	14.95

PAIN0424-010 07/01/2021

	Rates	Fringes
PAINTER (Brush, Roller, and Spray, Excludes Drywall Finishing/Taping).....	\$ 16.25 **	10.42

PLUM0155-014 08/01/2024

	Rates	Fringes
PLUMBER (Includes HVAC Pipe Installation).....	\$ 33.08	13.56

Bill and Hillary Clinton National Airport (LIT)
ABP Fire Suppression Improvements

PLUM0155-016 08/01/2024

	Rates	Fringes
PIPEFITTER (Excludes HVAC Pipe Installation).....	\$ 33.08	13.56

SHEE0036-034 06/01/2021

	Rates	Fringes
SHEET METAL WORKER (Includes HVAC Duct Installation).....	\$ 24.44	13.66

SUAR2015-029 01/09/2017

	Rates	Fringes
BRICKLAYER.....	\$ 20.37	3.77
CARPENTER, Includes Acoustical Ceiling Installation, and Drywall Hanging.....	\$ 17.51 **	2.26
CEMENT MASON/CONCRETE FINISHER...	\$ 19.91	3.30
DRYWALL FINISHER/TAPER.....	\$ 15.38 **	0.00
INSULATOR - MECHANICAL (Duct, Pipe & Mechanical System Insulation).....	\$ 17.16 **	4.76
IRONWORKER, REINFORCING.....	\$ 14.00 **	0.00
IRONWORKER, STRUCTURAL.....	\$ 19.84	0.00
LABORER: Common or General.....	\$ 12.85 **	0.00
LABORER: Mason Tender - Brick...	\$ 12.37 **	0.00
LABORER: Pipelayer.....	\$ 14.00 **	0.00
OPERATOR: Backhoe/Excavator/Trackhoe.....	\$ 28.21	0.00
OPERATOR: Bulldozer.....	\$ 16.74 **	0.00

Bill and Hillary Clinton National Airport (LIT)
ABP Fire Suppression Improvements

OPERATOR: Crane.....	\$ 17.52 **	0.00
OPERATOR: Grader/Blade.....	\$ 14.66 **	0.00
OPERATOR: Paver (Asphalt, Aggregate, and Concrete).....	\$ 23.75	0.00
OPERATOR: Roller.....	\$ 14.78 **	0.00
ROOFER.....	\$ 15.39 **	0.00
SPRINKLER FITTER (Fire Sprinklers).....	\$ 23.56	2.77
TRUCK DRIVER: Dump Truck.....	\$ 13.80 **	0.71

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

=====

** Workers in this classification may be entitled to a higher minimum wage under Executive Order 14026 (\$17.75) or 13658 (\$13.30). 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 classifications and wage rates that have been found to be prevailing for the type(s) of construction and geographic area covered by the wage determination. The classifications are listed in alphabetical order under rate identifiers indicating whether the particular rate is a union rate (current union negotiated rate), a survey rate, a weighted union average rate, a state adopted rate, or a supplemental classification rate.

Union Rate Identifiers

A four-letter identifier beginning with characters other than "SU", "UAVG", "SA", or "SC" denotes that a union rate was prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2024. PLUM is an identifier of the union whose collectively bargained rate 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. The date, 07/01/2024 in the example, is the effective date of the most current negotiated rate.

Union prevailing wage rates are updated to reflect all changes over time that are reported to WHD in the rates in the collective bargaining agreement (CBA) governing the classification.

Union Average Rate Identifiers

The UAVG identifier indicates that no single rate prevailed for those classifications, but that 100% of the data reported for the classifications reflected union rates. EXAMPLE: UAVG-OH-0010 01/01/2024. UAVG indicates that the rate is a weighted union average rate. OH indicates the State of Ohio. The next number, 0010 in the example, is an internal number used in producing the wage determination. The date, 01/01/2024 in the example, indicates the date the wage determination was updated to reflect the most current union average rate.

A UAVG rate will be updated once a year, usually in January, to reflect a weighted average of the current rates in the collective bargaining agreements on which the rate is based.

Survey Rate Identifiers

The ""SU"" identifier indicates that either a single non-union rate prevailed (as defined in 29 CFR 1.2) for this classification in the survey or that the rate was derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As a weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SUFL2022-007 6/27/2024. SU indicates the rate is a single non-union prevailing rate or a weighted average of survey data for that classification. FL indicates the State of Florida. 2022 is the year of the 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. The date, 6/27/2024 in the example, indicates the survey completion date for the classifications and rates under that identifier.

?SU? wage rates typically remain in effect until a new survey is conducted. However, the Wage and Hour Division (WHD) has the discretion to update such rates under 29 CFR 1.6(c)(1).

State Adopted Rate Identifiers

The ""SA"" identifier indicates that the classifications and prevailing wage rates set by a state (or local) government were adopted under 29 C.F.R 1.3(g)-(h). Example: SAME2023-007 01/03/2024. SA reflects that the rates are state adopted. ME refers to the State of Maine. 2023 is the year during which the state completed the survey on which the listed classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 01/03/2024 in the example, reflects the date on which the classifications and rates under the ?SA? identifier took effect under state law in the state from which the rates were adopted.

WAGE DETERMINATION APPEALS PROCESS

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

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ABP Fire Suppression Improvements

- a) a survey underlying a wage determination
- b) an existing published wage determination
- c) an initial WHD letter setting forth a position on a wage determination matter
- d) an initial conformance (additional classification and rate) determination

On survey related matters, initial contact, including requests for summaries of surveys, should be directed to the WHD Branch of Wage Surveys. Requests can be submitted via email to davisbaconinfo@dol.gov or by mail to:

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

Regarding any other wage determination matter such as conformance decisions, requests for initial decisions should be directed to the WHD Branch of Construction Wage Determinations. Requests can be submitted via email to BCWD-Office@dol.gov or by mail 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 an initial decision has been issued, then any interested party (those affected by the action) that disagrees with the decision can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Requests for review and reconsideration can be submitted via email to dba.reconsideration@dol.gov or by mail 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 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

Bill and Hillary Clinton National Airport (LIT)

ABP Fire Suppression Improvements

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.

=====

END OF GENERAL DECISION"

00 45 13 QUALIFICATIONS STATEMENT

<p>THE INFORMATION SUPPLIED IN THIS DOCUMENT IS CONFIDENTIAL TO THE EXTENT PERMITTED BY LAWS AND REGULATIONS</p>

1. SUBMITTED BY:

Official Name of Firm:

Address:

2. SUBMITTED FOR:

Owner:

LITTLE ROCK MUNICIPAL AIRPORT COMMISSION

Project Name:

ABP FIRE SUPPRESSION IMPROVEMENTS

TYPE OF WORK:

The Project consists of installation of new fire suppression systems for the existing Airport Business Park and Hangars, 200N, 200S, 300, 400, and 500, including new emergency systems backup natural gas generators, and fire alarm and architectural improvements to the buildings for the new suppression equipment. This project will also include replacement of pumps and electrical equipment in B1000 (pump house) serving sprinkler water to each hangar and electrical improvements for B100 office building adjacent to the hangars.

3. CONTRACTOR'S CONTACT INFORMATION

Contact Person:

Title:

Phone:

Email:

4. AFFILIATED COMPANIES:

Name:

Address:

5. TYPE OF ORGANIZATION:

☐ SOLE PROPRIETORSHIP

Name of Owner:

Doing Business As:

Date of Organization:

☐ PARTNERSHIP

Date of Organization:

Type of Partnership:

Name of General Partner(s):

☐ CORPORATION

State of Organization:

Date of Organization:

Executive Officers:

- President:

- Vice President(s):

- Treasurer:

- Secretary:

☐ LIMITED LIABILITY COMPANY

State of Organization:

Date of Organization:

Members:

Bill and Hillary Clinton National Airport (LIT)
ABP Fire Suppression Improvements

☐ JOINT VENTURE

Sate of Organization:

Date of Organization:

Form of Organization:

Joint Venture Managing Partner

- Name:

- Address:

Joint Venture Managing Partner

- Name:

- Address:

Joint Venture Managing Partner

- Name:

- Address:

6. LICENSING

Jurisdiction:

Type of License:

License Number:

Jurisdiction:

Type of License:

License Number:

Has firm listed in Section 1 ever been fined or suspended by a Contractor's licensing board?

☐ YES ☐ NO

If YES, attach as an Attachment details including where and why.

7. CERTIFICATIONS

CERTIFIED BY:

Disadvantage Business Enterprise:

Minority Business Enterprise:

Woman Owned Enterprise:

Small Business Enterprise:

Other (_____):

8. BONDING INFORMATION

Bonding Company:

Address:

Bonding Agent:

Address:

Contact Name:

Phone:

Aggregate Bonding Capacity:

Available Bonding Capacity as of date of this submittal:

9. FINANCIAL INFORMATION

Financial Institution:

Address:

Account Manager:

Phone:

Credit available:

\$ _____

10. CONSTRUCTION EXPERIENCE:

Current Experience:

List on **Schedule A** all uncompleted projects currently under contract (If Joint Venture list each participant's projects separately).

Previous Experience:

List on **Schedule B** all projects completed within the last 5 Years (If Joint Venture list each participant's projects separately).

Has firm listed in Section 1 ever failed to complete a construction contract awarded to it?

☐ YES ☐ NO

If YES, attach as an Attachment details including Project Owner's contact information.

Has any Corporate Officer, Partner, Joint Venture participant or Proprietor ever failed to complete a construction contract awarded to them in their name or when acting as a principal of another entity?

☐ YES ☐ NO

If YES, attach as an Attachment details including Project Owner's contact information.

Are there any judgments, claims, disputes or litigation pending or outstanding involving the firm listed in Section 1 or any of its officers (or any of its partners if a partnership or any of the individual entities if a joint venture)?

☐ YES ☐ NO

If YES, attach as an Attachment details including Project Owner's contact information.

11. SAFETY PROGRAM:

Name of Contractor's Safety Officer: _____

Include the following as attachments:

[If requested after the bid,]Provide as an Attachment Contractor's (and Contractor's proposed subcontractors and suppliers furnishing or performing Work having a value in excess of 10 percent of the total amount of the Bid) OSHA No. 300- Log & Summary of Occupational Injuries & Illnesses for the past 5 years.

[If requested after the bid,]Provide as an Attachment Contractor's (and Contractor's proposed subcontractors and suppliers furnishing or performing Work having a value in excess of 10 percent of the total amount of the Bid) list of all OSHA Citations & Notifications of Penalty (monetary or other) received within the last 5 years (indicate disposition as applicable) - IF NONE SO STATE.

[If requested after the bid,]Provide as an Attachment Contractor's (and Contractor's proposed subcontractors and suppliers furnishing or performing Work having a value in excess of 10 percent of the total amount of the Bid) list of all safety citations or violations under any state all received within the last 5 years (indicate disposition as applicable) - IF NONE SO STATE.

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ABP Fire Suppression Improvements

Provide the following for the firm listed in Section 1 (and for each proposed subcontractor and supplier furnishing or performing Work having a value in excess of 10 percent of the total amount of the Bid) the following (attach additional sheets as necessary):

Workers' compensation Experience Modification Rate (EMR) for the last 5 years:

YEAR	_____	EMR	_____
YEAR	_____	EMR	_____
YEAR	_____	EMR	_____
YEAR	_____	EMR	_____
YEAR	_____	EMR	_____

Total Recordable Frequency Rate (TRFR) for the last 5 years:

YEAR	_____	TRFR	_____
YEAR	_____	TRFR	_____
YEAR	_____	TRFR	_____
YEAR	_____	TRFR	_____
YEAR	_____	TRFR	_____

Total number of man-hours worked for the last 5 Years:

YEAR	_____	TOTAL NUMBER OF MAN-HOURS	_____
YEAR	_____	TOTAL NUMBER OF MAN-HOURS	_____
YEAR	_____	TOTAL NUMBER OF MAN-HOURS	_____
YEAR	_____	TOTAL NUMBER OF MAN-HOURS	_____
YEAR	_____	TOTAL NUMBER OF MAN-HOURS	_____

Provide Contractor's (and Contractor's proposed subcontractors and suppliers furnishing or performing Work having a value in excess of 10 percent of the total amount of the Bid) Days Away From Work, Days of Restricted Work Activity or Job Transfer (DART) incidence rate for the particular industry or type of Work to be performed by Contractor and each of Contractor's proposed subcontractors and suppliers) for the last 5 years:

YEAR	_____	DART	_____
YEAR	_____	DART	_____
YEAR	_____	DART	_____
YEAR	_____	DART	_____
YEAR	_____	DART	_____

12. EQUIPMENT:

MAJOR EQUIPMENT:

List on **Schedule C** all pieces of major equipment available for use on project.

Bill and Hillary Clinton National Airport (LIT)
ABP Fire Suppression Improvements

I HEREBY CERTIFY THAT THE INFORMATION SUBMITTED HERewith, INCLUDING ANY ATTACHMENTS, IS TRUE TO THE BEST OF MY KNOWLEDGE AND BELIEF.

NAME OF ORGANIZATION: _____

BY: _____

TITLE: _____

DATED: _____

NOTARY ATTEST:

SUBSCRIBED AND SWORN TO BEFORE ME

THIS _____ DAY OF _____, 20____

NOTARY PUBLIC - STATE OF _____

MY COMMISSION EXPIRES: _____

REQUIRED ATTACHMENTS

1. Schedule A (Current Experience)*.
2. Schedule B (Previous Experience)*.
3. Schedule C (Major Equipment)*.
4. Evidence of authority for individuals listed in Section 5 to bind organization to an agreement.
5. Resumes of officers and key individuals (including Safety Officer) of firm named in Section 1.
6. Required safety program submittals listed in Section 11.

*Information may be provided on form attached or bidder provided form containing similar information.

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SCHEDULE A

CURRENT EXPERIENCE

Project Name	Owner's Contact Person	Design Engineer	Contract Date	Type of Work	Status	Cost of Work
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				

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SCHEDULE B

PREVIOUS EXPERIENCE (Include ALL Projects Completed within last 5 years)

Project Name	Owner's Contact Person	Design Engineer	Contract Date	Type of Work	Status	Cost of Work
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				

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SCHEDULE B

PREVIOUS EXPERIENCE (Include ALL Projects Completed within last 5 years)

Project Name	Owner's Contact Person	Design Engineer	Contract Date	Type of Work	Status	Cost of Work
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				

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SCHEDULE C - LIST OF MAJOR EQUIPMENT AVAILABLE

[illegible]

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00 45 39 DBE PARTICIPATION REPORTING

Disadvantaged Business Enterprise (DBE) Utilization

Bidder shall complete the following forms provided for DBE Project Goal Participation Statement, including Letter of Intent for each Subcontractor or Vendor to be utilized on the project, Bidders List, and Good Faith Efforts (GFE) documentation.

Note:

In accordance with CFR part 26.55, 60% of the value of materials or supplies purchased from a *DBE dealer* counts toward the DBE goal. Materials or supplies obtained from a *DBE manufacturer* count 100% of the cost of materials or supplies.

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Appendix E: Diversity Forms

1. Overview

The Commission is committed to fostering an inclusive environment that deliberately seeks to expand opportunities for diverse companies, and invites all stakeholders to join the Commission in this endeavor as we work to break down barriers and build a more inclusive and prosperous future for businesses everywhere.

- ✓ **It is the responding company's responsibility to contact the certifying agency directly to locate certified companies or confirm that certifications are valid.**
- ✓ Certifications **must** be valid at the time of submission, contract execution, amendment, or extension, if any.
- ✓ Click [here](#) to learn how participation is counted towards the diversity goal (i.e., counting expenditures for materials or supplies from a manufacturer or regular dealer).
- ✓ Use the following links to visit our website for more information on the [Commission's Business Diversity Program](#) and [Good Faith Efforts](#).

~~**A. Federally Regulated Programs**~~

~~**ONLY** Companies in this [ARDOT Directory](#) will count towards the goal for the following programs:~~

- ~~a. Disadvantage Business Enterprise (DBE) Program~~
- ~~a. Federally Funded Projects (12%)~~
- ~~i. Airport Concessionaires Disadvantage Business Enterprise (ACDBE) Program~~
- ~~a. Non-Car Rental (23%)~~
- ~~b. Car Rental (2%)~~

B. Locally Regulated Programs

Certified Companies in the directories below will count towards the goal for locally funded projects (18%):

- a. [AEDC Directory](#)
- b. [Commission Online Bidding & Supplier Portal](#)
- c. [ARDOT Directory](#)
- d. [SBA Directory](#)
- e. [WBENC Directory](#)

2. Forms included in Appendix E: Diversity Forms:

- a. Diversity Goal Participation Statement
- b. Bidders List
- c. Letter of Intent
- d. Good Faith Efforts Guidance
- e. Good Faith Efforts Form

Diversity Goal Participation Statement

~~12% Federal Funded Goal~~

or

18% Locally Funded Goal

Project Name: ABP Fire Suppression Improvements

Project No. 231000

The undersigned Company (Prime) has satisfied the requirements of the submission specifications in the following manner:
(check the appropriate section):

☐

Prime is a certified diverse Company.

1. **Attach proof of certification**
2. Submit a complete Bidders List (Appendix E: Diversity Forms, Pages 13-14), regardless of the gender or race of the owners.
 - a. Include the Prime and all Subcontractors regardless if the Prime decided to utilize the Subcontractor(s) or not, if applicable.
 - b. The yellow section should be the Prime on this project.
 - c. List both certified diverse and non-certified Subcontractors.
3. Submit a Letter of Intent (Appendix E: Diversity Forms, Page 15) for all Subcontractors, if applicable.
 - a. This includes both certified diverse and non-diverse Companies.
4. The Good Faith Efforts (GFE) form (Appendix E: Diversity Forms, Pages 17-20) is **not required** to be completed.

☐

The Prime is committed to a utilization of _____ % on this contract that meets or exceeds the goal.

1. Submit a complete Bidders List (Appendix E: Diversity Forms, Pages 13-14), regardless of the gender or race of the owners.
 - a. Include the Prime and all Subcontractors regardless if the Prime decided to utilize the Subcontractor(s) or not, if applicable.
 - b. The yellow section should be the Prime on this project.
 - c. List both certified diverse and non-certified Subcontractors.
2. Submit a Letter of Intent (Appendix E: Diversity Forms, Page 15) for all Subcontractors.
 - a. This includes both certified diverse and non-diverse Companies.
 - b. **Attach proof of certification** if the Subcontractor is certified.
3. The Good Faith Efforts (GFE) form (Appendix E: Diversity Forms, Pages 17-20) is **not required** to be completed.

☐

The Prime is unable to meet the goal and will submit documentation demonstrating Good Faith Efforts consistent with the Commission's program.

1. Submit a complete Bidders List (Appendix E: Diversity Forms, Pages 13-14), regardless of the gender or race of the owners.
 - a. Include the Prime and all Subcontractors regardless if the Prime decided to utilize the Subcontractor(s) or not, if applicable.
 - b. The yellow section should be the Prime on this project.
2. List both certified diverse and non-certified Subcontractors.
3. Submit a Letter of Intent (Appendix E: Diversity Forms, Page 15) for all Subcontractors.
 - a. This includes both certified diverse and non-diverse Companies.
 - b. **Attach proof of certification** if the Subcontractor is certified.
4. Submit the Good Faith Efforts (GFE) form (Appendix E: Diversity Forms, Pages 17-20) with all supporting documentation.
 - a. The GFE form **is required** to be completed.
 - b. Review the Good Faith Efforts Guidance for assistance, if needed.

Company (Prime): _____ Preparer's Name: _____

Title: _____ Email: _____

Bidders List

Pursuant to 49 CFR Parts 26 and 23, the Commission maintains bidding statistics regarding ALL Companies submitting responses for federal and locally funded projects. This information will be used for statistical purposes. This requirement applies to ALL Subcontractors, regardless of the gender or race of the owners, who submit a bid to the Prime (whether the Prime decided to utilize the Subcontractor or not). **The yellow section should be the Prime on this project.** All the requested information **must** be reported.

Consistent with the federally regulated requirements, this information is also collected on locally regulated solicitations.

You may use Attachment B – Bidders List in lieu of pages 3 – 4. However, when submitting, you should upload Attachment B as a PDF and place it in the same order sequence as the Bidders List falls currently.

Prime's Name Address, City, State, Zip	Prime's Phone Number/Email Address	Prime or Joint Ventures	How did you find out about this opportunity?	Certified Diverse Company	Prime's Majority Owner Gender	Prime's Majority Owner Ethnicity	Age of Company
		<input type="checkbox"/> Prime <input type="checkbox"/> Joint Venture	<input type="checkbox"/> Email <input type="checkbox"/> Phone <input type="checkbox"/> B2GNow <input type="checkbox"/> Newspaper <input type="checkbox"/> Other: _____	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Female <input type="checkbox"/> Male		
NAICS Codes	Description of Work	Gross Receipts					
		<input type="checkbox"/> Less than \$1 million <input type="checkbox"/> \$1 – 3 million <input type="checkbox"/> \$3 – 6 million <input type="checkbox"/> \$6 – 10 million					

Subcontractor Name Address, City, State, Zip	Subcontractor Phone Number/Email Address	Subcontractor	How did you notify this subcontractor about this opportunity?	Certified Diverse Company	Subcontractor's Majority Owner Gender	Subcontractor's Majority Owner Ethnicity	Age of Company
		<input type="checkbox"/> Subcontractor	<input type="checkbox"/> Email <input type="checkbox"/> Phone <input type="checkbox"/> B2GNow <input type="checkbox"/> Newspaper <input type="checkbox"/> Certifying Agency: _____ <input type="checkbox"/> Other: _____	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Female <input type="checkbox"/> Male		
NAICS Codes	Description of Work	Gross Receipts					
		<input type="checkbox"/> Less than \$1 million <input type="checkbox"/> \$1 – 3 million <input type="checkbox"/> \$3 – 6 million <input type="checkbox"/> \$6 – 10 million					

Ethnicity Section: **A.** Black American **B.** Hispanic American **C.** Native American **D.** Subcontinent Asian American **E.** Asian Pacific American **F.** Non-Minority **G.** Other

Subcontractor Name Address, City, State, Zip	Subcontractor Phone Number/Email Address	Subcontractor	How did you notify this subcontractor about this opportunity?	Certified Diverse Company	Subcontractor's Majority Owner Gender	Subcontractor's Majority Owner Ethnicity	Age of Company
		<input type="checkbox"/> Subcontractor	<input type="checkbox"/> Email <input type="checkbox"/> Phone <input type="checkbox"/> B2GNow <input type="checkbox"/> Newspaper <input type="checkbox"/> Certifying Agency: _____ <input type="checkbox"/> Other: _____	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Female <input type="checkbox"/> Male		
NAICS Codes	Description of Work		Gross Receipts				
			<input type="checkbox"/> Less than \$1 million <input type="checkbox"/> \$1 – 3 million <input type="checkbox"/> \$3 – 6 million <input type="checkbox"/> \$6 – 10 million				

Subcontractor Name Address, City, State, Zip	Subcontractor Phone Number/Email Address	Subcontractor	How did you notify this subcontractor about this opportunity?	Certified Diverse Company	Subcontractor's Majority Owner Gender	Subcontractor's Majority Owner Ethnicity	Age of Company
		<input type="checkbox"/> Subcontractor	<input type="checkbox"/> Email <input type="checkbox"/> Phone <input type="checkbox"/> B2GNow <input type="checkbox"/> Newspaper <input type="checkbox"/> Certifying Agency: _____ <input type="checkbox"/> Other: _____	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Female <input type="checkbox"/> Male		
NAICS Codes	Description of Work		Gross Receipts				
			<input type="checkbox"/> Less than \$1 million <input type="checkbox"/> \$1 – 3 million <input type="checkbox"/> \$3 – 6 million <input type="checkbox"/> \$6 – 10 million				

Subcontractor Name Address, City, State, Zip	Subcontractor Phone Number/Email Address	Subcontractor	How did you notify this subcontractor about this opportunity?	Certified Diverse Company	Subcontractor's Majority Owner Gender	Subcontractor's Majority Owner Ethnicity	Age of Company
		<input type="checkbox"/> Subcontractor	<input type="checkbox"/> Email <input type="checkbox"/> Phone <input type="checkbox"/> B2GNow <input type="checkbox"/> Newspaper <input type="checkbox"/> Certifying Agency: _____ <input type="checkbox"/> Other: _____	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Female <input type="checkbox"/> Male		
NAICS Codes	Description of Work		Gross Receipts				
			<input type="checkbox"/> Less than \$1 million <input type="checkbox"/> \$1 – 3 million <input type="checkbox"/> \$3 – 6 million <input type="checkbox"/> \$6 – 10 million				

Ethnicity Section: A. Black American B. Hispanic American C. Native American D. Subcontinent Asian American E. Asian Pacific American F. Non-Minority G. Other

*Copy and paste this list as needed.

Letter of Intent

(Complete one Letter of Intent for each Subcontractor, supplier, or manufacturer that will perform on the contract, if awarded.)

Project Name: ABP Fire Suppression Improvements Project No: 231000

☐ Prime ☐ Joint Venture: _____

Subcontractor: _____

Subcontractor Street Address: _____

City: _____ State: _____ Zip: _____

Subcontractors Contact Person: _____ Subcontractor Telephone Number: _____

State relationship, if any, between Prime & Subcontractor/Subconsultant: _____

Owners/Partners/Corporate Directors/Principal Stockholders (>5% stock holdings:)

Names	%

Is this company certified? ☐ Yes ☐ No Certifying Agency: _____
(If yes, certification must be attached)

Classification (please select one): ☐ Subcontractor ☐ Manufacturer ☐ Regular Dealer ☐ Reseller ☐ Broker

NAICS	SUMMARY OF WORK TO BE PERFORMED BY SUBCONTRACTOR:

The Prime is committed to utilizing the above-named Subcontractor to perform ____% of the contracted dollar amount using the services described above.

Affirmation: (Signatures are required)

The above-named Company affirms that the Subcontractor will perform the portion of the contract for the percentage stated above.

By: _____
(Signature of Subcontractor's representative) (Title)

By: _____
(Signature of Prime's representative) (Title)

If the Prime does not receive the contract award, any and all representations in this Letter of Intent and Affirmation shall be null and void.

➤ **Submit a Letter of Intent for each Subcontractor performing on the contract (certified and non-certified).**

The Company must utilize the Subcontractor as shown on this Letter of Intent. Any changes after submission must be sent to procurement@clintonairport.com for the DBE Liaison Officer (LO)/ACDBE LO to review for approval.

Good Faith Efforts Guidance

If the Company (Prime) cannot fully meet the diversity goal, the Prime **must** complete the Good Faith Efforts (“GFE”) form and attach documentation demonstrating the GFE. A Prime’s GFE will be determined on a case-by-case basis.

The following is a list of types of actions that you should consider as part of your GFE to obtain diverse participation. It is not intended to be a mandatory checklist, nor is it intended to be exclusive or exhaustive. Other factors or types of efforts may be relevant in appropriate cases.

- Conducting market research to identify small business contractors and suppliers and soliciting through all reasonable and available means the interest of all certified Diverse Subcontractors that have the capability to perform the work of the contract. This may include attendance at pre-response and business matchmaking meetings and events, advertising and/or written notices, posting of Notices of Sources Sought and/or Requests/or Proposals, written notices or emails to all Diverse Companies listed in the certifying agencies accepted by the Commission.
- The Prime should solicit this interest as early in the acquisition process as practicable to allow Diverse Subcontractors to respond to the solicitation and submit a timely offer for the subcontracting opportunity. The Prime should determine with certainty if the Diverse Subcontractor is interested in taking appropriate steps to follow up on initial solicitations. The efforts must be documented as applicable, including call logs, posted advertisements, printed emails, attendance logs of pre-response meetings, and records of negotiation.
- Selecting portions of the work to be performed by a Diverse Subcontractor to increase the likelihood that the goal will be achieved. This includes, where appropriate, breaking out contract work items into economically feasible units (for example, smaller tasks or quantities) to facilitate Diverse participation, even when the Prime contractor might otherwise prefer to perform these work items with its own forces.
- Providing interested Diverse Subcontractors with adequate information about the plans, specifications, and requirements of the contract in a timely manner to assist them in responding to Prime with their offer for subcontracting.
- Making efforts to assist interested Diverse Subcontractors in obtaining bonding, lines of credit, or insurance as required by the recipient or contractor.
- Making efforts to assist interested Diverse Subcontractors in obtaining necessary equipment, supplies, materials, or related assistance or services.
- A Prime, using good business judgment, would consider a number of factors in negotiating with Subcontractors, including Diverse Subcontractors, and would take price and capabilities as well as contract goals into consideration. However, the fact that there may be some additional costs involved in finding and using Diverse Subcontractors is not in itself a sufficient reason for Prime’s failure to meet the contract goal, as long as such costs are reasonable.
- The ability or desire of a Prime to perform the work of a contract with its own organization does not relieve the submitter of the responsibility to make good faith efforts. Prime contractors are not, however, required to accept higher quotes from Diverse Subcontractors if the price difference is excessive or unreasonable.
- Not rejecting Diverse Subcontractors as being unqualified without sound reasons based on a thorough investigation of their capabilities: The Prime’s standing within its industry, membership in specific groups, organizations, or associations, and political or social affiliations (for example, union vs. non-union status) are not legitimate causes for the rejection or non-solicitation of bids in the contractor’s efforts to meet the project goal.

Good Faith Efforts Form

This form and supporting documentation of Good Faith Efforts (“GFE”) made by all Companies submitting this solicitation to subcontract with diverse companies. The Company's demonstration of GFE will prove that the Company actively and deliberately sought out Diverse Subcontractors to participate in the responsibilities of the contract if awarded. All information provided should be accurate, complete, and inclusive of the efforts to obtain diverse participation. The Commission will review this form and all supporting documentation to confirm that good faith efforts were performed.

- A. Review “Section 1: Good Faith Efforts Guidance” for assistance what may be considered a good faith effort.
- B. For Federally Regulated Programs, contacting certified Disadvantaged Business Enterprises (DBEs) in the Arkansas Department of Transportation (ARDOT) directory **is required**.
- C. Logs should list only Diverse Companies that were directly solicited.
 - a. Do not list mass e-mailings performed.
 - b. Outreach should be narrowly focused, targeted, and result-oriented.
 - c. *Mere pro forma* efforts are not good faith efforts to meet the goal.
- D. We encourage you to contact as many Diverse Companies as possible and attach all supporting documentation.
- E. All efforts must be made prior to the Submission Due Date.
- F. If you have questions regarding GFEs, diversity opportunities, locating diverse companies, or need help completing your form during the solicitation process, contact Procurement at procurement@clintonairport.com before the Deadline for Questions.

Project Name ABP Fire Suppression Improvements Project Number: 231000
Company (Prime) Name: _____
GFE Preparer: _____ GFE Title: _____
Phone Number: _____ Email: _____

- ☒ The Prime is unable to meet the contract goal; however, it is committed to a _____ % utilization on this contract and has completed and submitted the GFE form along with all required supporting GFE documentation.

This executed form, along with all required documentation, **must** be submitted at the time of submission. The information provided in the GFE form will be evaluated to determine if the Prime is responsive. If the Prime fails to comply with this request, or the GFE submitted is not considered acceptable, the submission will be considered non-responsive and disqualified.

The Prime certifies that all efforts have been made and submitted in their solicitation.

Please Sign Below (Signature is Required)

Signature of Responding Company’s Representative

Date

Did your Company attend the Pre-Response meeting scheduled by the Commission?	Yes ___ No ___
For potential Diverse Subcontracting opportunities, you can access the Pre-Response Meeting attendance log by logging into B2GNow and viewing documents under the proposal.	

SPECIFIC PORTIONS OF WORK IDENTIFIED FOR DIVERSE SUBCONTRACTORS: You MUST list all selected scopes or portions of work to be performed by Diverse Subcontractors to increase the likelihood of meeting the contract goal for this project and the estimated value of each scope or portions of work identified. Use additional pages if needed.			
Scope or Portions of Work Identified for Diverse Participation		Estimated Value	% of Contract Value
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

ADVERTISING SUBCONTRACTING OPPORTUNITIES: You MUST identify publications in which announcements were placed and published. Included a copy of each announcement or notification.				
A. Did your Company advertise in a general circulation, trade associations, or minority-focused media outlet? a. If Yes , complete the boxes below and attach <u>all</u> supporting documentation				Yes ___ No ___
Adverting/Outreach Agency	Method of Announcement/Notification	Date Sent to Agency to Advertising	Date of Announcement/Notification	DBELO/ACDBELO Verification
<i>Arkansas Democrat-Gazette</i>	<i>Email</i>	<i>01/01/24</i>	<i>01/04/24</i>	
If No , explain why not.				



CERTIFYING AGENCY ASSISTANCE: You **MUST** identify certifying agencies or organizations (i.e., ARDOT, SBA, APEX) that assist in recruiting and placement of Diverse Companies.

A. Did your Company notify any agencies or organizations that assist in recruiting and placement of Diverse Companies?

Yes ___ No ___

a. If **Yes**, complete the boxes below and attach all supporting documentation

Adverting/Outreach Agency	Method of Announcement/Notification	Date of Announcement/Notification	Results of Initial Communication	DBELO/ACDBELO Verification
ARDOT	Email	01/01/24	ARDOT Emailed Directory	

If **No**, explain why not.

NEGOTIATE IN GOOD FAITH: You **MUST** provide an explanation for any rejected bid or price quotation unless another diverse company is accepted for the same work.

You must complete all fields below and provide a copy of the written rejection notice, including the reason for rejection, to the rejected DBE firm.

Subcontractor	Scope	Date of Rejection	Reason	DBELO/ACDBELO Verification

If needed, use additional sheets in the provided format to document all efforts taken. All documentation **must** be submitted at the time of submission.

00 51 00 NOTICE OF AWARD

Date of Issuance:

Owner: **LITTLE ROCK MUNICIPAL AIRPORT
COMMISSION** Owner's Contract No.: LIT Project No. 231000
Engineer: **GARVER** Engineer's Project No.: 21A10111
Project: ABP Fire Suppression Improvements
Bidder:
Bidder's Address:

TO BIDDER:

You are notified that Owner has accepted your Bid dated [] for the above Contract, and that you are the Successful Bidder and are awarded a Contract for:

[describe Work, alternates, or sections of Work awarded]

The Contract price of the awarded Contract is: \$_____

[] unexecuted counterparts of the Agreement accompany this Notice of Award, and one copy of the Contract Documents accompanies this Notice of Award, or has been transmitted or made available to Bidder electronically. *[revise if multiple copies accompany the Notice of Award]*

☐ a set of the drawings will be delivered separately from the other Contract Documents.

You must comply with the following conditions precedent within 15 days of the date of receipt of this Notice of Award:

1. Return signed copy of Notice of Award to Owner and Engineer as acknowledgement of receipt.
2. Deliver to Owner [] counterparts of the Agreement, fully executed by Bidder.
3. Deliver with the executed Agreement(s) the Contract security *[e.g., Performance bond and Payment bond]* and insurance documentation as specified in the Instructions to Bidders, General Provisions and Special Provisions.
4. Other conditions precedent (if any):

Failure to comply with these conditions within the time specified will entitle Owner to consider you in default, annul this Notice of Award, and declare your Bid security forfeited.

After you comply with the above conditions, Owner will return to you one fully executed counterpart of the Agreement, together with any additional copies of the Contract Documents as indicated in Section 50-05 of the General Provisions.

Owner:

Authorized Signature

By:

Title:

Bidder:

Authorized Signature

By:

Title:

Copy: Engineer

**00 52 00 CONTRACT
BETWEEN OWNER AND CONTRACTOR
FOR CONSTRUCTION CONTRACT**

THIS AGREEMENT is by and between _____ (“Owner”) and
_____. (“Contractor”).

Owner and Contractor hereby agree as follows:

ARTICLE 1 – WORK

- 1.01 Contractor shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows:

ARTICLE 2 – THE PROJECT

- 2.01 The Project, of which the Work under the Contract Documents is a part, is generally described as follows: Replacement of the existing fire suppression systems for Hangar 300 and Hangar 400, including new emergency systems backup natural gas generators, and fire alarm and architectural improvements to the buildings for the new suppression equipment.

ARTICLE 3 – ENGINEER

- 3.01 The Project has been designed by **Garver, LLC**.
- 3.02 The Owner has retained **Garver, LLC** (“Engineer”) to act as Owner’s representative, and to have the rights, responsibilities, duties, and authority assigned to Engineer in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

ARTICLE 4 – CONTRACT TIMES

4.01 *Time of the Essence*

- A. All time limits for Milestones, if any, Substantial Completion, and completion and readiness for final payment as stated in the Contract Documents are of the essence of the Contract.

4.02 *Contract Times: Days*

- A. The Work will be substantially completed within the following number of days after the date when the Contract Times commence to run as provided in Section 80-07 of the General Provisions, and completed and ready for final payment in accordance with Section 90-09 of the General Provisions within the following number of days after the date when the Contract Times commence to run.

Description	Substantial Completion
Total Project	240 calendar days

4.03

4.03 *Liquidated Damages*

- A. Contractor and Owner recognize that time is of the essence as stated in Paragraph 4.01 above and that Owner will suffer financial and other losses if the Work is not completed and Milestones not achieved within the times specified in Paragraph 4.02 above, plus any extensions thereof allowed in accordance with the Contract. The parties also recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of

requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty):

1. Substantial Completion: Contractor shall pay Owner **\$1000** for each day that expires after the time (as duly adjusted pursuant to the Contract) specified in Paragraph 4.02.A above for Substantial Completion until the Work is substantially complete.

4.04 *Special Damages*

- A. Not Used.

ARTICLE 5 – CONTRACT PRICE

5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents the amounts that follow, subject to adjustment under the Contract:

- A. For all Unit Price Work, an amount equal to the sum of the extended prices (established for each separately identified item of Unit Price Work by multiplying the unit price times the actual quantity of that item):
- B. The extended prices for Unit Price Work set forth as of the Effective Date of the Contract are based on estimated quantities. Estimated quantities are not guaranteed, and determinations of actual quantities and classifications are to be made by Engineer and Owner.

ARTICLE 6 – PAYMENT PROCEDURES

6.01 *Submittal and Processing of Payments*

- A. Applications for Payment shall be made in accordance with Section 90-06 of the General Provisions. Applications for Payment will be processed by Engineer as provided in the General Provisions.

6.02 *Progress Payments; Retainage*

- A. Progress payments and retainage shall be in accordance with Section 90-06 of the General Provisions.

6.03 *Final Payment*

- A. Upon final completion and acceptance of the Work in accordance with Section 50-15 of the General Provisions, Owner shall pay the remainder of the Contract Price as recommended by Engineer as provided in Section 90-09 of the General Provisions, minus any damages as described in Paragraphs 4.03 and 4.04.

ARTICLE 7 – INTEREST

7.01 Not Used.

ARTICLE 8 – CONTRACTOR'S REPRESENTATIONS

8.01 In order to induce Owner to enter into this Contract, Contractor makes the following representations:

- A. Contractor has examined and carefully studied the Contract Documents, and any data and reference items identified in the Contract Documents.
- B. Contractor has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

- C. Contractor is familiar with and is satisfied as to all laws and regulations that may affect cost, progress, and performance of the Work.
- D. Contractor has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Special Provisions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Special Provisions, especially with respect to Technical Data in such reports and drawings.
- E. Contractor has considered the information known to Contractor itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Site-related reports and drawings identified in the Contract Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor; and (3) Contractor's safety precautions and programs.
- F. Based on the information and observations referred to in the preceding paragraph, Contractor agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.
- G. Contractor is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.
- H. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
- I. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
- J. Contractor's entry into this Contract constitutes an incontrovertible representation by Contractor that without exception all prices in the Agreement are premised upon performing and furnishing the Work required by the Contract Documents.
- K. The Contractor hereby represents and warrants to and for the benefit of the Owner that:
 - 1. The Contractor has reviewed and understands the prevailing wage rate requirements and will provide any further verified information, certification or assurance of compliance as may be required by the Owner.
 - 2. Notwithstanding any other provision of this Agreement, any failure to comply with this paragraph by the Contractor shall permit the Owner to recover as damages against the Contractor any loss, expense or cost (including without limitation attorney's fees) incurred by the Owner resulting from any such failure (including without limitation any impairment or loss of funding, whether in whole or in part, from the State or any damages owed to the State by the Owner). While the Contractor has no direct contractual privity with the State, as a lender to the Owner for the funding of its Project, the Owner and the Contractor agree that the State is a third-party beneficiary and neither this paragraph (nor any other provision of this Agreement necessary to give this paragraph force or effect) shall be amended or waived without the prior written consent of the State.

ARTICLE 9 – CONTRACT DOCUMENTS

9.01 *Contents*

- A. The Contract Documents consist of the following:
 - 1. Executed Contract
 - 2. Addenda (if any)
 - 3. Advertisement for Bids
 - 4. Instructions to Bidders
 - 5. Bid Form
 - 6. List of Proposed Subcontractors
 - 7. Wage Rates
 - 8. Qualification Statement
 - 9. General Provisions
 - 10. Special Provisions
 - 11. **DBE Participation Reporting**
 - 12. Supplemental Specifications as listed in the Table of Contents
 - 13. Technical Specifications as listed in the Table of Contents
 - 14. Drawings
 - 15. Performance Bond
 - 16. Payment Bond
 - 17. Certificates of Insurance
 - 18. Exhibits to this Agreement (enumerated as follows):
 - a. Contractor's Bid
 - 19. The following which may be delivered or issued on or after the Effective Date of the Contract and are not attached hereto:
 - a. Notice to Proceed.
 - b. Work Change Directives.
 - c. Change Orders.
 - d. Field Orders.
- B. The documents listed in Paragraph 9.01.A are attached to this Agreement (except as expressly noted otherwise above).
- C. There are no Contract Documents other than those listed above in this Article 9.
- D. The Contract Documents may only be amended, modified, or supplemented as provided in the General Provisions.

ARTICLE 10 – MISCELLANEOUS

10.01 *Terms*

- A. Terms not otherwise defined herein and used in this Agreement will have the meanings stated in the General Provisions and the Special Provisions.

10.02 *Assignment of Contract*

- A. Unless expressly agreed to elsewhere in the Contract, no assignment by a party hereto of any rights under or interests in the Contract will be binding on another party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, money that may become due and money that is due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

10.03 *Successors and Assigns*

- A. Owner and Contractor each binds itself, its successors, assigns, and legal representatives to the other party hereto, its successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

10.04 *Severability*

- A. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon Owner and Contractor, who agree that the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

10.05 *Contractor's Certifications*

- A. Contractor certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this Paragraph 10.05:
 - 1. “corrupt practice” means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process or in the Contract execution;
 - 2. “fraudulent practice” means an intentional misrepresentation of facts made (a) to influence the bidding process or the execution of the Contract to the detriment of Owner, (b) to establish Bid or Contract prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
 - 3. “collusive practice” means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid prices at artificial, non-competitive levels; and
 - 4. “coercive practice” means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

Bill and Hillary Clinton National Airport (LIT)
ABP Fire Suppression Improvements

IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement.

This Agreement will be effective on _____ (which is the Effective Date of the Contract).

OWNER:

CONTRACTOR:

By: _____

By: _____

Title: _____

Title: _____

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

Attest: _____

Attest: _____

Title: _____

Title: _____

Address for giving notices:

Address for giving notices:

License No.: _____
(where applicable)

This document is a MODIFIED version of EJCDC® C-520, Agreement Between Owner and Contractor for Construction Contract (Stipulated Price). Copyright © 2013 National Society of Professional Engineers, American Council of Engineering Companies and is based in part on excerpts from EJCDC documents. Those portions of the text that originated in published EJCDC documents remain subject to copyright.

Bill and Hillary Clinton National Airport (LIT)
ABP Fire Suppression Improvements

00 55 00 **NOTICE TO PROCEED**

Owner: **LITTLE ROCK MUNICIPAL AIRPORT
COMMISSION**

Owner's Contract No.: LIT PROJECT NO. 231000

Contractor:

Contractor's Project No.:

Engineer: **GARVER**

Engineer's Project No.: 21A10111

**Project: ABP FIRE SUPPRESSION
IMPROVEMENTS**

Effective Date of Contract:

TO CONTRACTOR:

Owner hereby notifies Contractor that the Contract Times under the above Contract will commence to run on [_____, 20__]. *[see Section 80-02 of the General Provisions]*

On that date, Contractor shall start performing its obligations under the Contract Documents. No Work shall be done at the Site prior to such date. In accordance with the Agreement, the number of calendar days to achieve Substantial Completion is 240.

Before starting any Work at the Site, Contractor must comply with the following:

[Note any access limitations, security procedures, or other restrictions]

Owner:

Authorized Signature

By:

Title:

Date Issued:

Copy: Engineer

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE TO PROCEED is hereby acknowledged by _____
_____ this _____ day of _____, 20 ____.

BY

TITLE

EJCDC® C-550, Notice to Proceed. Prepared and published 2013 by the Engineers Joint Contract Documents Committee.

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00 61 13 PERFORMANCE BOND

CONTRACTOR (*name and address*):

SURETY (*name and address of principal place of business*):

OWNER (*name and address*):

LITTLE ROCK MUNICIPAL AIRPORT COMMISSION

CONSTRUCTION CONTRACT

Effective Date of the Agreement:

Amount:

Description (*name and location*):

BOND

Bond Number:

Date (*not earlier than the Effective Date of the Agreement of the Construction Contract*):

Amount:

Modifications to this Bond Form: ☐ None ☐ See Paragraph 16

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Performance Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

SURETY

Contractor's Name and Corporate Seal

Surety's Name and Corporate Seal

By: _____
Signature

By: _____
Signature (*attach power of attorney*)

Print Name

Print Name

Title

Title

Attest: _____
Signature

Attest: _____
Signature

Title

Title

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

Bill and Hillary Clinton National Airport (LIT)
ABP Fire Suppression Improvements

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

2. If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Paragraph 3.

3. If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after:

3.1 The Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor, and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Paragraph 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor, and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default;

3.2 The Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and

3.3 The Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

4. Failure on the part of the Owner to comply with the notice requirement in Paragraph 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

5. When the Owner has satisfied the conditions of Paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

5.1 Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

5.2 Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;

5.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owners concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of

damages as described in Paragraph 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

5.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor, and with reasonable promptness under the circumstances:

5.4.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or

5.4.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

6. If the Surety does not proceed as provided in Paragraph 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Paragraph 5.4, and the Owner refuses the payment or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

7. If the Surety elects to act under Paragraph 5.1, 5.2, or 5.3, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication for:

7.1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;

7.2 additional legal, design professional, and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Paragraph 5; and

7.3 liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

8. If the Surety elects to act under Paragraph 5.1, 5.3, or 5.4, the Surety's liability is limited to the amount of this Bond.

9. The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors, and assigns.

10. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.

11. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum periods of limitations available to sureties as a defense in the jurisdiction of the suit shall be applicable.

12. Notice to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.

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

14. Definitions

14.1 Balance of the Contract Price: The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made including allowance for the Contractor for any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

14.2 Construction Contract: The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

14.3 Contractor Default: Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

14.4 Owner Default: Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

14.5 Contract Documents: All the documents that comprise the agreement between the Owner and Contractor.

15. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

16. Modifications to this Bond are as follows:

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Bill and Hillary Clinton National Airport (LIT)
ABP Fire Suppression Improvements

00 61 16 PAYMENT BOND

CONTRACTOR (*name and address*):

SURETY (*name and address of principal place of business*):

OWNER (*name and address*):

LITTLE ROCK MUNICIPAL AIRPORT COMMISSION

CONSTRUCTION CONTRACT

Effective Date of the Agreement:

Amount:

Description (*name and location*):

BOND

Bond Number:

Date (*not earlier than the Effective Date of the Agreement of the Construction Contract*):

Amount:

Modifications to this Bond Form: ☐ None ☐ See Paragraph 18

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Payment Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

SURETY

Contractor's Name and Corporate Seal

Surety's Name and Corporate Seal

By: _____
Signature

By: _____
Signature (*attach power of attorney*)

Print Name

Print Name

Title

Title

Attest: _____
Signature

Attest: _____
Signature

Title

Title

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

Bill and Hillary Clinton National Airport (LIT)
ABP Fire Suppression Improvements

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner to pay for labor, materials, and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.
2. If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies, and holds harmless the Owner from claims, demands, liens, or suits by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.
3. If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Paragraph 13) of claims, demands, liens, or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, and tendered defense of such claims, demands, liens, or suits to the Contractor and the Surety.
4. When the Owner has satisfied the conditions in Paragraph 3, the Surety shall promptly and at the Surety's expense defend, indemnify, and hold harmless the Owner against a duly tendered claim, demand, lien, or suit.
5. The Surety's obligations to a Claimant under this Bond shall arise after the following:
 - 5.1 Claimants who do not have a direct contract with the Contractor,
 - 5.1.1 have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and
 - 5.1.2 have sent a Claim to the Surety (at the address described in Paragraph 13).
 - 5.2 Claimants who are employed by or have a direct contract with the Contractor have sent a Claim to the Surety (at the address described in Paragraph 13).
6. If a notice of non-payment required by Paragraph 5.1.1 is given by the Owner to the Contractor that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Paragraph 5.1.1.
7. When a Claimant has satisfied the conditions of Paragraph 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:
 - 7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and
 - 7.2 Pay or arrange for payment of any undisputed amounts.
 - 7.3 The Surety's failure to discharge its obligations under Paragraph 7.1 or 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Paragraph 7.1 or 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.
8. The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Paragraph 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.
9. Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.
10. The Surety shall not be liable to the Owner, Claimants, or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to or give notice on behalf of Claimants, or otherwise have any obligations to Claimants under this Bond.
11. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.
12. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent

Bill and Hillary Clinton National Airport (LIT)
ABP Fire Suppression Improvements

jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Paragraph 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

13. Notice and Claims to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.

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

15. Upon requests by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

16. Definitions

16.1 **Claim:** A written statement by the Claimant including at a minimum:

1. The name of the Claimant;
2. The name of the person for whom the labor was done, or materials or equipment furnished;
3. A copy of the agreement or purchase order pursuant to which labor, materials, or equipment was furnished for use in the performance of the Construction Contract;
4. A brief description of the labor, materials, or equipment furnished;
5. The date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
6. The total amount earned by the Claimant for labor, materials, or equipment furnished as of the date of the Claim;
7. The total amount of previous payments received by the Claimant; and
8. The total amount due and unpaid to the Claimant for labor, materials, or equipment furnished as of the date of the Claim.

16.2 **Claimant:** An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials, or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond shall be to include without limitation in the terms of "labor, materials, or equipment" that part of the water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.

16.3 **Construction Contract:** The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.

16.4 **Owner Default:** Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

16.5 **Contract Documents:** All the documents that comprise the agreement between the Owner and Contractor.

17. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

18. Modifications to this Bond are as follows:

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00 65 16 CERTIFICATE OF SUBSTANTIAL COMPLETION

Owner:	LITTLE ROCK MUNICIPAL AIRPORT COMMISSION	Owner's Contract No.:	
Contractor:		Contractor's Project No.:	
Engineer:	Garver	Engineer's Project No.:	21A10111
Project:	ABP Fire Suppression Improvements		

This [preliminary] [final] Certificate of Substantial Completion applies to:

☐ All Work ☐ The following specified portions of the Work:

Date of Substantial Completion

The Work to which this Certificate applies has been inspected by authorized representatives of Owner, Contractor, and Engineer, and found to be substantially complete. The Date of Substantial Completion of the Work or portion thereof designated above is hereby established, subject to the provisions of the Contract pertaining to Substantial Completion. The date of Substantial Completion in the final Certificate of Substantial Completion marks the commencement of the contractual correction period and applicable warranties required by the Contract.

A punch list of items to be completed or corrected is attached to this Certificate. This list may not be all-inclusive, and 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.

The responsibilities between Owner and Contractor for security, operation, safety, maintenance, heat, utilities, insurance, and warranties upon Owner's use or occupancy of the Work shall be as provided in the Contract, except as amended as follows: *[Note: Amendments of contractual responsibilities recorded in this Certificate should be the product of mutual agreement of Owner and Contractor.]*

Amendments to Owner's responsibilities: ☐ None
☐ As follows

Amendments to Contractor's responsibilities: ☐ None
☐ As follows:

The following documents are attached to and made a part of this Certificate: *[punch list; others]*

This Certificate does not constitute an acceptance of Work not in accordance with the Contract Documents, nor is it a release of Contractor's obligation to complete the Work in accordance with the Contract.

EXECUTED BY ENGINEER:		RECEIVED:	RECEIVED:
By: _____ (Authorized signature)	By: _____ Owner (Authorized Signature)	By: _____ Contractor (Authorized Signature)	
Title: _____	Title: _____	Title: _____	
Date: _____	Date: _____	Date: _____	

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00 72 00 GENERAL PROVISIONS

SECTION 10 DEFINITION OF TERMS

When the following terms are used in these specifications, in the contract, or in any documents or other instruments pertaining to construction where these specifications govern, the intent and meaning shall be defined as follows:

Paragraph Number	Term	Definition
10-01	AASHTO	The American Association of State Highway and Transportation Officials.
10-02	Access Road	The right-of-way, the roadway and all improvements constructed thereon connecting the airport to a public roadway.
10-03	Advertisement	A public announcement, as required by local law, inviting bids for work to be performed and materials to be furnished.
10-03.01	Agreement	<i>The written instrument, executed by Owner and Contractor, that sets forth the Contract Price and Contract Times, identifies the parties and the Engineer, and designates the specific items that are Contract Documents. See also "Contract."</i>
10-04	Airport	Airport means an area of land or water which is used or intended to be used for the landing and takeoff of aircraft; an appurtenant area used or intended to be used for airport buildings or other airport facilities or rights of way; airport buildings and facilities located in any of these areas, and a heliport.
10-05	Airport Improvement Program (AIP)	A grant-in-aid program, administered by the Federal Aviation Administration (FAA).
10-06	Air Operations Area (AOA)	The term air operations area (AOA) shall mean any area of the airport used or intended to be used for the landing, takeoff, or surface maneuvering of aircraft. An air operation area shall include such paved or unpaved areas that are used or intended to be used for the unobstructed movement of aircraft in addition to its associated runway, taxiway, or apron.
10-07	Apron	Area where aircraft are parked, unloaded or loaded, fueled and/or serviced.
10-08	ASTM International (ASTM)	Formerly known as the American Society for Testing and Materials (ASTM).
10-09	Award	The Owner's notice to the successful bidder of the acceptance of the submitted bid.
10-09.01	Bid	<i>The written offer of the Bidder (when submitted on the approved proposal form) to perform the contemplated work and furnish the necessary materials in accordance with the</i>

Paragraph Number	Term	Definition
		<i>provisions of the plans and specifications. See also "Proposal."</i>
10-10	Bidder	Any individual, partnership, firm, or corporation, acting directly or through a duly authorized representative, who submits a proposal for the work contemplated.
10-10.01	Bidding Documents	<i>The Bidding Requirements, the proposed Contract Documents, and all Addenda.</i>
10-11	Building Area	An area on the airport to be used, considered, or intended to be used for airport buildings or other airport facilities or rights-of-way together with all airport buildings and facilities located thereon.
10-12	Calendar Day	Every day shown on the calendar.
10-13	Certificate of Analysis (COA)	The COA is the manufacturer's Certificate of Compliance (COC) including all applicable test results required by the specifications.
10-14	Certificate of Compliance (COC)	The manufacturer's certification stating that materials or assemblies furnished fully comply with the requirements of the contract. The certificate shall be signed by the manufacturer's authorized representative.
10-15	Change Order	A written order to the Contractor covering changes in the plans, specifications, or proposal quantities and establishing the basis of payment and contract time adjustment, if any, for work within the scope of the contract and necessary to complete the project.
10-16	Contract	A written agreement between the Owner and the Contractor that establishes the obligations of the parties including but not limited to performance of work, furnishing of labor, equipment and materials and the basis of payment. The awarded Contract includes but may not be limited to: Advertisement, Contract form, Proposal, Performance bond, Payment bond, General provisions, certifications and representations, Technical Specifications, Plans, Supplemental Provisions, standards incorporated by reference and issued addenda. <i>See also "Agreement."</i>
10-17	Contract Item (Pay Item)	A specific unit of work for which a price is provided in the contract.
10-18	Contract Time	The number of calendar days or working days, stated in the proposal, allowed for completion of the contract, including authorized time extensions. If a calendar date of completion is stated in the proposal, in lieu of a number of calendar or working days, the contract shall be completed by that date.
10-19	Contractor	The individual, partnership, firm, or corporation primarily liable for the acceptable performance of the work contracted

Paragraph Number	Term	Definition
		and for the payment of all legal debts pertaining to the work who acts directly or through lawful agents or employees to complete the contract work.
10-20	Contractors Quality Control (QC) Facilities	The Contractor's QC facilities in accordance with the Contractor Quality Control Program (CQCP).
10-21	Contractor Quality Control Program (CQCP)	Details the methods and procedures that will be taken to assure that all materials and completed construction required by the contract conform to contract plans, technical specifications and other requirements, whether manufactured by the Contractor, or procured from subcontractors or vendors.
10-22	Control Strip	A demonstration by the Contractor that the materials, equipment, and construction processes results in a product meeting the requirements of the specification.
10-23	Construction Safety and Phasing Plan (CSPP)	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.
10-24	Drainage System	The system of pipes, ditches, and structures by which surface or subsurface waters are collected and conducted from the airport area.
10-25	Engineer	The individual, partnership, firm, or corporation duly authorized by the Owner to be responsible for engineering, inspection, and/or observation of the contract work and acting directly or through an authorized representative.
10-26	Equipment	All machinery, together with the necessary supplies for upkeep and maintenance; and all tools and apparatus necessary for the proper construction and acceptable completion of the work.
10-27	Extra Work	An item of work not provided for in the awarded contract as previously modified by change order or supplemental agreement, but which is found by the Owner's Engineer or Resident Project Representative (RPR) to be necessary to complete the work within the intended scope of the contract as previously modified.
10-28	FAA	The Federal Aviation Administration. When used to designate a person, FAA shall mean the Administrator or their duly authorized representative.
10-29	Federal Specifications	The federal specifications and standards, commercial item descriptions, and supplements, amendments, and indices prepared and issued by the General Services Administration.

Paragraph Number	Term	Definition
10-30	Force Account	a. Contract Force Account - A method of payment that addresses extra work performed by the Contractor on a time and material basis. b. Owner Force Account - Work performed for the project by the Owner's employees.
10-30.01	Hazardous Environmental Condition	<i>The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated in the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, does not establish a Hazardous Environmental Condition.</i>
10-31	Intention of Terms	Whenever, in these specifications or on the plans, the words "directed," "required," "permitted," "ordered," "designated," "prescribed," or words of like import are used, it shall be understood that the direction, requirement, permission, order, designation, or prescription of the Engineer and/or Resident Project Representative (RPR) is intended; and similarly, the words "approved," "acceptable," "satisfactory," or words of like import, shall mean approved by, or acceptable to, or satisfactory to the Engineer and/or RPR, subject in each case to the final determination of the Owner. Any reference to a specific requirement of a numbered paragraph of the contract specifications or a cited standard shall be interpreted to include all general requirements of the entire section, specification item, or cited standard that may be pertinent to such specific reference.
10-32	Lighting	A system of fixtures providing or controlling the light sources used on or near the airport or within the airport buildings. The field lighting includes all luminous signals, markers, floodlights, and illuminating devices used on or near the airport or to aid in the operation of aircraft landing at, taking off from, or taxiing on the airport surface.
10-33	Major and Minor Contract Items	A major contract item shall be any item that is listed in the proposal, the total cost of which is equal to or greater than 20% of the total amount of the award contract. All other items shall be considered minor contract items.
10-34	Materials	Any substance specified for use in the construction of the contract work.
10-35	Modification of Standards (MOS)	Any deviation from standard specifications applicable to material and construction methods in accordance with FAA Order 5300.1.

Paragraph Number	Term	Definition
10-36	Notice to Proceed (NTP)	A written notice to the Contractor to begin the actual contract work on a previously agreed to date. If applicable, the Notice to Proceed shall state the date on which the contract time begins.
10-37	Owner	The term "Owner" shall mean the party of the first part or the contracting agency signatory to the contract. Where the term "Owner" is capitalized in this document, it shall mean airport Sponsor only. The Owner for this project is the Little Rock Municipal Airport Commission.
10-38	Passenger Facility Charge (PFC)	Per 14 Code of Federal Regulations (CFR) Part 158 and 49 United States Code (USC) § 40117, a PFC is a charge imposed by a public agency on passengers enplaned at a commercial service airport it controls.
10-39	Pavement Structure	The combined surface course, base course(s), and subbase course(s), if any, considered as a single unit.
10-40	Payment bond	The approved form of security furnished by the Contractor and their own surety as a guaranty that the Contractor will pay in full all bills and accounts for materials and labor used in the construction of the work.
10-41	Performance bond	The approved form of security furnished by the Contractor and their own surety as a guaranty that the Contractor will complete the work in accordance with the terms of the contract.
10-42	Plans	The official drawings or exact reproductions which show the location, character, dimensions and details of the airport and the work to be done and which are to be considered as a part of the Contract, supplementary to the specifications. Plans may also be referred to as "contract drawings," or "drawings."
10-43	Project	The agreed scope of work for accomplishing specific airport development with respect to a particular airport.
10-44	Proposal	The written offer of the Bidder (when submitted on the approved proposal form) to perform the contemplated work and furnish the necessary materials in accordance with the provisions of the plans and specifications. <i>See also</i> "Bid."
10-45	Proposal guaranty	The security furnished with a proposal to guarantee that the bidder will enter into a contract if their own proposal is accepted by the Owner.
10-46	Quality Assurance (QA)	Owner's responsibility to assure that construction work completed complies with specifications for payment.
10-47	Quality Control (QC)	Contractor's responsibility to control material(s) and construction processes to complete construction in accordance with project specifications.

Paragraph Number	Term	Definition
10-48	Quality Assurance (QA) Inspector	An authorized representative of the Engineer and/or Resident Project Representative (RPR) assigned to make all necessary inspections, observations, tests, and/or observation of tests of the work performed or being performed, or of the materials furnished or being furnished by the Contractor.
10-49	Quality Assurance (QA) Laboratory	The official quality assurance testing laboratories of the Owner or such other laboratories as may be designated by the Engineer or RPR. May also be referred to as Engineer's, Owner's, or QA Laboratory.
10-50	Resident Project Representative (RPR)	The individual, partnership, firm, or corporation duly authorized by the Owner to be responsible for all necessary inspections, observations, tests, and/or observations of tests of the contract work performed or being performed, or of the materials furnished or being furnished by the Contractor, and acting directly or through an authorized representative.
10-51	Runway	The area on the airport prepared for the landing and takeoff of aircraft.
10-52	Runway Safety Area (RSA)	A defined surface surrounding the runway prepared or suitable for reducing the risk of damage to aircraft. See the construction safety and phasing plan (CSPP) for limits of the RSA.
10-53	Safety Plan Compliance Document (SPCD)	Details how the Contractor will comply with the CSPP.
10-54	Specifications	A part of the contract containing the written directions and requirements for completing the contract work. Standards for specifying materials or testing which are cited in the contract specifications by reference shall have the same force and effect as if included in the contract physically.
10-54.01	Site	<i>Has the meaning set forth in Section 4.01 of the Instructions to Bidders.</i>
10-55	Sponsor	A Sponsor is defined in 49 USC § 47102(24) as a public agency that submits to the FAA for an AIP grant; or a private Owner of a public-use airport that submits to the FAA an application for an AIP grant for the airport.
10-56	Structures	Airport facilities such as bridges; culverts; catch basins, inlets, retaining walls, cribbing; storm and sanitary sewer lines; water lines; underdrains; electrical ducts, manholes, handholes, lighting fixtures and bases; transformers; navigational aids; buildings; vaults; and, other manmade features of the airport that may be encountered in the work and not otherwise classified herein.
10-57	Subgrade	The soil that forms the pavement foundation.

Paragraph Number	Term	Definition
10-58	Superintendent	The Contractor's executive representative who is present on the work during progress, authorized to receive and fulfill instructions from the RPR, and who shall supervise and direct the construction.
10-59	Supplemental Agreement	A written agreement between the Contractor and the Owner that establishes the basis of payment and contract time adjustment, if any, for the work affected by the supplemental agreement. A supplemental agreement is required if: (1) in scope work would increase or decrease the total amount of the awarded contract by more than 25%; (2) in scope work would increase or decrease the total of any major contract item by more than 25%; (3) work that is not within the scope of the originally awarded contract; or (4) adding or deleting of a major contract item.
10-60	Surety	The corporation, partnership, or individual, other than the Contractor, executing payment or performance bonds that are furnished to the Owner by the Contractor.
10-61	Taxilane	A taxiway designed for low speed movement of aircraft between aircraft parking areas and terminal areas.
10-62	Taxiway	The portion of the air operations area of an airport that has been designated by competent airport authority for movement of aircraft to and from the airport's runways, aircraft parking areas, and terminal areas.
10-63	Taxiway/Taxilane Safety Area (TSA)	A defined surface alongside the taxiway prepared or suitable for reducing the risk of damage to an aircraft. See the construction safety and phasing plan (CSPP) for limits of the TSA.
10-63.01	Technical Data	<i>Those items expressly identified as Technical Data in the Special Provisions, with respect to either (a) subsurface conditions at the Site, or physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) or (b) Hazardous Environmental Conditions at the Site. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then the data contained in boring logs, recorded measurements of subsurface water levels, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical or environmental report prepared for the Project and made available to Contractor are hereby defined as Technical Data with respect to conditions at the Site.</i>
10-63.02	Underground Facilities	<i>All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including but not limited to those that convey electricity, gases, steam, liquid petroleum products,</i>

Paragraph Number	Term	Definition
		<i>telephone or other communications, fiber optic transmissions, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.</i>
10-64	Work	The furnishing of all labor, materials, tools, equipment, and incidentals necessary or convenient to the Contractor's performance of all duties and obligations imposed by the contract, plans, and specifications.
10-65	Working day	A working day shall be any day other than a legal holiday, Saturday, or Sunday on which the normal working forces of the Contractor may proceed with regular work for at least six (6) hours toward completion of the contract. When work is suspended for causes beyond the Contractor's control, it will not be counted as a working day. Saturdays, Sundays and holidays on which the Contractor's forces engage in regular work will be considered as working days.
10-66	Owner Defined terms	<i>Owner defined terms have been incorporated in alphabetical order above and are shown in italics.</i>

END OF SECTION 10

SECTION 20 PROPOSAL REQUIREMENTS AND CONDITIONS

20-01 Advertisement (Notice to Bidders). [See Section 00 11 00]

20-02 Qualification of bidders. ~~See Instructions to Bidders, Article 3. Each bidder shall submit evidence of competency and evidence of financial responsibility to perform the work to the Owner at the time of bid opening.~~

~~Evidence of competency, unless otherwise specified, shall consist of statements covering the bidder's past experience on similar work, and a list of equipment and a list of key personnel that would be available for the work.~~

~~Each bidder shall furnish the Owner satisfactory evidence of their financial responsibility. Evidence of financial responsibility, unless otherwise specified, shall consist of a confidential statement or report of the bidder's financial resources and liabilities as of the last calendar year or the bidder's last fiscal year. Such statements or reports shall be certified by a public accountant. At the time of submitting such financial statements or reports, the bidder shall further certify whether their financial responsibility is approximately the same as stated or reported by the public accountant. If the bidder's financial responsibility has changed, the bidder shall qualify the public accountant's statement or report to reflect the bidder's true financial condition at the time such qualified statement or report is submitted to the Owner.~~

~~Unless otherwise specified, a bidder may submit evidence that they are prequalified with the State Highway Division and are on the current "bidder's list" of the state in which the proposed work is located. Evidence of State Highway Division prequalification may be submitted as evidence of financial responsibility in lieu of the certified statements or reports specified above.~~

20-03 Contents of proposal forms. The Owner's *bidding documents* ~~proposal forms~~ state the location and description of the proposed construction; the place, date, and time of opening of the proposals; and the estimated quantities of the various items of work to be performed and materials to be furnished for which unit bid prices are asked. The proposal form states the time in which the work must be completed, and the amount of the proposal guaranty that must accompany the proposal. The Owner will accept only those Proposals properly executed on physical forms or electronic forms provided by the Owner. Bidder actions that may cause the Owner to deem a proposal irregular are given in paragraph 20-09 *Irregular proposals*.

20-04 Issuance of proposal forms. The Owner reserves the right to refuse to issue a proposal form to a prospective bidder if the bidder is in default for any of the following reasons:

- a. Failure to comply with any prequalification regulations of the Owner, if such regulations are cited, or otherwise included, in the proposal as a requirement for bidding.
- b. Failure to pay, or satisfactorily settle, all bills due for labor and materials on former contracts in force with the Owner at the time the Owner issues the proposal to a prospective bidder.
- c. Documented record of Contractor default under previous contracts with the Owner.
- d. Documented record of unsatisfactory work on previous contracts with the Owner.

20-05 Interpretation of estimated proposal quantities. An estimate of quantities of work to be done and materials to be furnished under these specifications is given in the proposal. It is the result of careful calculations and is believed to be correct. It is given only as a basis for comparison of proposals and the award of the contract. The Owner does not expressly, or by implication, agree that the actual quantities involved will correspond exactly therewith; nor shall the bidder plead misunderstanding or deception because of such estimates of quantities, or of the character, location, or other conditions pertaining to the work. Payment to the Contractor will be made only for the actual quantities of work performed or materials furnished in accordance with the plans and specifications. It is understood that the quantities may be increased or decreased as provided in the Section 40, paragraph 40-02, Alteration of Work and Quantities, without in any way invalidating the unit bid prices.

20-06 Examination of plans, specifications, and site. The bidder is expected to carefully examine the site of the proposed work, the proposal, plans, specifications, and contract forms. Bidders shall satisfy themselves to the character, quality, and quantities of work to be performed, materials to be furnished, and to the requirements of the proposed contract. The submission of a proposal shall be prima facie evidence that the bidder has made such examination and is satisfied to the conditions to be encountered in performing the work and the requirements of the proposed contract, plans, and specifications.

20-07 Preparation of proposal. ~~See Instructions to Bidders, Article 13. The bidder shall submit their proposal on the forms furnished by the Owner. All blank spaces in the proposal forms, unless explicitly stated otherwise, must be correctly filled in where indicated for each and every item for which a quantity is given. If so requested, the bidder shall state the price (written in ink or typed) both in words and numerals which they propose for each pay item furnished in the proposal. In case of conflict between words and numerals, the words, unless obviously incorrect, shall govern.~~

~~The bidder shall correctly sign the proposal in ink. If the proposal is made by an individual, their name and post office address must be shown. If made by a partnership, the name and post office address of each member of the partnership must be shown. If made by a corporation, the person signing the proposal shall give the name of the state where the corporation was chartered and the name, titles, and business address of the president, secretary, and the treasurer. Anyone signing a proposal as an agent shall file evidence of their authority to do so and that the signature is binding upon the firm or corporation.~~

20-08 Responsive and responsible bidder. ~~See Instructions to Bidders, Article 3. A responsive bid conforms to all significant terms and conditions contained in the Owner's invitation for bid. It is the Owner's responsibility to decide if the exceptions taken by a bidder to the solicitation are material or not and the extent of deviation it is willing to accept.~~

~~A responsible bidder has the ability to perform successfully under the terms and conditions of a proposed procurement, as defined in 2 CFR § 200.318(h). This includes such matters as Contractor integrity, compliance with public policy, record of past performance, and financial and technical resources.~~

20-09 Irregular proposals. Proposals shall be considered irregular for the following reasons:

- a. If the proposal is on a form other than that furnished by the Owner, or if the Owner's form is altered, or if any part of the proposal form is detached.
- b. If there are unauthorized additions, conditional or alternate pay items, or irregularities of any kind that make the proposal incomplete, indefinite, or otherwise ambiguous.
- c. If the proposal does not contain a unit price for each pay item listed in the proposal, except in the case of authorized alternate pay items, for which the bidder is not required to furnish a unit price.
- d. If the proposal contains unit prices that are obviously unbalanced.
- e. If the proposal is not accompanied by the proposal guaranty specified by the Owner.
- f. If the applicable Disadvantaged Business Enterprise information is incomplete.

The Owner reserves the right to reject any irregular proposal and the right to waive technicalities if such waiver is in the best interest of the Owner and conforms to local laws and ordinances pertaining to the letting of construction contracts.

20-10 Bid guarantee. ~~See Instructions to Bidders, Article 8. Each separate proposal shall be accompanied by a bid bond, certified check, or other specified acceptable collateral, in the amount specified in the proposal form. Such bond, check, or collateral, shall be made payable to the Owner.~~

20-11 Delivery of proposal. *See Instructions to Bidders, Article 15.* ~~Each proposal submitted shall be placed in a sealed envelope plainly marked with the project number, location of airport, and name and business address of the bidder on the outside. When sent by mail, preferably registered, the sealed proposal, marked as indicated above, should be enclosed in an additional envelope. No proposal will be considered unless received at the place specified in the advertisement or as modified by Addendum before the time specified for opening all bids. Proposals received after the bid opening time shall be returned to the bidder unopened.~~

20-12 Withdrawal or revision of proposals. *See Instructions to Bidders, Article 16.* ~~A bidder may withdraw or revise (by withdrawal of one proposal and submission of another) a proposal provided that the bidder's request for withdrawal is received by the Owner [in writing] [by fax] [by email] before the time specified for opening bids. Revised proposals must be received at the place specified in the advertisement before the time specified for opening all bids.~~

20-13 Public opening of proposals. *See Instructions to Bidders, Article 17.* ~~Proposals shall be opened, and read, publicly at the time and place specified in the advertisement. Bidders, their authorized agents, and other interested persons are invited to attend. Proposals that have been withdrawn (by written or telegraphic request) or received after the time specified for opening bids shall be returned to the bidder unopened.~~

20-14 Disqualification of bidders. *See Instructions to Bidders, Article 19.* ~~A bidder shall be considered disqualified for any of the following reasons:~~

~~a. Submitting more than one proposal from the same partnership, firm, or corporation under the same or different name.~~

~~b. Evidence of collusion among bidders. Bidders participating in such collusion shall be disqualified as bidders for any future work of the Owner until any such participating bidder has been reinstated by the Owner as a qualified bidder.~~

~~c. If the bidder is considered to be in "default" for any reason specified in paragraph 20-04, *Issuance of Proposal Forms*, of this section.~~

20-15 Discrepancies and Omissions. *See Instructions to Bidders, Article 5.* ~~A Bidder who discovers discrepancies or omissions with the project bid documents shall immediately notify the Owner's Engineer of the matter. A bidder that has doubt as to the true meaning of a project requirement may submit to the Owner's Engineer a written request for interpretation no later than [] days prior to bid opening.~~

~~Any interpretation of the project bid documents by the Owner's Engineer will be by written addendum issued by the Owner. The Owner will not consider any instructions, clarifications or interpretations of the bidding documents in any manner other than written addendum.~~

END OF SECTION 20

SECTION 30 AWARD AND EXECUTION OF CONTRACT

30-01 Consideration of proposals. ~~See Instructions to Bidders, Article 19. After the proposals are publicly opened and read, they will be compared on the basis of the summation of the products obtained by multiplying the estimated quantities shown in the proposal by the unit bid prices. If a bidder's proposal contains a discrepancy between unit bid prices written in words and unit bid prices written in numbers, the unit bid price written in words shall govern.~~

Until the award of a contract is made, the Owner reserves the right to reject a bidder's proposal for any of the following reasons:

~~a. If the proposal is irregular as specified in Section 20, paragraph 20-09, *Irregular Proposals*.~~

~~b. If the bidder is disqualified for any of the reasons specified Section 20, paragraph 20-14, *Disqualification of Bidders*.~~

In addition, until the award of a contract is made, the Owner reserves the right to reject any or all proposals, waive technicalities, if such waiver is in the best interest of the Owner and is in conformance with applicable state and local laws or regulations pertaining to the letting of construction contracts; advertise for new proposals; or proceed with the work otherwise. All such actions shall promote the Owner's best interests.

30-02 Award of contract. ~~See Instructions to Bidders, Article 19. The award of a contract, if it is to be awarded, shall be made within [] calendar days of the date specified for publicly opening proposals, unless otherwise specified herein.~~

~~If the Owner elects to proceed with an award of contract, the Owner will make award to the responsible bidder whose bid, conforming with all the material terms and conditions of the bid documents, is the lowest in price.~~

30-03 Cancellation of award. The Owner reserves the right to cancel the award without liability to the bidder, except return of proposal guaranty, at any time before a contract has been fully executed by all parties and is approved by the Owner in accordance with paragraph 30-07 *Approval of Contract*.

30-04 Return of proposal guaranty. ~~See Instructions to Bidders, Article 18. All proposal guaranties, except those of the two lowest bidders, will be returned immediately after the Owner has made a comparison of bids as specified in the paragraph 30-01, *Consideration of Proposals*. Proposal guaranties of the two lowest bidders will be retained by the Owner until such time as an award is made, at which time, the unsuccessful bidder's proposal guaranty will be returned. The successful bidder's proposal guaranty will be returned as soon as the Owner receives the contract bonds as specified in paragraph 30-05, *Requirements of Contract Bonds*.~~

30-05 Requirements of contract bonds. At the time of the execution of the contract, the successful bidder shall furnish the Owner a surety bond or bonds that have been fully executed by the bidder and the surety guaranteeing the performance of the work and the payment of all legal debts that may be incurred by reason of the Contractor's performance of the work. The surety and the form of the bond or bonds shall be acceptable to the Owner. Unless otherwise specified in this subsection, the surety bond or bonds shall be in a sum equal to the full amount of the contract.

30-06 Execution of contract. ~~See Instructions to Bidders, Article 21. The successful bidder shall sign (execute) the necessary agreements for entering into the contract and return the signed contract to the Owner, along with the fully executed surety bond or bonds specified in paragraph 30-05, *Requirements of Contract Bonds*, of this section, within 15 calendar days from the date mailed or otherwise delivered to the successful bidder.~~

30-07 Approval of contract. *See Instructions to Bidders, Article 21.* ~~Upon receipt of the contract and contract bond or bonds that have been executed by the successful bidder, the Owner shall complete the execution of the contract in accordance with local laws or ordinances, and return the fully executed contract to the Contractor. Delivery of the fully executed contract to the Contractor shall constitute the Owner's approval to be bound by the successful bidder's proposal and the terms of the contract.~~

30-08 Failure to execute contract. *See Instructions to Bidders, Article 8.* ~~Failure of the successful bidder to execute the contract and furnish an acceptable surety bond or bonds within the period specified in paragraph 30-06, *Execution of Contract*, of this section shall be just cause for cancellation of the award and forfeiture of the proposal guaranty, not as a penalty, but as liquidated damages to the Owner.~~

END OF SECTION 30

SECTION 40 SCOPE OF WORK

40-01 Intent of contract. The intent of the contract is to provide for construction and completion, in every detail, of the work described. It is further intended that the Contractor shall furnish all labor, materials, equipment, tools, transportation, and supplies required to complete the work in accordance with the plans, specifications, and terms of the contract.

40-02 Alteration of work and quantities. The Owner reserves the right to make such changes in quantities and work as may be necessary or desirable to complete, in a satisfactory manner, the original intended work. Unless otherwise specified in the Contract, the Owner's Engineer or RPR shall be and is hereby authorized to make, in writing, such in-scope alterations in the work and variation of quantities as may be necessary to complete the work, provided such action does not represent a significant change in the character of the work.

For purpose of this section, a significant change in character of work means: any change that is outside the current contract scope of work; any change (increase or decrease) in the total contract cost by more than 25%; or any change in the total cost of a major contract item by more than 25%.

Work alterations and quantity variances that do not meet the definition of significant change in character of work shall not invalidate the contract nor release the surety. Contractor agrees to accept payment for such work alterations and quantity variances in accordance with Section 90, paragraph 90-03, *Compensation for Altered Quantities*.

Should the value of altered work or quantity variance meet the criteria for significant change in character of work, such altered work and quantity variance shall be covered by a supplemental agreement. Supplemental agreements shall also require consent of the Contractor's surety and separate performance and payment bonds. If the Owner and the Contractor are unable to agree on a unit adjustment for any contract item that requires a supplemental agreement, the Owner reserves the right to terminate the contract with respect to the item and make other arrangements for its completion.

40-03 Omitted items. The Owner, the Owner's Engineer or the RPR may provide written notice to the Contractor to omit from the work any contract item that does not meet the definition of major contract item. Major contract items may be omitted by a supplemental agreement. Such omission of contract items shall not invalidate any other contract provision or requirement.

Should a contract item be omitted or otherwise ordered to be non-performed, the Contractor shall be paid for all work performed toward completion of such item prior to the date of the order to omit such item. Payment for work performed shall be in accordance with Section 90, paragraph 90-04, *Payment for Omitted Items*.

40-04 Extra work. Should acceptable completion of the contract require the Contractor to perform an item of work not provided for in the awarded contract as previously modified by change order or supplemental agreement, Owner may issue a Change Order to cover the necessary extra work. Change orders for extra work shall contain agreed unit prices for performing the change order work in accordance with the requirements specified in the order, and shall contain any adjustment to the contract time that, in the RPR's opinion, is necessary for completion of the extra work.

When determined by the RPR to be in the Owner's best interest, the RPR may order the Contractor to proceed with extra work as provided in Section 90, paragraph 90-05, *Payment for Extra Work*. Extra work that is necessary for acceptable completion of the project, but is not within the general scope of the work covered by the original contract shall be covered by a supplemental agreement as defined in Section 10, paragraph 10-59, *Supplemental Agreement*.

If extra work is essential to maintaining the project critical path, RPR may order the Contractor to commence the extra work under a Time and Material contract method. Once sufficient detail is available to establish the level of effort necessary for the extra work, the Owner shall initiate a change order or supplemental agreement to cover the extra work.

Any claim for payment of extra work that is not covered by written agreement (change order or supplemental agreement) shall be rejected by the Owner.

40-05 Maintenance of traffic. It is the explicit intention of the contract that the safety of aircraft, as well as the Contractor's equipment and personnel, is the most important consideration. The Contractor shall maintain traffic in the manner detailed in the Construction Safety and Phasing Plan (CSPP).

a. It is understood and agreed that the Contractor shall provide for the free and unobstructed movement of aircraft in the air operations areas (AOAs) of the airport with respect to their own operations and the operations of all subcontractors as specified in Section 80, paragraph 80-04, *Limitation of Operations*. It is further understood and agreed that the Contractor shall provide for the uninterrupted operation of visual and electronic signals (including power supplies thereto) used in the guidance of aircraft while operating to, from, and upon the airport as specified in Section 70, paragraph 70-15, *Contractor's Responsibility for Utility Service and Facilities of Others*.

b. With respect to their own operations and the operations of all subcontractors, the Contractor shall provide marking, lighting, and other acceptable means of identifying personnel, equipment, vehicles, storage areas, and any work area or condition that may be hazardous to the operation of aircraft, fire-rescue equipment, or maintenance vehicles at the airport in accordance with the construction safety and phasing plan (CSPP) and the safety plan compliance document (SPCD).

c. When the contract requires the maintenance of an existing road, street, or highway during the Contractor's performance of work that is otherwise provided for in the contract, plans, and specifications, the Contractor shall keep the road, street, or highway open to all traffic and shall provide maintenance as may be required to accommodate traffic. The Contractor, at their expense, shall be responsible for the repair to equal or better than preconstruction conditions of any damage caused by the Contractor's equipment and personnel. The Contractor shall furnish, erect, and maintain barricades, warning signs, flag person, and other traffic control devices in reasonable conformity with the Manual on Uniform Traffic Control Devices (MUTCD) (<http://mutcd.fhwa.dot.gov/>), unless otherwise specified. The Contractor shall also construct and maintain in a safe condition any temporary connections necessary for ingress to and egress from abutting property or intersecting roads, streets or highways. Unless otherwise specified herein, the Contractor will not be required to furnish snow removal for such existing road, street, or highway.

40-06 Removal of existing structures. All existing structures encountered within the established lines, grades, or grading sections shall be removed by the Contractor, unless such existing structures are otherwise specified to be relocated, adjusted up or down, salvaged, abandoned in place, reused in the work or to remain in place. The cost of removing such existing structures shall not be measured or paid for directly, but shall be included in the various contract items.

Should the Contractor encounter an existing structure (above or below ground) in the work for which the disposition is not indicated on the plans, the Resident Project Representative (RPR) shall be notified prior to disturbing such structure. The disposition of existing structures so encountered shall be immediately determined by the RPR in accordance with the provisions of the contract.

Except as provided in Section 40, paragraph 40-07, *Rights in and Use of Materials Found in the Work*, it is intended that all existing materials or structures that may be encountered (within the lines, grades, or grading sections established for completion of the work) shall be used in the work as otherwise provided for in the contract and shall remain the property of the Owner when so used in the work.

40-07 Rights in and use of materials found in the work. Should the Contractor encounter any material such as (but not restricted to) sand, stone, gravel, slag, or concrete slabs within the established lines, grades, or grading sections, the use of which is intended by the terms of the contract to be embankment, the Contractor may at their own option either:

- a. Use such material in another contract item, providing such use is approved by the RPR and is in conformance with the contract specifications applicable to such use; or,
- b. Remove such material from the site, upon written approval of the RPR; or
- c. Use such material for the Contractor's own temporary construction on site; or,
- d. Use such material as intended by the terms of the contract.

Should the Contractor wish to exercise option a., b., or c., the Contractor shall request the RPR's approval in advance of such use.

Should the RPR approve the Contractor's request to exercise option a., b., or c., the Contractor shall be paid for the excavation or removal of such material at the applicable contract price. The Contractor shall replace, at their expense, such removed or excavated material with an agreed equal volume of material that is acceptable for use in constructing embankment, backfills, or otherwise to the extent that such replacement material is needed to complete the contract work. The Contractor shall not be charged for use of such material used in the work or removed from the site.

Should the RPR approve the Contractor's exercise of option a., the Contractor shall be paid, at the applicable contract price, for furnishing and installing such material in accordance with requirements of the contract item in which the material is used.

It is understood and agreed that the Contractor shall make no claim for delays by reason of their own exercise of option a., b., or c.

The Contractor shall not excavate, remove, or otherwise disturb any material, structure, or part of a structure which is located outside the lines, grades, or grading sections established for the work, except where such excavation or removal is provided for in the contract, plans, or specifications.

40-08 Final cleanup. Upon completion of the work and before acceptance and final payment will be made, the Contractor shall remove from the site all machinery, equipment, surplus and discarded materials, rubbish, temporary structures, and stumps or portions of trees. The Contractor shall cut all brush and woods within the limits indicated and shall leave the site in a neat and presentable condition. Material cleared from the site and deposited on adjacent property will not be considered as having been disposed of satisfactorily, unless the Contractor has obtained the written permission of the property Owner.

END OF SECTION 40

SECTION 50 CONTROL OF WORK

50-01 Authority of the Resident Project Representative (RPR). The RPR has final authority regarding the interpretation of project specification requirements. The RPR shall determine acceptability of the quality of materials furnished, method of performance of work performed, and the manner and rate of performance of the work. The RPR does not have the authority to accept work that does not conform to specification requirements.

50-02 Conformity with plans and specifications. All work and all materials furnished shall be in reasonably close conformity with the lines, grades, grading sections, cross-sections, dimensions, material requirements, and testing requirements that are specified (including specified tolerances) in the contract, plans, or specifications.

If the RPR finds the materials furnished, work performed, or the finished product not within reasonably close conformity with the plans and specifications, but that the portion of the work affected will, in their opinion, result in a finished product having a level of safety, economy, durability, and workmanship acceptable to the Owner, the RPR will advise the Owner of their determination that the affected work be accepted and remain in place. The RPR will document the determination and recommend to the Owner a basis of acceptance that will provide for an adjustment in the contract price for the affected portion of the work. Changes in the contract price must be covered by contract change order or supplemental agreement as applicable.

If the RPR finds the materials furnished, work performed, or the finished product are not in reasonably close conformity with the plans and specifications and have resulted in an unacceptable finished product, the affected work or materials shall be removed and replaced or otherwise corrected by and at the expense of the Contractor in accordance with the RPR's written orders.

The term "reasonably close conformity" shall not be construed as waiving the Contractor's responsibility to complete the work in accordance with the contract, plans, and specifications. The term shall not be construed as waiving the RPR's responsibility to insist on strict compliance with the requirements of the contract, plans, and specifications during the Contractor's execution of the work, when, in the RPR's opinion, such compliance is essential to provide an acceptable finished portion of the work.

The term "reasonably close conformity" is also intended to provide the RPR with the authority, after consultation with the Sponsor and FAA, to use sound engineering judgment in their determinations to accept work that is not in strict conformity, but will provide a finished product equal to or better than that required by the requirements of the contract, plans and specifications.

The RPR will not be responsible for the Contractor's means, methods, techniques, sequences, or procedures of construction or the safety precautions incident thereto.

50-03 Coordination of contract, plans, and specifications. The contract, plans, specifications, and all referenced standards cited are essential parts of the contract requirements. If electronic files are provided and used on the project and there is a conflict between the electronic files and hard copy plans, the hard copy plans shall govern. A requirement occurring in one is as binding as though occurring in all. They are intended to be complementary and to describe and provide for a complete work. In case of discrepancy, calculated dimensions will govern over scaled dimensions; contract technical specifications shall govern over contract general provisions, plans, cited standards for materials or testing, and cited advisory circulars (ACs); contract general provisions shall govern over plans, cited standards for materials or testing, and cited ACs; plans shall govern over cited standards for materials or testing and cited ACs. If any paragraphs contained in the Special Provisions conflict with General Provisions or Technical Specifications, the Special Provisions shall govern.

From time to time, discrepancies within cited testing standards occur due to the timing of the change, edits, and/or replacement of the standards. If the Contractor discovers any apparent discrepancy within standard test methods, the Contractor shall immediately ask the RPR for an interpretation and decision, and such decision shall be final.

The Contractor shall not take advantage of any apparent error or omission on the plans or specifications. In the event the Contractor discovers any apparent error or discrepancy, Contractor shall immediately notify the Owner or the designated representative in writing requesting their written interpretation and decision.

50-04 List of Special Provisions. See Special Provisions (Section 00 73 00)

50-05 Cooperation of Contractor. The Contractor shall be supplied with three hard copies *and* an electronic PDF of the plans and specifications. The Contractor shall have available on the construction site at all times one hardcopy each of the plans and specifications. Additional hard copies of plans and specifications may be obtained by the Contractor for the cost of reproduction.

The Contractor shall give constant attention to the work to facilitate the progress thereof, and shall cooperate with the RPR and their inspectors and with other Contractors in every way possible. The Contractor shall have a competent superintendent on the work at all times who is fully authorized as their agent on the work. The superintendent shall be capable of reading and thoroughly understanding the plans and specifications and shall receive and fulfill instructions from the RPR or their authorized representative.

50-06 Cooperation between Contractors. The Owner reserves the right to contract for and perform other or additional work on or near the work covered by this contract.

When separate contracts are let within the limits of any one project, each Contractor shall conduct the work not to interfere with or hinder the progress of completion of the work being performed by other Contractors. Contractors working on the same project shall cooperate with each other as directed.

Each Contractor involved shall assume all liability, financial or otherwise, in connection with their own contract and shall protect and hold harmless the Owner from any and all damages or claims that may arise because of inconvenience, delays, or loss experienced because of the presence and operations of other Contractors working within the limits of the same project.

The Contractor shall arrange their work and shall place and dispose of the materials being used to not interfere with the operations of the other Contractors within the limits of the same project. The Contractor shall join their work with that of the others in an acceptable manner and shall perform it in proper sequence to that of the others.

50-07 Construction layout and stakes. The Engineer/RPR shall establish necessary horizontal and vertical control. The establishment of Survey Control and/or reestablishment of survey control shall be by a State Licensed Land Surveyor. Contractor is responsible for preserving integrity of horizontal and vertical controls established by Engineer/RPR. In case of negligence on the part of the Contractor or their employees, resulting in the destruction of any horizontal and vertical control, the resulting costs will be deducted as a liquidated damage against the Contractor.

Prior to the start of construction, the Contractor will check all control points for horizontal and vertical accuracy and certify in writing to the RPR that the Contractor concurs with survey control established for the project. All lines, grades and measurements from control points necessary for the proper execution and control of the work on this project will be provided to the RPR. The Contractor is responsible to establish all layout required for the construction of the project.

Copies of survey notes will be provided to the RPR for each area of construction and for each placement of material as specified to allow the RPR to make periodic checks for conformance with plan grades, alignments and grade tolerances required by the applicable material specifications. Surveys will be provided to the RPR prior to commencing work items that cover or disturb the survey staking. Survey(s) and notes shall be provided in the following format(s): AutoCAD Civil 3D format

Laser, GPS, String line, or other automatic control shall be checked with temporary control as necessary. In the case of error, on the part of the Contractor, their surveyor, employees or subcontractors, resulting in established grades, alignment or grade tolerances that do not concur with those specified or shown on the plans, the Contractor is solely responsible for correction, removal, replacement and all associated costs at no additional cost to the Owner.

No direct payment will be made, unless otherwise specified in contract documents, for this labor, materials, or other expenses. The cost shall be included in the price of the bid for the various items of the Contract.

50-08 Authority and duties of Quality Assurance (QA) inspectors. QA inspectors shall be authorized to inspect all work done and all material furnished. Such QA inspection may extend to all or any part of the work and to the preparation, fabrication, or manufacture of the materials to be used. QA inspectors are not authorized to revoke, alter, or waive any provision of the contract. QA inspectors are not authorized to issue instructions contrary to the plans and specifications or to act as foreman for the Contractor.

QA Inspectors are authorized to notify the Contractor or their representatives of any failure of the work or materials to conform to the requirements of the contract, plans, or specifications and to reject such nonconforming materials in question until such issues can be referred to the RPR for a decision.

50-09 Inspection of the work. All materials and each part or detail of the work shall be subject to inspection. The RPR shall be allowed access to all parts of the work and shall be furnished with such information and assistance by the Contractor as is required to make a complete and detailed inspection.

If the RPR requests it, the Contractor, at any time before acceptance of the work, shall remove or uncover such portions of the finished work as may be directed. After examination, the Contractor shall restore said portions of the work to the standard required by the specifications. Should the work thus exposed or examined prove acceptable, the uncovering, or removing, and the replacing of the covering or making good of the parts removed will be paid for as extra work; but should the work so exposed or examined prove unacceptable, the uncovering, or removing, and the replacing of the covering or making good of the parts removed will be at the Contractor's expense.

Provide advance written notice to the RPR of work the Contractor plans to perform each week and each day. Any work done or materials used without written notice and allowing opportunity for inspection by the RPR may be ordered removed and replaced at the Contractor's expense.

Should the contract work include relocation, adjustment, or any other modification to existing facilities, not the property of the (contract) Owner, authorized representatives of the Owners of such facilities shall have the right to inspect such work. Such inspection shall in no sense make any facility owner a party to the contract, and shall in no way interfere with the rights of the parties to this contract.

50-10 Removal of unacceptable and unauthorized work. All work that does not conform to the requirements of the contract, plans, and specifications will be considered unacceptable, unless otherwise determined acceptable by the RPR as provided in paragraph 50-02, *Conformity with Plans and Specifications*.

Unacceptable work, whether the result of poor workmanship, use of defective materials, damage through carelessness, or any other cause found to exist prior to the final acceptance of the work, shall be removed immediately and replaced in an acceptable manner in accordance with the provisions of Section 70, paragraph 70-14, *Contractor's Responsibility for Work*.

No removal work made under provision of this paragraph shall be done without lines and grades having been established by the RPR. Work done contrary to the instructions of the RPR, work done beyond the lines shown on the plans or as established by the RPR, except as herein specified, or any extra work done without authority, will be considered as unauthorized and will not be paid for under the provisions of the contract. Work so done may be ordered removed or replaced at the Contractor's expense.

Upon failure on the part of the Contractor to comply with any order of the RPR made under the provisions of this subsection, the RPR will have authority to cause unacceptable work to be remedied or removed and replaced; and unauthorized work to be removed and recover the resulting costs as a liquidated damage against the Contractor.

50-11 Load restrictions. The Contractor shall comply with all legal load restrictions in the hauling of materials on public roads beyond the limits of the work. A special permit will not relieve the Contractor of liability for damage that may result from the moving of material or equipment.

The operation of equipment of such weight or so loaded as to cause damage to structures or to any other type of construction will not be permitted. Hauling of materials over the base course or surface course under construction shall be limited as directed. No loads will be permitted on a concrete pavement, base, or structure before the expiration of the curing period. The Contractor, at their own expense, shall be responsible for the repair to equal or better than preconstruction conditions of any damage caused by the Contractor's equipment and personnel.

50-12 Maintenance during construction. The Contractor shall maintain the work during construction and until the work is accepted. Maintenance shall constitute continuous and effective work prosecuted day by day, with adequate equipment and forces so that the work is maintained in satisfactory condition at all times.

In the case of a contract for the placing of a course upon a course or subgrade previously constructed, the Contractor shall maintain the previous course or subgrade during all construction operations.

All costs of maintenance work during construction and before the project is accepted shall be included in the unit prices bid on the various contract items, and the Contractor will not be paid an additional amount for such work.

50-13 Failure to maintain the work. Should the Contractor at any time fail to maintain the work as provided in paragraph 50-12, *Maintenance during Construction*, the RPR shall immediately notify the Contractor of such noncompliance. Such notification shall specify a reasonable time within which the Contractor shall be required to remedy such unsatisfactory maintenance condition. The time specified will give due consideration to the exigency that exists.

Should the Contractor fail to respond to the RPR's notification, the Owner may suspend any work necessary for the Owner to correct such unsatisfactory maintenance condition, depending on the exigency that exists. Any maintenance cost incurred by the Owner, shall be recovered as a liquidated damage against the Contractor.

50-14 Partial acceptance. If at any time during the execution of the project the Contractor substantially completes a usable unit or portion of the work, the occupancy of which will benefit the Owner, the Contractor may request the RPR to make final inspection of that unit. If the RPR finds upon inspection that the unit has been satisfactorily completed in compliance with the contract, the RPR may accept it as being complete, and the Contractor may be relieved of further responsibility for that unit. Such partial acceptance and beneficial occupancy by the Owner shall not void or alter any provision of the contract.

50-15 Final acceptance. Upon due notice from the Contractor of presumptive completion of the entire project, the RPR and Owner will make an inspection. If all construction provided for and contemplated by the contract is found to be complete in accordance with the contract, plans, and specifications, such inspection shall constitute the final inspection. The RPR shall notify the Contractor in writing of final acceptance as of the date of the final inspection.

If, however, the inspection discloses any work, in whole or in part, as being unsatisfactory, the RPR will notify the Contractor and the Contractor shall correct the unsatisfactory work. Upon correction of the work, another inspection will be made which shall constitute the final inspection, provided the work has been satisfactorily completed. In such event, the RPR will make the final acceptance and notify the Contractor in writing of this acceptance as of the date of final inspection.

50-16 Claims for adjustment and disputes. If for any reason the Contractor deems that additional compensation is due for work or materials not clearly provided for in the contract, plans, or specifications or previously authorized as extra work, the Contractor shall notify the RPR in writing of their intention to claim such additional compensation before the Contractor begins the work on which the Contractor bases the claim. If such notification is not given or the RPR is not afforded proper opportunity by the Contractor for keeping strict account of actual cost as required, then the Contractor hereby agrees to waive any claim for such additional compensation. Such notice by the Contractor and the fact that the RPR has kept account of the cost of the work shall not in any way be construed as proving or substantiating the validity of the claim. When the work on which the claim for additional compensation is based has been completed, the Contractor shall, within 10 calendar days, submit a written claim to the RPR who will present it to the Owner for consideration in accordance with local laws or ordinances.

Nothing in this subsection shall be construed as a waiver of the Contractor's right to dispute final payment based on differences in measurements or computations.

END OF SECTION 50

SECTION 60 CONTROL OF MATERIALS

60-01 Source of supply and quality requirements. The materials used in the work shall conform to the requirements of the contract, plans, and specifications. Unless otherwise specified, such materials that are manufactured or processed shall be new (as compared to used or reprocessed).

In order to expedite the inspection and testing of materials, the Contractor shall furnish documentation to the RPR as to the origin, composition, and manufacture of all materials to be used in the work. Documentation shall be furnished promptly after execution of the contract but, in all cases, prior to delivery of such materials.

At the RPR's option, materials may be approved at the source of supply before delivery. If it is found after trial that sources of supply for previously approved materials do not produce specified products, the Contractor shall furnish materials from other sources.

The Contractor shall furnish airport lighting equipment that meets the requirements of the specifications; and is listed in AC 150/5345-53, *Airport Lighting Equipment Certification Program and Addendum*, that is in effect on the date of advertisement.

60-02 Samples, tests, and cited specifications. All materials used in the work shall be inspected, tested, and approved by the RPR before incorporation in the work unless otherwise designated. Any work in which untested materials are used without approval or written permission of the RPR shall be performed at the Contractor's risk. Materials found to be unacceptable and unauthorized will not be paid for and, if directed by the RPR, shall be removed at the Contractor's expense.

Unless otherwise designated, quality assurance tests will be made by and at the expense of the Owner in accordance with the cited standard methods of ASTM, American Association of State Highway and Transportation Officials (AASHTO), federal specifications, Commercial Item Descriptions, and all other cited methods, which are current on the date of advertisement for bids.

The testing organizations performing on-site quality assurance field tests shall have copies of all referenced standards on the construction site for use by all technicians and other personnel. Unless otherwise designated, samples for quality assurance will be taken by a qualified representative of the RPR. All materials being used are subject to inspection, test, or rejection at any time prior to or during incorporation into the work. Copies of all tests will be furnished to the Contractor's representative at their request after review and approval of the RPR.

A copy of all Contractor QC test data shall be provided to the RPR daily, along with printed reports, in an approved format, on a weekly basis. After completion of the project, and prior to final payment, the Contractor shall submit a final report to the RPR showing all test data reports, plus an analysis of all results showing ranges, averages, and corrective action taken on all failing tests.

60-03 Certification of compliance/analysis (COC/COA). The RPR may permit the use, prior to sampling and testing, of certain materials or assemblies when accompanied by manufacturer's COC stating that such materials or assemblies fully comply with the requirements of the contract. The certificate shall be signed by the manufacturer. Each lot of such materials or assemblies delivered to the work must be accompanied by a certificate of compliance in which the lot is clearly identified. The COA is the manufacturer's COC and includes all applicable test results.

Materials or assemblies used on the basis of certificates of compliance may be sampled and tested at any time and if found not to be in conformity with contract requirements will be subject to rejection whether in place or not.

The form and distribution of certificates of compliance shall be as approved by the RPR.

When a material or assembly is specified by "brand name or equal" and the Contractor elects to furnish the specified "or equal," the Contractor shall be required to furnish the manufacturer's certificate of compliance

for each lot of such material or assembly delivered to the work. Such certificate of compliance shall clearly identify each lot delivered and shall certify as to:

- a. Conformance to the specified performance, testing, quality or dimensional requirements; and,
- b. Suitability of the material or assembly for the use intended in the contract work.

The RPR shall be the sole judge as to whether the proposed "or equal" is suitable for use in the work.

The RPR reserves the right to refuse permission for use of materials or assemblies on the basis of certificates of compliance.

60-04 Plant inspection. The RPR or their authorized representative may inspect, at its source, any specified material or assembly to be used in the work. Manufacturing plants may be inspected from time to time for the purpose of determining compliance with specified manufacturing methods or materials to be used in the work and to obtain samples required for acceptance of the material or assembly.

Should the RPR conduct plant inspections, the following conditions shall exist:

- a. The RPR shall have the cooperation and assistance of the Contractor and the producer with whom the Contractor has contracted for materials.
- b. The RPR shall have full entry at all reasonable times to such parts of the plant that concern the manufacture or production of the materials being furnished.
- c. If required by the RPR, the Contractor shall arrange for adequate office or working space that may be reasonably needed for conducting plant inspections. Place office or working space in a convenient location with respect to the plant.

It is understood and agreed that the Owner shall have the right to retest any material that has been tested and approved at the source of supply after it has been delivered to the site. The RPR shall have the right to reject only material which, when retested, does not meet the requirements of the contract, plans, or specifications.

60-05 Engineer/ Resident Project Representative (RPR) field office. *See Section C-105.* ~~—The Contractor shall provide dedicated space for the use of the engineer, RPR, and inspectors, as a field office for the duration of the project. This space shall be located conveniently near the construction and shall be separate from any space used by the Contractor. The Contractor shall furnish water, sanitary facilities, heat, air conditioning, and electricity.—~~ [An Engineer/RPR field office is not required.]

60-06 Storage of materials. Materials shall be stored to assure the preservation of their quality and fitness for the work. Stored materials, even though approved before storage, may again be inspected prior to their use in the work. Stored materials shall be located to facilitate their prompt inspection. The Contractor shall coordinate the storage of all materials with the RPR. Materials to be stored on airport property shall not create an obstruction to air navigation nor shall they interfere with the free and unobstructed movement of aircraft. Unless otherwise shown on the plans and/or CSPP, the storage of materials and the location of the Contractor's plant and parked equipment or vehicles shall be as directed by the RPR. Private property shall not be used for storage purposes without written permission of the Owner or lessee of such property. The Contractor shall make all arrangements and bear all expenses for the storage of materials on private property. Upon request, the Contractor shall furnish the RPR a copy of the property Owner's permission.

All storage sites on private or airport property shall be restored to their original condition by the Contractor at their expense, except as otherwise agreed to (in writing) by the Owner or lessee of the property.

60-07 Unacceptable materials. Any material or assembly that does not conform to the requirements of the contract, plans, or specifications shall be considered unacceptable and shall be rejected. The Contractor shall remove any rejected material or assembly from the site of the work, unless otherwise instructed by the RPR.

Rejected material or assembly, the defects of which have been corrected by the Contractor, shall not be returned to the site of the work until such time as the RPR has approved its use in the work.

60-08 Owner furnished materials. The Contractor shall furnish all materials required to complete the work, except those specified, if any, to be furnished by the Owner. Owner-furnished materials shall be made available to the Contractor at the location specified.

All costs of handling, transportation from the specified location to the site of work, storage, and installing Owner-furnished materials shall be included in the unit price bid for the contract item in which such Owner-furnished material is used.

After any Owner-furnished material has been delivered to the location specified, the Contractor shall be responsible for any demurrage, damage, loss, or other deficiencies that may occur during the Contractor's handling, storage, or use of such Owner-furnished material. The Owner will deduct from any monies due or to become due the Contractor any cost incurred by the Owner in making good such loss due to the Contractor's handling, storage, or use of Owner-furnished materials.

END OF SECTION 60

SECTION 70 LEGAL REGULATIONS AND RESPONSIBILITY TO PUBLIC

70-01 Laws to be observed. The Contractor shall keep fully informed of all federal and state laws, all local laws, ordinances, and regulations and all orders and decrees of bodies or tribunals having any jurisdiction or authority, which in any manner affect those engaged or employed on the work, or which in any way affect the conduct of the work. The Contractor shall at all times observe and comply with all such laws, ordinances, regulations, orders, and decrees; and shall protect and indemnify the Owner and all their officers, agents, or servants against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order, or decree, whether by the Contractor or the Contractor's employees.

70-02 Permits, licenses, and taxes. The Contractor shall procure all permits and licenses, pay all charges, fees, and taxes, and give all notices necessary and incidental to the due and lawful execution of the work.

70-03 Patented devices, materials, and processes. If the Contractor is required or desires to use any design, device, material, or process covered by letters of patent or copyright, the Contractor shall provide for such use by suitable legal agreement with the Patentee or Owner. The Contractor and the surety shall indemnify and hold harmless the Owner, any third party, or political subdivision from any and all claims for infringement by reason of the use of any such patented design, device, material or process, or any trademark or copyright, and shall indemnify the Owner for any costs, expenses, and damages which it may be obliged to pay by reason of an infringement, at any time during the execution or after the completion of the work.

70-04 Restoration of surfaces disturbed by others. The Owner reserves the right to authorize the construction, reconstruction, or maintenance of any public or private utility service, FAA or National Oceanic and Atmospheric Administration (NOAA) facility, or a utility service of another government agency at any time during the progress of the work. To the extent that such construction, reconstruction, or maintenance has been coordinated with the Owner, such authorized work (by others) must be shown on the plans and is indicated as follows:

Owner	Contact	Phone Number
LIT Manager – Design and Construction	David Finnie	(501) 537-7385
LIT Director - Facilities	Randy Ellison	(501) 537-7320
LIT Director – Operations	Carlos De La Torre	(501) 537-1721
FAA	Chase Holden	(904) 305-6788
FAA	Timothy Worthington	(501) 918-4471
Little Rock Water Reclamation Authority	Myron Welch	(501) 688-1439

Except as listed above, the Contractor shall not permit any individual, firm, or corporation to excavate or otherwise disturb such utility services or facilities located within the limits of the work without the written permission of the RPR.

Should the Owner of public or private utility service, FAA, or NOAA facility, or a utility service of another government agency be authorized to construct, reconstruct, or maintain such utility service or facility during the progress of the work, the Contractor shall cooperate with such Owners by arranging and performing the work in this contract to facilitate such construction, reconstruction or maintenance by others whether or not such work by others is listed above. When ordered as extra work by the RPR, the Contractor shall make all necessary repairs to the work which are due to such authorized work by others, unless otherwise provided for in the contract, plans, or specifications. It is understood and agreed that the Contractor shall not be entitled to make any claim for damages due to such authorized work by others or for any delay to the work resulting from such authorized work.

70-05 Federal Participation. The United States Government has agreed to reimburse the Owner for some portion of the contract costs. The contract work is subject to the inspection and approval of duly authorized representatives of the FAA Administrator. No requirement of this contract shall be construed as making the United States a party to the contract nor will any such requirement interfere, in any way, with the rights of either party to the contract.

70-06 Sanitary, health, and safety provisions. The Contractor's worksite and facilities shall comply with applicable federal, state, and local requirements for health, safety and sanitary provisions.

70-07 Public convenience and safety. The Contractor shall control their operations and those of their subcontractors and all suppliers, to assure the least inconvenience to the traveling public. Under all circumstances, safety shall be the most important consideration.

The Contractor shall maintain the free and unobstructed movement of aircraft and vehicular traffic with respect to their own operations and those of their own subcontractors and all suppliers in accordance with Section 40, paragraph 40-05, *Maintenance of Traffic*, and shall limit such operations for the convenience and safety of the traveling public as specified in Section 80, paragraph 80-04, *Limitation of Operations*.

The Contractor shall remove or control debris and rubbish resulting from its work operations at frequent intervals, and upon the order of the RPR. If the RPR determines the existence of Contractor debris in the work site represents a hazard to airport operations and the Contractor is unable to respond in a prompt and reasonable manner, the RPR reserves the right to assign the task of debris removal to a third party and recover the resulting costs as a liquidated damage against the Contractor.

70-08 Construction Safety and Phasing Plan (CSPP). The Contractor shall complete the work in accordance with the approved Construction Safety and Phasing Plan (CSPP) developed in accordance with AC 150/5370-2, Operational Safety on Airports During Construction. The CSPP is on sheet(s) **GI-003** of the project plans.

70-09 Use of explosives. The use of explosives is not permitted on this project.

70-10 Protection and restoration of property and landscape. The Contractor shall be responsible for the preservation of all public and private property, and shall protect carefully from disturbance or damage all land monuments and property markers until the Engineer/RPR has witnessed or otherwise referenced their location and shall not move them until directed.

The Contractor shall be responsible for all damage or injury to property of any character, during the execution of the work, resulting from any act, omission, neglect, or misconduct in manner or method of executing the work, or at any time due to defective work or materials, and said responsibility shall not be released until the project has been completed and accepted.

When or where any direct or indirect damage or injury is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the work, or in consequence of the non-execution thereof by the Contractor, the Contractor shall restore, at their expense, such property to a condition similar or equal to that existing before such damage or injury was done, by repairing, or otherwise restoring as may be directed, or the Contractor shall make good such damage or injury in an acceptable manner.

70-11 Responsibility for damage claims. The Contractor shall indemnify and hold harmless the Engineer/RPR and the Owner and their officers, agents, and employees from all suits, actions, or claims, of any character, brought because of any injuries or damage received or sustained by any person, persons, or property on account of the operations of the Contractor; or on account of or in consequence of any neglect in safeguarding the work; or through use of unacceptable materials in constructing the work; or because of any act or omission, neglect, or misconduct of said Contractor; or because of any claims or amounts recovered from any infringements of patent, trademark, or copyright; or from any claims or amounts arising or recovered under the "Workmen's Compensation Act," or any other law, ordinance, order, or decree. Money due the Contractor under and by virtue of their own contract considered necessary by

the Owner for such purpose may be retained for the use of the Owner or, in case no money is due, their own surety may be held until such suits, actions, or claims for injuries or damages shall have been settled and suitable evidence to that effect furnished to the Owner, except that money due the Contractor will not be withheld when the Contractor produces satisfactory evidence that he or she is adequately protected by public liability and property damage insurance.

70-12 Third party beneficiary clause. It is specifically agreed between the parties executing the contract that it is not intended by any of the provisions of any part of the contract to create for the public or any member thereof, a third-party beneficiary or to authorize anyone not a party to the contract to maintain a suit for personal injuries or property damage pursuant to the terms or provisions of the contract.

70-13 Opening sections of the work to traffic. If it is necessary for the Contractor to complete portions of the contract work for the beneficial occupancy of the Owner prior to completion of the entire contract, such "phasing" of the work must be specified below and indicated on the approved Construction Safety and Phasing Plan (CSPP) and the project plans. When so specified, the Contractor shall complete such portions of the work on or before the date specified or as otherwise specified.

Detailed phasing information is provided in the Construction Safety and Phasing Plan.

Upon completion of any portion of work listed above, such portion shall be accepted by the Owner in accordance with Section 50, paragraph 50-14, *Partial Acceptance*.

No portion of the work may be opened by the Contractor until directed by the Owner in writing. Should it become necessary to open a portion of the work to traffic on a temporary or intermittent basis, such openings shall be made when, in the opinion of the RPR, such portion of the work is in an acceptable condition to support the intended traffic. Temporary or intermittent openings are considered to be inherent in the work and shall not constitute either acceptance of the portion of the work so opened or a waiver of any provision of the contract. Any damage to the portion of the work so opened that is not attributable to traffic which is permitted by the Owner shall be repaired by the Contractor at their expense.

The Contractor shall make their own estimate of the inherent difficulties involved in completing the work under the conditions herein described and shall not claim any added compensation by reason of delay or increased cost due to opening a portion of the contract work.

The Contractor must conform to safety standards contained AC 150/5370-2 and the approved CSPP.

Contractor shall refer to the plans, specifications, and the approved CSPP to identify barricade requirements, temporary and/or permanent markings, airfield lighting, guidance signs and other safety requirements prior to opening up sections of work to traffic.

70-14 Contractor's responsibility for work. Until the RPR's final written acceptance of the entire completed work, excepting only those portions of the work accepted in accordance with Section 50, paragraph 50-14, *Partial Acceptance*, the Contractor shall have the charge and care thereof and shall take every precaution against injury or damage to any part due to the action of the elements or from any other cause, whether arising from the execution or from the non-execution of the work. The Contractor shall rebuild, repair, restore, and make good all injuries or damages to any portion of the work occasioned by any of the above causes before final acceptance and shall bear the expense thereof except damage to the work due to unforeseeable causes beyond the control of and without the fault or negligence of the Contractor, including but not restricted to acts of God such as earthquake, tidal wave, tornado, hurricane or other cataclysmic phenomenon of nature, or acts of the public enemy or of government authorities.

If the work is suspended for any cause whatever, the Contractor shall be responsible for the work and shall take such precautions necessary to prevent damage to the work. The Contractor shall provide for normal drainage and shall erect necessary temporary structures, signs, or other facilities at their own expense. During such period of suspension of work, the Contractor shall properly and continuously maintain in an acceptable growing condition all living material in newly established planting, seeding, and sodding

furnished under the contract, and shall take adequate precautions to protect new tree growth and other important vegetative growth against injury.

70-15 Contractor's responsibility for utility service and facilities of others. As provided in paragraph 70-04, *Restoration of Surfaces Disturbed by Others*, the Contractor shall cooperate with the owner of any public or private utility service, FAA or NOAA, or a utility service of another government agency that may be authorized by the Owner to construct, reconstruct or maintain such utility services or facilities during the progress of the work. In addition, the Contractor shall control their operations to prevent the unscheduled interruption of such utility services and facilities.

To the extent that such public or private utility services, FAA, or NOAA facilities, or utility services of another governmental agency are known to exist within the limits of the contract work, the approximate locations have been indicated on the plans and/or in the contract documents.

It is understood and agreed that the Owner does not guarantee the accuracy or the completeness of the location information relating to existing utility services, facilities, or structures that may be shown on the plans or encountered in the work. Any inaccuracy or omission in such information shall not relieve the Contractor of the responsibility to protect such existing features from damage or unscheduled interruption of service.

It is further understood and agreed that the Contractor shall, upon execution of the contract, notify the Owners of all utility services or other facilities of their plan of operations. Such notification shall be in writing addressed to "The Person to Contact" as provided in this paragraph and paragraph 70-04, *Restoration of Surfaces Disturbed By Others*. A copy of each notification shall be given to the RPR.

In addition to the general written notification provided, it shall be the responsibility of the Contractor to keep such individual Owners advised of changes in their plan of operations that would affect such Owners.

Prior to beginning the work in the general vicinity of an existing utility service or facility, the Contractor shall again notify each such Owner of their plan of operation. If, in the Contractor's opinion, the Owner's assistance is needed to locate the utility service or facility or the presence of a representative of the Owner is desirable to observe the work, such advice should be included in the notification. Such notification shall be given by the most expeditious means to reach the utility owner's "Person to Contact" no later than two normal business days prior to the Contractor's commencement of operations in such general vicinity. The Contractor shall furnish a written summary of the notification to the RPR.

The Contractor's failure to give the two days' notice shall be cause for the Owner to suspend the Contractor's operations in the general vicinity of a utility service or facility.

Where the outside limits of an underground utility service have been located and staked on the ground, the Contractor shall be required to use hand excavation methods within 3 feet (1 m) of such outside limits at such points as may be required to ensure protection from damage due to the Contractor's operations.

Should the Contractor damage or interrupt the operation of a utility service or facility by accident or otherwise, the Contractor shall immediately notify the proper authority and the RPR and shall take all reasonable measures to prevent further damage or interruption of service. The Contractor, in such events, shall cooperate with the utility service or facility owner and the RPR continuously until such damage has been repaired and service restored to the satisfaction of the utility or facility owner.

The Contractor shall bear all costs of damage and restoration of service to any utility service or facility due to their operations whether due to negligence or accident. The Owner reserves the right to deduct such costs from any monies due or which may become due the Contractor, or their own surety.

70-16 Furnishing rights-of-way. The Owner will be responsible for furnishing all rights-of-way upon which the work is to be constructed in advance of the Contractor's operations.

70-17 Personal liability of public officials. In carrying out any of the contract provisions or in exercising any power or authority granted by this contract, there shall be no liability upon the Engineer, RPR, their authorized representatives, or any officials of the Owner either personally or as an official of the Owner. It is understood that in such matters they act solely as agents and representatives of the Owner.

70-18 No waiver of legal rights. Upon completion of the work, the Owner will expeditiously make final inspection and notify the Contractor of final acceptance. Such final acceptance, however, shall not preclude or stop the Owner from correcting any measurement, estimate, or certificate made before or after completion of the work, nor shall the Owner be precluded or stopped from recovering from the Contractor or their surety, or both, such overpayment as may be sustained, or by failure on the part of the Contractor to fulfill their obligations under the contract. A waiver on the part of the Owner of any breach of any part of the contract shall not be held to be a waiver of any other or subsequent breach.

The Contractor, without prejudice to the terms of the contract, shall be liable to the Owner for latent defects, fraud, or such gross mistakes as may amount to fraud, or as regards the Owner's rights under any warranty or guaranty.

70-19 Environmental protection. The Contractor shall comply with all federal, state, and local laws and regulations controlling pollution of the environment. The Contractor shall take necessary precautions to prevent pollution of streams, lakes, ponds, and reservoirs with fuels, oils, asphalts, chemicals, or other harmful materials and to prevent pollution of the atmosphere from particulate and gaseous matter.

70-20 Archaeological and historical findings. Unless otherwise specified in this subsection, the Contractor is advised that the site of the work is not within any property, district, or site, and does not contain any building, structure, or object listed in the current National Register of Historic Places published by the United States Department of Interior.

Should the Contractor encounter, during their operations, any building, part of a building, structure, or object that is incongruous with its surroundings, the Contractor shall immediately cease operations in that location and notify the RPR. The RPR will immediately investigate the Contractor's finding and the Owner will direct the Contractor to either resume operations or to suspend operations as directed.

Should the Owner order suspension of the Contractor's operations in order to protect an archaeological or historical finding, or order the Contractor to perform extra work, such shall be covered by an appropriate contract change order or supplemental agreement as provided in Section 40, paragraph 40-04, *Extra Work*, and Section 90, paragraph 90-05, *Payment for Extra Work*. If appropriate, the contract change order or supplemental agreement shall include an extension of contract time in accordance with Section 80, paragraph 80-07, *Determination and Extension of Contract Time*.

70-21 Insurance Requirements. See *Special Provisions*.

END OF SECTION 70

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.

If requested, 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 48 hours 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 *and in advance of the preconstruction meeting*. 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 24 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 twice monthly 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~~:

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 (*bid form*) and contract (*agreement*) 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.

Details of liquidated damages are included in the Contract.

Construction time shall be as included in the Contract (Agreement). The maximum construction time allowed for Schedules [] will be the sum of the time allowed for individual schedules but not more than [] 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 waiver 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

SECTION 90 MEASUREMENT AND PAYMENT

90-01 Measurement of quantities. All work completed under the contract will be measured by the RPR, or their authorized representatives, using United States Customary Units of Measurement.

The method of measurement and computations to be used in determination of quantities of material furnished and of work performed under the contract will be those methods generally recognized as conforming to good engineering practice.

Unless otherwise specified, longitudinal measurements for area computations will be made horizontally, and no deductions will be made for individual fixtures (or leave-outs) having an area of 9 square feet (0.8 square meters) or less. Unless otherwise specified, transverse measurements for area computations will be the neat dimensions shown on the plans or ordered in writing by the RPR.

Unless otherwise specified, all contract items which are measured by the linear foot such as electrical ducts, conduits, pipe culverts, underdrains, and similar items shall be measured parallel to the base or foundation upon which such items are placed.

The term "lump sum" when used as an item of payment will mean complete payment for the work described in the contract. When a complete structure or structural unit (in effect, "lump sum" work) is specified as the unit of measurement, the unit will be construed to include all necessary fittings and accessories.

When requested by the Contractor and approved by the RPR in writing, material specified to be measured by the cubic yard (cubic meter) may be weighed, and such weights will be converted to cubic yards (cubic meters) for payment purposes. Factors for conversion from weight measurement to volume measurement will be determined by the RPR and shall be agreed to by the Contractor before such method of measurement of pay quantities is used.

MEASUREMENT AND PAYMENT TERMS

Term	Description
Excavation and Embankment Volume	In computing volumes of excavation, the average end area method will be used unless otherwise specified.
Measurement and Proportion by Weight	The term "ton" will mean the short ton consisting of 2,000 pounds avoirdupois. All materials that are measured or proportioned by weights shall be weighed on accurate, independently certified scales by competent, qualified personnel at locations designated by the RPR. If material is shipped by rail, the car weight may be accepted provided that only the actual weight of material is paid for. However, car weights will not be acceptable for material to be passed through mixing plants. Trucks used to haul material being paid for by weight shall be weighed empty daily at such times as the RPR directs, and each truck shall bear a plainly legible identification mark.
Measurement by Volume	Materials to be measured by volume in the hauling vehicle shall be hauled in approved vehicles and measured therein at the point of delivery. Vehicles for this purpose may be of any size or type acceptable for the materials hauled, provided that the body is of such shape that the actual contents may be readily and accurately determined. All vehicles shall be loaded to at least their water level capacity, and all loads shall be leveled when the vehicles arrive at the point of delivery.
Asphalt Material	Asphalt materials will be measured by the gallon or ton. When measured by volume, such volumes will be measured at 60°F (16°C) or will be corrected to the volume at 60°F (16°C) using ASTM D1250 for asphalts. Net certified scale weights

Term	Description
	or weights based on certified volumes in the case of rail shipments will be used as a basis of measurement, subject to correction when asphalt material has been lost from the car or the distributor, wasted, or otherwise not incorporated in the work. When asphalt materials are shipped by truck or transport, net certified weights by volume, subject to correction for loss or foaming, will be used for computing quantities.
Cement	Cement will be measured by the ton or hundredweight.
Structure	Structures will be measured according to neat lines shown on the plans or as altered to fit field conditions.
Timber	Timber will be measured by the thousand feet board measure (MFBM) actually incorporated in the structure. Measurement will be based on nominal widths and thicknesses and the extreme length of each piece.
Plates and Sheets	The thickness of plates and galvanized sheet used in the manufacture of corrugated metal pipe, metal plate pipe culverts and arches, and metal cribbing will be specified and measured in decimal fraction of inch.
Miscellaneous Items	When standard manufactured items are specified such as fence, wire, plates, rolled shapes, pipe conduit, etc., and these items are identified by gauge, unit weight, section dimensions, etc., such identification will be considered to be nominal weights or dimensions. Unless more stringently controlled by tolerances in cited specifications, manufacturing tolerances established by the industries involved will be accepted.
Scales	<p>Scales must be tested for accuracy and serviced before use. Scales for weighing materials which are required to be proportioned or measured and paid for by weight shall be furnished, erected, and maintained by the Contractor, or be certified permanently installed commercial scales. Platform scales shall be installed and maintained with the platform level and rigid bulkheads at each end.</p> <p>Scales shall be accurate within 0.5% of the correct weight throughout the range of use. The Contractor shall have the scales checked under the observation of the RPR before beginning work and at such other times as requested. The intervals shall be uniform in spacing throughout the graduated or marked length of the beam or dial and shall not exceed 0.1% of the nominal rated capacity of the scale, but not less than one pound. The use of spring balances will not be permitted.</p> <p>In the event inspection reveals the scales have been "overweighing" (indicating more than correct weight) they will be immediately adjusted. All materials received subsequent to the last previous correct weighting-accuracy test will be reduced by the percentage of error in excess of 0.5%.</p> <p>In the event inspection reveals the scales have been under-weighing (indicating less than correct weight), they shall be immediately adjusted. No additional payment to the Contractor will be allowed for materials previously weighed and recorded.</p> <p>Beams, dials, platforms, and other scale equipment shall be so arranged that the operator and the RPR can safely and conveniently view them.</p> <p>Scale installations shall have available ten standard 50-pound weights for testing the weighing equipment or suitable weights and devices for other approved equipment.</p>

Term	Description
	All costs in connection with furnishing, installing, certifying, testing, and maintaining scales; for furnishing check weights and scale house; and for all other items specified in this subsection, for the weighing of materials for proportioning or payment, shall be included in the unit contract prices for the various items of the project.
Rental Equipment	Rental of equipment will be measured by time in hours of actual working time and necessary traveling time of the equipment within the limits of the work. Special equipment ordered in connection with extra work will be measured as agreed in the change order or supplemental agreement authorizing such work as provided in paragraph 90-05 <i>Payment for Extra Work</i> .
Pay Quantities	When the estimated quantities for a specific portion of the work are designated as the pay quantities in the contract, they shall be the final quantities for which payment for such specific portion of the work will be made, unless the dimensions of said portions of the work shown on the plans are revised by the RPR. If revised dimensions result in an increase or decrease in the quantities of such work, the final quantities for payment will be revised in the amount represented by the authorized changes in the dimensions.

90-02 Scope of payment. The Contractor shall receive and accept compensation provided for in the contract as full payment for furnishing all materials, for performing all work under the contract in a complete and acceptable manner, and for all risk, loss, damage, or expense of whatever character arising out of the nature of the work or the execution thereof, subject to the provisions of Section 70, paragraph 70-18, *No Waiver of Legal Rights*.

When the "basis of payment" subsection of a technical specification requires that the contract price (price bid) include compensation for certain work or material essential to the item, this same work or material will not also be measured for payment under any other contract item which may appear elsewhere in the contract, plans, or specifications.

90-03 Compensation for altered quantities. When the accepted quantities of work vary from the quantities in the proposal, the Contractor shall accept as payment in full, so far as contract items are concerned, payment at the original contract price for the accepted quantities of work actually completed and accepted. No allowance, except as provided for in Section 40, paragraph 40-02, *Alteration of Work and Quantities*, will be made for any increased expense, loss of expected reimbursement, or loss of anticipated profits suffered or claimed by the Contractor which results directly from such alterations or indirectly from their own unbalanced allocation of overhead and profit among the contract items, or from any other cause.

90-04 Payment for omitted items. As specified in Section 40, paragraph 40-03, *Omitted Items*, the RPR shall have the right to omit from the work (order nonperformance) any contract item, except major contract items, in the best interest of the Owner.

Should the RPR omit or order nonperformance of a contract item or portion of such item from the work, the Contractor shall accept payment in full at the contract prices for any work actually completed and acceptable prior to the RPR's order to omit or non-perform such contract item.

Acceptable materials ordered by the Contractor or delivered on the work prior to the date of the RPR's order will be paid for at the actual cost to the Contractor and shall thereupon become the property of the Owner.

In addition to the reimbursement hereinbefore provided, the Contractor shall be reimbursed for all actual costs incurred for the purpose of performing the omitted contract item prior to the date of the RPR's order. Such additional costs incurred by the Contractor must be directly related to the deleted contract item and shall be supported by certified statements by the Contractor as to the nature the amount of such costs.

90-05 Payment for extra work. Extra work, performed in accordance with Section 40, paragraph 40-04, *Extra Work*, will be paid for at the contract prices or agreed prices specified in the change order or supplemental agreement authorizing the extra work.

90-06 Partial payments. Partial payments will be made to the Contractor at least once each month as the work progresses. Said payments will be based upon estimates, prepared by the RPR, of the value of the work performed and materials complete and in place, in accordance with the contract, plans, and specifications. Such partial payments may also include the delivered actual cost of those materials stockpiled and stored in accordance with paragraph 90-07, *Payment for Materials on Hand*. No partial payment will be made when the amount due to the Contractor since the last estimate amounts to less than five hundred dollars.

a. From the total of the amount determined to be payable on a partial payment, 5 percent of such total amount will be deducted and retained by the Owner for protection of the Owner's interests. Unless otherwise instructed by the Owner, the amount retained by the Owner will be in effect until the final payment is made except as follows:

(1) Contractor may request release of retainage on work that has been partially accepted by the Owner in accordance with Section 50-14. Contractor must provide a certified invoice to the RPR that supports the value of retainage held by the Owner for partially accepted work.

(2) In lieu of retainage, the Contractor may exercise at its option the establishment of an escrow account per paragraph 90-08.

b. The Contractor is required to pay all subcontractors for satisfactory performance of their contracts no later than 30 days after the Contractor has received a partial payment. Contractor must provide the Owner evidence of prompt and full payment of retainage held by the prime Contractor to the subcontractor within 30 days after the subcontractor's work is satisfactorily completed. A subcontractor's work is satisfactorily completed when all the tasks called for in the subcontract have been accomplished and documented as required by the Owner. When the Owner has made an incremental acceptance of a portion of a prime contract, the work of a subcontractor covered by that acceptance is deemed to be satisfactorily completed.

c. When at least 95% of the work has been completed to the satisfaction of the RPR, the RPR shall, at the Owner's discretion and with the consent of the surety, prepare estimates of both the contract value and the cost of the remaining work to be done. The Owner may retain an amount not less than twice the contract value or estimated cost, whichever is greater, of the work remaining to be done. The remainder, less all previous payments and deductions, will then be certified for payment to the Contractor.

It is understood and agreed that the Contractor shall not be entitled to demand or receive partial payment based on quantities of work in excess of those provided in the proposal or covered by approved change orders or supplemental agreements, except when such excess quantities have been determined by the RPR to be a part of the final quantity for the item of work in question.

No partial payment shall bind the Owner to the acceptance of any materials or work in place as to quality or quantity. All partial payments are subject to correction at the time of final payment as provided in paragraph 90-09, *Acceptance and Final Payment*.

The Contractor shall deliver to the Owner a complete release of all claims for labor and material arising out of this contract before the final payment is made. If any subcontractor or supplier fails to furnish such a release in full, the Contractor may furnish a bond or other collateral satisfactory to the Owner to indemnify the Owner against any potential lien or other such claim. The bond or collateral shall include all costs, expenses, and attorney fees the Owner may be compelled to pay in discharging any such lien or claim.

90-07 Payment for materials on hand. Partial payments may be made to the extent of the delivered cost of materials to be incorporated in the work, provided that such materials meet the requirements of the contract, plans, and specifications and are delivered to acceptable sites on the airport property or at other

sites in the vicinity that are acceptable to the Owner. Such delivered costs of stored or stockpiled materials may be included in the next partial payment after the following conditions are met:

- a. The material has been stored or stockpiled in a manner acceptable to the RPR at or on an approved site.
- b. The Contractor has furnished the RPR with acceptable evidence of the quantity and quality of such stored or stockpiled materials.
- c. The Contractor has furnished the RPR with satisfactory evidence that the material and transportation costs have been paid.
- d. The Contractor has furnished the Owner legal title (free of liens or encumbrances of any kind) to the material stored or stockpiled.
- e. The Contractor has furnished the Owner evidence that the material stored or stockpiled is insured against loss by damage to or disappearance of such materials at any time prior to use in the work.

It is understood and agreed that the transfer of title and the Owner's payment for such stored or stockpiled materials shall in no way relieve the Contractor of their responsibility for furnishing and placing such materials in accordance with the requirements of the contract, plans, and specifications.

In no case will the amount of partial payments for materials on hand exceed the contract price for such materials or the contract price for the contract item in which the material is intended to be used.

No partial payment will be made for stored or stockpiled living or perishable plant materials.

The Contractor shall bear all costs associated with the partial payment of stored or stockpiled materials in accordance with the provisions of this paragraph.

90-08 Payment of withheld funds. At the Contractor's option, if an Owner withholds retainage in accordance with the methods described in paragraph 90-06 *Partial Payments*, the Contractor may request that the Owner deposit the retainage into an escrow account. The Owner's deposit of retainage into an escrow account is subject to the following conditions:

- a. The Contractor shall bear all expenses of establishing and maintaining an escrow account and escrow agreement acceptable to the Owner.
- b. The Contractor shall deposit to and maintain in such escrow only those securities or bank certificates of deposit as are acceptable to the Owner and having a value not less than the retainage that would otherwise be withheld from partial payment.
- c. The Contractor shall enter into an escrow agreement satisfactory to the Owner.
- d. The Contractor shall obtain the written consent of the surety to such agreement.

90-09 Acceptance and final payment. When the contract work has been accepted in accordance with the requirements of Section 50, paragraph 50-15, *Final Acceptance*, the RPR will prepare the final estimate of the items of work actually performed. The Contractor shall approve the RPR's final estimate or advise the RPR of the Contractor's objections to the final estimate which are based on disputes in measurements or computations of the final quantities to be paid under the contract as amended by change order or supplemental agreement. The Contractor and the RPR shall resolve all disputes (if any) in the measurement and computation of final quantities to be paid within 30 calendar days of the Contractor's receipt of the RPR's final estimate. If, after such 30-day period, a dispute still exists, the Contractor may approve the RPR's estimate under protest of the quantities in dispute, and such disputed quantities shall be considered by the Owner as a claim in accordance with Section 50, paragraph 50-16, *Claims for Adjustment and Disputes*.

After the Contractor has approved, or approved under protest, the RPR's final estimate, and after the RPR's receipt of the project closeout documentation required in paragraph 90-11, *Contractor Final Project Documentation*, final payment will be processed based on the entire sum, or the undisputed sum in case of approval under protest, determined to be due the Contractor less all previous payments and all amounts to be deducted under the provisions of the contract. All prior partial estimates and payments shall be subject to correction in the final estimate and payment.

If the Contractor has filed a claim for additional compensation under the provisions of Section 50, paragraph 50-16, *Claims for Adjustments and Disputes*, or under the provisions of this paragraph, such claims will be considered by the Owner in accordance with local laws or ordinances. Upon final adjudication of such claims, any additional payment determined to be due the Contractor will be paid pursuant to a supplemental final estimate.

90-10 Construction warranty.

a. In addition to any other warranties in this contract, the Contractor warrants that work performed under this contract conforms to the contract requirements and is free of any defect in equipment, material, workmanship, or design furnished, or performed by the Contractor or any subcontractor or supplier at any tier.

b. This warranty shall continue for a period of one year from the date of final acceptance of the work, except as noted. If the Owner takes possession of any part of the work before final acceptance, this warranty shall continue for a period of one year from the date the Owner takes possession.

c. The Contractor shall remedy at the Contractor's expense any failure to conform, or any defect. In addition, the Contractor shall remedy at the Contractor's expense any damage to Owner real or personal property, when that damage is the result of the Contractor's failure to conform to contract requirements; or any defect of equipment, material, workmanship, or design furnished by the Contractor.

d. The Contractor shall restore any work damaged in fulfilling the terms and conditions of this clause. The Contractor's warranty with respect to work repaired or replaced will run for one year from the date of repair or replacement.

e. The Owner will notify the Contractor, in writing, within seven (7) days after the discovery of any failure, defect, or damage.

f. If the Contractor fails to remedy any failure, defect, or damage within 14 days after receipt of notice, the Owner shall have the right to replace, repair, or otherwise remedy the failure, defect, or damage at the Contractor's expense.

g. With respect to all warranties, express or implied, from subcontractors, manufacturers, or suppliers for work performed and materials furnished under this contract, the Contractor shall: (1) Obtain all warranties that would be given in normal commercial practice; (2) Require all warranties to be executed, in writing, for the benefit of the Owner, as directed by the Owner, and (3) Enforce all warranties for the benefit of the Owner.

h. This warranty shall not limit the Owner's rights with respect to latent defects, gross mistakes, or fraud.

90-11 Contractor Final Project Documentation. Approval of final payment to the Contractor is contingent upon completion and submittal of the items listed below. The final payment will not be approved until the RPR approves the Contractor's final submittal. The Contractor shall:

a. Provide two (2) copies of all manufacturers warranties specified for materials, equipment, and installations.

b. Provide weekly payroll records (not previously received) from the general Contractor and all subcontractors.

- c. Complete final cleanup in accordance with Section 40, paragraph 40-08, *Final Cleanup*.
- d. Complete all punch list items identified during the Final Inspection.
- e. Provide complete release of all claims for labor and material arising out of the Contract.
- f. Provide a certified statement signed by the subcontractors, indicating actual amounts paid to the Disadvantaged Business Enterprise (DBE) subcontractors and/or suppliers associated with the project.
- g. When applicable per state requirements, return copies of sales tax completion forms.
- h. Manufacturer's certifications for all items incorporated in the work.
- i. All required record drawings, as-built drawings or as-constructed drawings.
- j. Project Operation and Maintenance (O&M) Manual(s).
- k. Security for Construction Warranty.
- l. Equipment commissioning documentation submitted, if required.

END OF SECTION 90

00 73 00 SPECIAL PROVISIONS

TABLE OF CONTENTS

A. REQUIRED FEDERAL CONTRACT PROVISIONS

- A-01 CIVIL RIGHTS - GENERAL
- A-02 CIVIL RIGHTS - TITLE VI ASSURANCE
- A-03 OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970

B. STATE TERMS AND CONDITIONS

- B-01 GENERAL
- B-02 BIDDING
- B-03 BONDING

C. LOCAL TERMS AND CONDITIONS

- C-01 CONTRACTOR'S INSURANCE
- C-02 UTILITIES
- C-03 LEGAL HOLIDAYS
- C-04 PROJECT MEETINGS AND COORDINATION
- C-05 EXTENSIONS OF TIME
- C-06 QUALITY ASSURANCE/MATERIALS TESTING
- C-07 RECORD DOCUMENTS
- C-08 CONTRACTOR/SUBCONTRACTOR/SUPPLIER LEGAL DISPUTES
- C-09 CONSTRUCTION WARRANTY OBSERVATION COST
- C-10 CONTRACTOR'S RELEASE AND AFFIDAVIT
- C-11 SUBMITTALS
- C-12 OWNER'S SAFETY PROGRAM
- C-13 PROJECT SUPERINTENDENT

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SECTION A – FEDERAL AVIATION ADMINISTRATION REQUIREMENTS

A-01 CIVIL RIGHTS - GENERAL

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, religion, 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.

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

A-02 CIVIL RIGHTS – TITLE VI ASSURANCE

Title VI Solicitation Notice:

The Owner, in accordance with the provisions of Title VI of the Civil Rights Act of 1964 (78 Stat. 252, 42 U.S.C. §§ 2000d to 2000d-4) and the Regulations, hereby notifies all bidders that it will affirmatively ensure that for any contract entered into pursuant to this advertisement, disadvantaged business enterprises will be afforded full and fair opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, national origin (including limited English proficiency), creed, sex (including sexual orientation and gender identity), age, or disability in consideration for an award.

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 of paragraphs one through six in every subcontract, 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.

Title VI List of Pertinent Nondiscrimination Acts and Authorities:

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 U.S.C. § 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 U.S.C. § 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 U.S.C. § 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 U.S.C. § 6101 *et seq.*), (prohibits discrimination on the basis of age);
- Airport and Airway Improvement Act of 1982, (49 USC § 471, Section 47123), as amended, (prohibits discrimination based on race, creed, color, national origin, or sex);
- The Civil Rights Restoration Act of 1987, (PL 100-209), (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

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ABP Fire Suppression Improvements

transportation systems, places of public accommodation, and certain testing entities as implemented by Department of Transportation regulations at 49 CFR parts 37 and 38;

- The Federal Aviation Administration's Non-discrimination statute (49 U.S.C. § 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 U.S.C. 1681 *et seq*).

A-03 OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970

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. Contractor 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 (20 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.

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SECTION B – STATE TERMS AND CONDITIONS

B-01 GENERAL

The intent of this section is to outline the requirements set forth by the State of Arkansas; however, this section does not claim to include all State laws. All requirements set for by the State of Arkansas for bidding and construction shall be included by reference herein. If for any reason that the Federal and/or State requirements conflict with the requirements set forth in this contract, the more stringent of the requirements shall govern.

B-02 BIDDING

B-02.01 Act 150 of 1965, as amended, has been interpreted, by the State Contractor's Licensing Board, to require a contractor to have a current Arkansas contractor's license in order to submit a valid bid for work when the cost thereof is fifty thousand dollars (\$50,000) or more.

B-02.02 Act 159 of 1949, as amended, requires the bidder to list his mechanical, plumbing, electrical, and roofing and sheet metal subcontractors.

B-03 BONDING

Bonding shall be executed pursuant to the terms of Arkansas Code Annotated §§ 18-44-501 et. Seq., as amended.

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SECTION C – LOCAL TERMS AND CONDITIONS

C-01 CONTRACTOR'S INSURANCE

Contractor shall obtain insurance of the types and in the amounts described below, but in no event shall such limits be less than those required by applicable law. The insurance shall be written by insurance companies and on forms acceptable to Owner.

Garver, LLC shall be included as an insured under the CGL, (using ISO Additional Insured Endorsement CG 20 10 11 85 or a substitute providing equivalent coverage), and under the commercial automobile liability (using ISO Additional Insured Endorsement CA 2048 or a substitute providing equivalent coverage), and commercial umbrella, if any. This insurance, including insurance provided under the commercial umbrella, if any, shall apply as primary and non-contributory insurance with respect to any other insurance or self-insurance programs afforded to, or maintained by, Owner.

C-01.1 Commercial General and Umbrella Liability Insurance: Contractor shall maintain commercial general liability (CGL) and, if necessary, commercial umbrella insurance, with a limit of not less than \$5,000,000 each occurrence. If such CGL insurance contains a general aggregate limit, it shall apply separately to the Project.

CGL insurance shall be written on ISO occurrence form CG 20 10 (11-85) (or a substitute combination of the following forms CG 20 10 (10-01) and CG 20 37 (10-01) providing equivalent coverage) and shall cover liability arising from premises, operations, independent contractors, products-completed operations, personal injury and advertising injury and liability assumed under an insured contract.

There shall be no endorsement or modification of the CGL limiting the scope of coverage for liability arising from pollution, explosion, collapse, underground property damage, or amending the contractual coverage in the ISO occurrence form.

CGL insurance shall be written with an ISO form CG 25 03 05 09 Designated Construction Project(s) General Aggregate Limit or a substitute form providing equivalent coverage.

C-01.2 Continuing CGL Coverage: Contractor shall maintain commercial general liability (CGL) and, if necessary, commercial umbrella liability insurance, with a limit of not less than \$5,000,000 each occurrence for at least 3 years following substantial completion of the Work.

Continuing commercial umbrella coverage, if any, shall include liability coverage for damage to the insured's completed Work equivalent to that provided under ISO form CG 00 01.

C-01.3 Contractor's Professional Liability Insurance: If Contractor will provide or furnish professional services under this Contract, through a delegation of professional design services or otherwise, then Contractor shall be responsible for purchasing and maintaining applicable professional liability insurance with a limit not less than \$2,000,000 per claim. This insurance shall provide protection against claims arising out of performance of professional design or related services, and caused by a negligent error, omission, or act for which the insured party is legally liable. It shall be maintained throughout the duration of the Contract and for a minimum of three years after Substantial Completion. If such professional design services are performed by a Subcontractor, and not by Contractor itself, then the requirements of this paragraph may be satisfied through the purchasing and maintenance of such insurance by such Subcontractor.

C-01.4 Commercial Auto and Umbrella Liability Insurance: Contractor shall maintain business auto liability and, if necessary, commercial umbrella liability insurance with a limit of not less than \$1,000,000 each accident.

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ABP Fire Suppression Improvements

Such insurance shall cover liability arising out of any auto (including owned, hired and non-owned autos).

Commercial auto coverage shall be written on ISO form CA 00 01, CA 00 05, CA 00 12, CA 00 20, or a substitute form providing equivalent liability coverage. If necessary, the policy shall be endorsed to provide contractual liability coverage equivalent to that provided in the 1990 and later editions of CA 00 01.

If the Contract Documents require Contractor to remove and haul hazardous waste from the Project site, or if the Project involves such similar environmental exposure, pollution liability coverage equivalent to that provided under the ISO Pollution Liability-Broadened Coverage for Covered Autos Endorsement (CA 99 48) shall be provided, and the Motor Carrier Act Endorsement (MCS 90) shall be attached.

C-01.5 Workers' Compensation Insurance: Contractor shall maintain workers' compensation and employer's liability insurance in accordance with statutory limits.

The employer's liability, and if necessary commercial umbrella, limits shall not be less than \$500,000 each accident for bodily injury by accident or \$500,000 each employee for bodily injury by disease.

If Contractor leases its employees, the alternate employer endorsement (WC 00 03 01 A) shall be attached showing Owner in the schedule as the alternate employer.

Where applicable, U.S. Longshore and Harborworkers Compensation Act Endorsement shall be attached to the policy.

Where applicable, Nonappropriated Fund Instrumentalities Act (NFIA) shall be attached to the policy. NFIA extends the coverage of the Longshore and Harbor Workers' Compensation Act to civilian employees working on United States military bases throughout the world who are not paid with funds appropriated by Congress. These employees, working in facilities operated for the comfort, contentment, and improvement of armed forces personnel, are instead compensated with funds generated from earnings of their facility.

Where applicable, Outer Continental Shelf Lands Act Endorsement shall be attached to the policy.

Where applicable, the Maritime Coverage Endorsement shall be attached to the policy.

If project is located in a state where workers compensation is secured via monopolistic state funds, include evidence of the "Stop Gap" endorsement to the general liability policy.

C-01.6 Property Insurance: If applicable, Contractor shall purchase and maintain property insurance for the Work. Such insurance shall be written in an amount at least equal to the initial contract sum as well as subsequent modifications of that sum. The insurance shall apply on a replacement cost basis. If the insurance obtained in compliance with this paragraph is builders risk insurance, coverage shall be written on a completed value form.

The property insurance as required above shall name as insureds the Owner, Contractor, and all subcontractors and sub-subcontractors on the Project.

C-01.7 Primary and Non-contributory: Contractor agrees that the insurance listed above, including insurance provided under the commercial umbrella, if any, shall apply as primary and non-contributory insurance with respect to any other insurance or self-insurance programs afforded to, or maintained by, Owner.

C-01.8 Waiver of Subrogation: Contractor waives all rights against the Owner and Garver, LLC and its agents, officers, directors and employees for recovery of damages to the extent these damages are covered by the commercial general liability, commercial umbrella liability insurance, automobile liability

Bill and Hillary Clinton National Airport (LIT)
ABP Fire Suppression Improvements

insurance and workers compensation insurance maintained pursuant to paragraph C-01 of this agreement.

C-01.9 No Implied Waiver: Contractor shall furnish certifications matching the coverage requirements. Failure of Owner or Engineer to demand such certificate or other evidence of full compliance with these insurance requirements or failure of Owner or Engineer to identify a deficiency from evidence that is provided shall not be construed as a waiver of the contractors obligations to furnish and maintain such insurance, or as a waiver to the enforcement of any of the provisions at a later date.

Any waiver of the contractor's obligation to furnish such certificate or maintain such evidence must be by written change order and signed by a Managing Member (Officer) of the Engineer and the Owner.

C-01.10 Cancellation, Non-Renewal, and/or Impairment Notification: The Contractor shall not cause any insurance policy to be cancelled or permit it to lapse and all insurance policies shall include an endorsement to the effect that the insurance policy or certificate shall not be subject to cancellation or to a reduction in the required limits of liability or amounts of insurance until notice has been mailed to the Owner and Engineer, stating the date when such cancellation or reduction shall be effective, which date shall not be less than (60) days after such notice.

Notice shall be sent via email and regular mail to the following persons and addresses:

Owner:
Bill and Hillary Clinton National Airport
David Finnie
1 Airport Road
Little Rock, Arkansas 72202
dfinnie@clintonairport.com

Garver:
Nick Holland
4701 Northshore Drive
North Little Rock, Arkansas 72218
NAHolland@GarverUSA.com

Bill and Hillary Clinton National Airport (LIT)
ABP Fire Suppression Improvements

C-01.11 Sample Certificate of Liability Insurance:



CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)
(must be dated)

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER Agency Name Agency Address www.stephens.com	CONTACT NAME: Agency contact
	PHONE (A/C, No, Ext): Agency ph# FAX (A/C, No):
INSURED Named Insured on the policies	E-MAIL ADDRESS: Agency contact email address
	INSURER(S) AFFORDING COVERAGE
	INSURER A: Carrier Name (AM Best Rating)
	INSURER B:
	INSURER C:
	INSURER D:
	INSURER E:
	INSURER F:

COVERAGES

CERTIFICATE NUMBER:

REVISION NUMBER:

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	APPL SUBR INSR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS
A	GENERAL LIABILITY	X X	XXXXXXXXXX			EACH OCCURRENCE \$ 5,000,000 DAMAGE TO RENTED PREMISES (Ea occurrence) \$ 300,000 MED EXP (Any one person) \$ 10,000 PERSONAL & ADV INJURY \$ 1,000,000 GENERAL AGGREGATE \$ 5,000,000 PRODUCTS - COMP/OP AGG \$ 5,000,000
	COMMERCIAL GENERAL LIABILITY					
	CLAIMS-MADE	<input checked="" type="checkbox"/> OCCUR				
	GEN'L AGGREGATE LIMIT APPLIES PER: POLICY <input checked="" type="checkbox"/> PROJECT <input type="checkbox"/> LOC					
	AUTOMOBILE LIABILITY	X X	XXXXXXXXXX			COMBINED SINGLE LIMIT (Ea accident) \$ 1,000,000 BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ PROPERTY DAMAGE (Per accident) \$ \$ \$
	ANY AUTO					
	ALL OWNED AUTOS	<input type="checkbox"/> SCHEDULED AUTOS				
	HIRED AUTOS	<input checked="" type="checkbox"/> NON-OWNED AUTOS				
	UMBRELLA LIAB	<input checked="" type="checkbox"/> OCCUR	X X	XXXXXXXXXX		EACH OCCURRENCE \$ AGGREGATE \$ \$ \$ \$
	EXCESS LIAB	<input type="checkbox"/> CLAIMS-MADE				
	DED <input type="checkbox"/> RETENTION \$ XXXXX					
	Umbrella / Excess only if needed to meet the required underlying General Liability limit					
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY	Y/N N/A	X	XXXXXXXXXX		<input checked="" type="checkbox"/> WC STATUTORY LIMITS <input type="checkbox"/> OTHER E.L. EACH ACCIDENT \$ 500,000 E.L. DISEASE - EA EMPLOYEE \$ 500,000 E.L. DISEASE - POLICY LIMIT \$ 500,000
	ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH)					
	If yes, describe under DESCRIPTION OF OPERATIONS below					
			XXXXXXXXXX			

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (Attach ACORD 101, Additional Remarks Schedule, if more space is required)

Owner & Garver, LLC shall be included as an Additional Insured by endorsement #CG2010(11/85) on the General Liability and #CA2048 on the Automobile and Umbrella or substitute endorsement providing equivalent coverage. Coverage shall be Primary and non-contributory with respect to any other insurance or self-insurance programs afforded to the Owner and Garver LLC. Waiver of Subrogation applies in favor of the Owner and Garver LLC on all policies. 60 day notice will be provided to the Owner and Garver LLC in the event of cancellation, non-renewal and/or impairment of the Contractor's policies.

CERTIFICATE HOLDER Owner and Garver LLC	CANCELLATION SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS. AUTHORIZED REPRESENTATIVE (must be signed by the Contractor's Insurance Agent)
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ACORD 25 (2010/05)

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CRRT NO.: 15475674 Kathy Jones 2/11/2013 10:58:41 AM Page 1 of 1

C-02 UTILITIES

All work in this contract shall be in accordance with the Arkansas Underground Facilities Damage Prevention Act. The Contractor shall abide by the most current edition of this Act.

C-03 LEGAL HOLIDAYS

Holidays that shall be observed are the following: New Year's Day (January 1); Dr. Martin Luther King Jr.'s Birthday (3rd Monday in January); President's Day (3rd Monday in February); Memorial Day (last Monday in May); Juneteenth (June 19); Independence Day (July 4); Labor Day (1st Monday in September); Columbus Day (2nd Monday in October); Thanksgiving Day (4th Thursday in November); Day after Thanksgiving (Friday following Thanksgiving); Christmas Eve (December 24); and Christmas Day (December 25). If a holiday falls on a Saturday or Sunday, the observed day shall be the Friday preceding the Saturday or the Monday following the Sunday. No construction observation will be furnished on legal holidays or Sundays, except in an emergency. The Contractor shall observe these legal holidays and all Sundays, and no work shall be performed on these days except in an emergency. Calendar day contract time includes delays for all holidays. Refer to Section C-05 for more information.

C-04 PROJECT MEETINGS AND COORDINATION

A preconstruction conference will be called by the Engineer at a time convenient to the Owner and before the issuance of the "Notice to Proceed". The Engineer and the Contractor and such subcontractors as the Contractor may desire shall attend this meeting with the Owner.

The Owner and/or Engineer will call such coordination conferences as may seem expedient to him for the purpose of assuring coordination of the work covered by this Contract. The Contractor shall attend all such conferences. This in no way relieves the Contractor of his responsibility to fully coordinate his work under this Contract.

C-05 EXTENSIONS OF TIME

Extensions of time for completion, under the condition of 3(a) next below, will be granted; extensions may be granted under other stated conditions:

1. If the satisfactory execution and completion of the Contract shall require work or material in greater amounts or quantities than those set forth in the Contract, then the Contract time shall be increased in the same proportion as the additional work bears to the original work contracted for.
2. The Engineer or other authorized representative of the Owner shall keep a daily weather log documenting weather and site conditions on the project. This weather log will be agreed to and executed by the Contractor, Engineer, and Owner on a weekly basis. The total weather days will be documented in the bi-weekly construction meetings with the Owner throughout the project. The Contractor may request in writing these weather days be added to the contract at the end of each month but shall be approved by the Owner and Engineer.
3. Should the work under the Contract be delayed by other causes which could not have been prevented or contemplated by the Contractor, and which are beyond the Contractor's power to prevent or remedy, an extension of time may be granted. Such causes of delay shall include but not necessarily be limited to the following:
 - a. Acts of God, acts of the public enemy, acts of the Owner except as provided in these Specifications, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and unusually severe weather.
 - b. Any delays of Subcontractors or suppliers occasioned by any of the causes specified above.

The Engineer or other authorized representative of the Owner shall keep a written record sufficient for determination as to the inclusion of that day in the computation of Contract time. This record shall be available for examination by the Contractor during normal hours of work as soon as feasible after the first of each construction month. Weather reporting locations and procedures shall be discussed during the preconstruction meeting. In case of disagreement between the representative of the Owner and the Contractor, as to the classification of any day, the matter shall be referred to the Owner whose decision shall be final.

If the Contractor finds it impossible for reasons beyond his control to complete the work within the Contract time as specified, or as extended in accordance with the provisions of this subsection, he may, at any time prior to the expiration of the Contract time as extended, make a written request to the Engineer for an extension of time setting forth the reasons which he believes will justify the granting of his request. The Contractor's plea that insufficient time was specified is not a valid reason for extension of time. If the Engineer finds that the work was delayed because of conditions beyond the control and without the fault of the Contractor, he may recommend to the Owner that the contract time be extended as conditions justify. If the Owner extends the contract, the extended time for completion shall then be in full force and effect, the same as though it were the original time for completion.

The amount of all extensions of time for whatever reason granted shall be determined by the Owner. In general, only actual and not hypothetical days of delay will be considered. The Owner shall have authority to grant additional extensions of time as the Owner may deem justifiable.

C-06 QUALITY ASSURANCE/MATERIALS TESTING

The Owner shall be responsible for quality assurance testing as stated in these specifications; however, the Contractor shall be responsible for payment of any subsequent tests made necessary by previous unsatisfactory tests. In this event, the Owner's quality assurance representative shall conduct the additional testing and payment for such tests shall be directly deducted from the Contractor's payment. The Contractor shall pay for additional testing at the Owner's contract rate.

C-07 RECORD DOCUMENTS

The Contractor shall keep one record copy of all Specifications, Drawings, Addenda, Modifications, Shop Drawings and samples at the site, in good order, and annotated to show all changes made during the construction process. In addition, the Contractor shall note any differences between locations of underground existing facilities shown in the plans and the actual location located during construction. These record documents shall be available to the Engineer for examination and shall be delivered to the Engineer upon completion of the work.

C-08 CONTRACTOR/SUBCONTRACTOR/SUPPLIER LEGAL DISPUTES

Any fees, expenses, charges, fines or other costs borne by the Owner as a result of legal disputes or lawsuits between the contractor and his subcontractors, or between the contractor and his suppliers, shall be deducted from monies due or which may thereafter become due the contractor.

C-09 CONSTRUCTION WARRANTY OBSERVATION COST

The Contractor will be responsible for all costs associated with construction observation and oversight for work related to warranty repair as described in the General Provisions.

C-10 CONTRACTOR'S RELEASE AND AFFIDAVIT

At the project's completion, the Contractor shall execute the attached Release and Lien Waiver to release all claims against the Owner arising under and by virtue of his Contract. The date of the Release shall be that agreed to for the final acceptance of the project with the Owner.

C-11 SUBMITTALS

The Contractor shall prepare and submit information required by the individual Specification sections sufficiently in advance of the related work to allow an appropriate review time by the Engineer. The types of submittals are indicated in the individual Specification sections.

During the preconstruction conference, the Contractor shall review his submittal schedule and procedures. The Contractor shall provide one of the following submittal package types:

1. Submit electronic submittals via email as PDF electronic files directly to the Engineer's designated representative, or post these PDF electronic files directly to the Engineer's FTP site specifically established for this project. Electronic submittals shall be in Adobe Acrobat (*.PDF) format and shall be legible when printed.

Submittals shall be neat, organized, and easy to interpret. Assemble complete submittal package into a single indexed electronic file, incorporating submittal requirements of an individual Specification section, the transmittal form with unique submittal numbering system, and electronic links or tabs enabling navigation to each item. Unless approved otherwise by the Engineer, all submittals for the individual Specification section shall be submitted at one time.

Submittals must come directly from the Prime Contractor; submittals from subcontractors or suppliers will not be reviewed.

Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review. Faxed submittals or submittals with extremely small or otherwise unreadable print will not be accepted. Submittals not required by the Contract Documents will be returned by the Engineer without action.

The Contractor shall be responsible for payment of any subsequent submittal reviews beyond the second iteration of a specific item as indicated by the construction submittal log. In this event, the Owner's representative shall conduct the submittal review and payment for the submittal review shall be directly deducted from the Contractor's payment. The Contractor shall pay for additional submittal reviews at the Owner's contract rate.

The Contractor shall retain complete copies of submittals on project site. Use only final submittals that are marked with approval notation from Engineer's submittal review stamp with comments form.

Resubmittals shall continue the unique, sequential, submittal numbering system. Resubmittals without unique numbering, example resubmittals transmitted as 005A or 005REV, are unacceptable and will be returned un-reviewed.

The Contractor will implement, in conjunction with the Engineer and Owner, project-specific procedures/policies for construction management services during construction to assist in obtaining completed Projects in accordance with the purpose and intent of the construction documents including, but not limited to the following:

1. Use web based Construction Management Software (Procore) provided to the Contractor. Access to this system will be provided at no cost to the Contractor by LIT. All applicable team members of the Contractor will be invited to, and required to create a Procore username (email) and password if they do not already have one.
2. Ensure that ALL Subcontractors, and any other project participants use the Procore Construction Management Software provided by LIT. Access to this system will be provided at no cost to each by LIT. All applicable team members of the Subcontractors will be invited to,

Bill and Hillary Clinton National Airport (LIT)
ABP Fire Suppression Improvements

and required to create a Procore username (email) and password if they do not already have one.

C-12 OWNER'S SAFETY PROGRAM

Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The following Owner safety programs are applicable to the Work: Information for Potential Bidders/Contractors Regarding the Security and Operations Requirements for Construction Projects at Bill and Hillary Clinton National Airport (LIT) and LIT Airside Operations Movement/Non-Movement Guide.

C-13 PROJECT SUPERINTENDENT

Contractor shall, upon receipt of the Notice of Award, designate in writing to the Engineer for approval the name of the superintendent who will be in charge of the Contractor's operations. It is a strict requirement of this Contract that the superintendent be permanently assigned to the project for the duration of the work. Once assigned to the project, the Superintendent cannot be removed by the Contractor without the prior written consent of the Engineer. The Superintendent shall have at least 10 years of construction experience (or other qualifications satisfactory to the Owner) on construction at air carrier airports. No work of any type shall be performed on the job site during the absence of the designated representative. With approval of the Engineer, additional representatives may be approved to cover additional shifts required by the project.

END OF SPECIAL PROVISIONS

Bill and Hillary Clinton National Airport (LIT)
ABP Fire Suppression Improvements

RELEASE OF LIEN

FROM: Contractor's Name: _____

Address: _____

TO: Owner's Name: _____

Address: _____

DATE OF CONTRACT: _____

Upon receipt of the final payment and in consideration of that amount, the undersigned does hereby release the Owner and its agents from any and all claims arising under or by virtue of this Contract or modification thereof occurring from the undersigned's performance in connection with the

project.

Contractor's Signature: _____

Title: _____

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

Notary Public

My Commission Expires:

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Bill and Hillary Clinton National Airport (LIT)
ABP Fire Suppression Improvements

CONTRACTOR'S AFFIDAVIT

FROM: Contractor's Name: _____

Address: _____

TO: Owner's Name: _____

Address: _____

DATE OF CONTRACT: _____

I hereby certify that all claims for material, labor, and supplies entered into contingent and incident to the construction or used in the course of the performance of the work on the

project have been fully satisfied.

Contractor's Signature: _____

Title: _____

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

Notary Public

My Commission Expires:

The Surety Company consents to the release of the retained percentage on this project with the understanding that should any unforeseen contingencies arise having a right of action on the bond that the Surety Company will not waive liability through the consent to the release of the retained percentage.

Dated: _____

Surety Company: _____

By: _____
Resident Agent, State of Arkansas

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ITEM SS-302 ALLOWANCES

DESCRIPTION

302-1.1 To provide adequate budget and bonding to cover items not precisely determined by the Owner prior to bidding, allow within the proposed Contract Sum, the amounts described in this Section.

302-1.2 Related work:

a. Documents affecting work of this Section include, but are not necessarily limited to, General Provisions, Special Provisions, and other Sections of these Specifications.

b. Other provisions concerning Allowances may be stated in other Sections of these Specifications.

SPECIFIC UTILITY ALLOWANCES

302-2.1 The following allowances are included within this Contract:

- a. Fire Alarm Allowance: The fire alarm system vendor, Johnson Controls, will summarize their incurred costs for all their work associated with this project prior to bidding. This allowance item shall match the vendor reimbursement amount. The Contractor shall not add additional administration or overhead charges to this allowance; those administration and overhead costs shall be considered subsidiary to the applicable work pay items within the unit price schedule.

BASIS OF PAYMENT

302-3.1 Allowance Payments:

Payment will be made under:

Item 5	Fire Alarm Allowance – Building 200 North - per Allowance
Item 9	Fire Alarm Allowance – Building 200 South - per Allowance
Item 13	Fire Alarm Allowance – Building 300 - per Allowance
Item 17	Fire Alarm Allowance – Building 400 - per Allowance
Item 21	Fire Alarm Allowance – Building 500 - per Allowance
Item 24	Fire Alarm Allowance – Building 1000 - per Allowance

END OF ITEM SS-302

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PART 1 - GENERAL

1.01 DESCRIPTION

- A. Make submittals required by Contract Documents; revise and resubmit as necessary to establish compliance with specified requirements. Submittals which are received from sources other than through the General Contractor's office will be returned by the Architect without action. Submit at least one original of manufacturer's product literature. The remainder of the number of copies required for submittal may be reproductions of manufacturer's literature. **FAX submittals, poor quality reproductions or illegible submittals will not be accepted.**
- B. Contractor's submittal of (and Architect's review of) shop drawings, product data or samples which relate to work not complying with requirements of Contract Documents, does not constitute an acceptable or valid request for a substitution, nor approval thereof.

1.02 RELATED DOCUMENTS

- A. Applicable portions of the Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, Addenda issued prior to the execution of the Contract, other documents listed in the Agreement and Modifications issued after the execution of the Contract shall apply to this Section.

1.03 QUALITY ASSURANCE

- A. Coordination of Submittals: Prior to each submittal, carefully review and coordinate all aspects of each item being submitted. By affixing Contractor's approval stamp to each submittal, certify that coordination has been performed.
- B. Verify that each item and submittal for it conform in all respects with specified requirements.
- C. Certificates: Document required of Contractor, or of a manufacturer, supplier, installer, or subcontractor through Contractor. The purpose is to document procedures, acceptability of methods, or personnel qualifications for a portion of the work.

1.04 TIMING OF SUBMITTALS

- A. General: Make submittals far enough in advance of scheduled dates of installation to provide required time for reviews, securing necessary approvals, possible revision and resubmittal, placing orders and securing delivery.
- B. Owner will not bear costs of delays due to late submittals.

1.05 COORDINATION AND SEQUENCING

- A. Coordinate preparation and processing of submittals with performance of work so that work will not be delayed by submittals.
- B. Coordinate and sequence different categories of submittals for same work, and for interfacing units of work, so that one will not be delayed for coordination of Architect's review with another.

1.06 SUBMITTAL FORMAT AND TRANSMISSION

- A. Provide submittals in electronic format, with the exception of material samples. Use PDF as the electronic format, unless otherwise specified or directed by the architect.
- B. Compile the electronic submittal file as a single, complete document. Name the electronic submittal file specifically according to its contents. **Bookmark individual submittals exceeding 20 pages, and those with multiple products and systems integrated into a single submission.**
- C. Electronic files must be of sufficient quality that all information is legible. Generate PDF files from original documents so that the text included in the PDF file is both searchable and can be copied.
- D. E-mail electronic submittal documents smaller than 5MB in size to e-mail addresses as directed by the architect.
- E. Provide electronic documents over 5MB through an electronic FTP file sharing system. Confirm that the electronic FTP file sharing system can be accessed from the architect's computer network. The Contractor is responsible for setting up, providing, and maintaining the electronic FTP file sharing system for the construction contract period of performance.
- F. Provide hard copies of submittals when requested by the architect. Up to 3 additional hard copies of any submittal may be requested at the discretion of the architect, at no additional cost to the owner.

PART 2 - PRODUCTS

2.01 PROGRESS SCHEDULE

- A. Within 7 days after Notice to Proceed, submit to Architect a bar-chart type progress schedule indicating time bar for each trade or operation of work to be performed. Time bar shall demonstrate planned work, properly sequenced and intermeshed, for expeditious completion of Work. Identify phases if required.
- B. Distribute progress schedule including all updates to Architect, Owner, subcontractor, suppliers, fabricators, and others with need-to-know schedule compliance requirements. Post copy in field office.

2.02 SCHEDULE OF VALUES

- A. Immediately after execution of the Contract Documents, Contractor shall submit for approval a Schedule of Values totaling the amount of the Contract.

2.03 LIST OF SUBCONTRACTORS

- A. Immediately after execution of the Contract Documents, Contractor shall submit for approval a listing of all subcontractors to be used for the project stating portions of Work to be performed, address and telephone number of firm, and contact at firm familiar with project.

- B. If all subcontractors have not been determined, submit a partial listing with regular updates indicating newly added subcontractors.

2.04 SUBSTITUTION REQUESTS

- A. Products specified herein establish a quality standard for comparison by manufacturers of similar products. Products of other manufacturers may be substituted for those specified herein on an "Approved Equal" basis. DO NOT propose the substitution of products that do not meet or exceed the quality standards established by the specified product. Products proposed as equivalent MUST be submitted through the General Contractor for review by the Architect after the Contract for Construction is awarded. DO NOT request approval of products prior to the awarding of the contract.
- B. Requests for substitution will be reviewed when extensive revisions to contract documents are not required and changes are in keeping with general intent of Contract Documents; when timely, fully documented and properly submitted; and when one or more of following conditions is satisfied, all as judged by Architect/Engineer. Otherwise, requests will be returned without action except to record non-compliance with these requirements.
 - 1. Where request is directly related to an "or equal" clause or other language of same effect in Contract Documents.
 - 2. Where required product, material or method cannot be provided within Contract Time, but not as a result of Contractor's failure to pursue the Work promptly or to coordinate various activities properly.
 - 3. Where required product, material or method cannot be provided in a manner which is compatible with other materials of the Work, or cannot be properly coordinated therewith, or cannot be warranted as required, or cannot be used without adversely affecting Owner's insurance coverage on completed work, or will encounter other substantial non-compliance items which are not possible to otherwise overcome except by making requested substitution, which Contractor thereby certified to overcome such non-compatibility, non-coordination, non-warranty, non-insurable or other non-compliance as claimed.
 - 4. Where required product, material or method cannot receive required approval by a governing authority, and requested substitution can be so approved.
- C. **SUBSTITUTIONS REQUESTS MUST BE SUBMITTED WITHIN 45 DAYS AFTER THE DATE OF THE NOTICE TO PROCEED.** Substitution requests received after that time will be returned and the Contractor will be required to provide the product specified, except in the following instances:
 - 1. Unavailability of product, material or method, not due to the Contractor's failure to pursue the work promptly or to coordinate various activities properly.
 - 2. Where a specified product or material contains a hazardous material, as defined in 40 CFR 261 and as defined by applicable state and local regulations and of which the Owner and Architect refuse to approve for use, based on Contractor furnished information.
- D. Submit request for substitutions in writing using the Substitution Request form found at the end of this Section. This is the only form that will be accepted.
- E. Submit 3 copies of substitution request, fully identified for product or method being replaced by substitution, including related specification section and drawing number(s), and fully documented to show compliance with requirements for substitutions. Include manufacturer's product data/drawings, description of installation methods, material samples where applicable, complete color and finish selection cards or samples, Contractor's detailed comparison of significant qualities between specified item and proposed substitution, statement of effect on construction

- time and coordination with other affected work, cost information or proposal, and Contractor's statement to the effect that proposed substitutions will result in overall work equal-to-or-better-than work originally indicated.
- F. Failure to provide the requested data and samples within the specified time frame will be grounds for rejection as a comparable product.
 - G. Do not incorporate substitutions into Shop Drawings until they have been reviewed by the Architect and written permission has been issued to make the proposed substitution a part of the contract.
 - H. Under no circumstances shall Architect's review of any such substitution relieve Contractor from timely, full and proper performance of Work.
 - I. In the event that the substitution of a product by the General Contractor necessitates the redrawing, redesign, modification or other change to the Contract Documents, the General Contractor will bear all associated costs of these changes.

2.05 REQUEST FOR SUPPLEMENTARY INFORMATION

- A. Make timely requests of Architect for additional information required in planning and production of Work.
- B. File requests in ample time to permit appropriate action by all parties involved and avoid delay in performance of Work.
- C. Owner will not bear costs for delays due to Contractor's failure to request information in a timely manner.

2.06 SHOP DRAWINGS

- A. Provide newly-prepared information, on reproducible sheet formats, with graphic information at accurate scale (except as otherwise indicated), with name of preparer indicated (firm name). Do not duplicate and submit Architect's construction drawings as shop drawings. Show dimensions and notes which are based on field measurement. Identify materials and products in work shown. Indicate compliance with standards, and special coordination requirements. **DIGITAL SUBMISSIONS ARE ALLOWED.**
- B. Shop drawings must bear Contractor's approval stamp. This approval stamp certifies that the Contractor has reviewed the shop drawings, product data, samples or similar submittals for conformance with the Contract Documents. All deviations will be noted in writing and highlighted on the submittal for Architect's review. The Architect is not responsible for errors, omissions or deviations in the shop drawings, product data, samples or similar submittals by the Contractor.
- C. Submittals are reviewed by the Architect for design intent only. The Contractor is responsible for verification of dimensional requirements, compliance with contract documents and local codes, quantities and coordination of all affected trades.
- D. Under no circumstances shall Architect's review of shop drawings or submittals relieve Contractor from timely, full and proper performance of Work in accordance with the Contract Documents.
- E. **Contract Documents (including all drawings, specifications, addenda and supplemental information) will not be made available in any digital format or on any other reproducible media to Prime Bidders or Sub-bidders before the award of a Contract nor will they be made available to the Contractor or Sub-contractors after the award of a Contract. Prime**

Bidders may obtain Bidding Documents in electronic or paper format through Southern Reprographics at www.sriplanroom.com for a non-refundable fee as pre-determined by level of access.

- F. CAD files will be available to the successful Contractor or Sub-contractors with a release letter or per AIA Document C106™ - 2013 Digital Data Licensing Agreement, after the award of a Contract.

2.07 PRODUCT DATA

- A. Collect required data into one submittal for each unit of work or system; mark each copy to show which choices and options are applicable to project AND WHICH ARE AVAILABLE FOR SELECTION BY THE ARCHITECT WITHOUT ADDITIONAL COST. NO PAYMENT WILL BE MADE FOR ADDITIONAL COST OF ANY CHOICES OR OPTIONS SUBMITTED BY THE CONTRACTOR FOR SELECTION BY THE ARCHITECT AND NOT CLEARLY SHOWN AS NOT AVAILABLE WITHIN THE CONTRACT.
- B. Include manufacturer's standard published recommendations for application and use, compliance with standards, application of labels and seals, notation of field measurements which have been checked, and special coordination requirements.
- C. Maintain one set of product data (for each submission) at project site, available for reference by Architect and others.
- D. Do not submit product data until compliance with requirements of contract documents has been confirmed by Contractor.
- E. Copies:
 - 1. Submit 3 paper copies of product data for Architect's review for items specified in various specification sections, unless digital submission.
 - 2. Three paper copies required for mechanical and electrical data, unless digital submission.
- F. Installer's Copy: Do not proceed with installation of materials, products or systems until final authorized copy of applicable product data is in possession of installer.

2.08 SAMPLES

- A. Unless precise color and pattern is specified in Contract Documents, submit accurate color and pattern charts or actual material samples to Architect for selection. Refer to pertinent sections of specifications for detailed submission requirements. Provide units identical with final condition of proposed materials or products for the work. Include "range" samples (not less than 3 units) where unavoidable variations must be expected, and describe or identify variations between units of each set.
- B. Make all submissions affecting color selection within sufficient time to allow selection without causing delay in Work.
- C. Submit items requiring color selection or verification AS ONE SUBMISSION to facilitate coordination of all colors at one time. Interior items may be submitted separately from exterior items.

- D. Provide full set of optional samples where Architect's selection is required. DO NOT INCLUDE OPTIONS REQUIRING ADDITIONAL COST.
- E. Samples are submitted for review and confirmation of color, pattern, texture and "kind" by Architect. Architect will not "test" samples (except as otherwise indicated) for compliance with other requirements, which are therefore the exclusive responsibility of Contractor.
- F. Submit 3 sets of samples in final submittal.
 - 1. Furnish two sets to Architect and assemble one set on site. When all samples are on site, Owner and Architect are to review. Contractor shall provide job samples indicating finished color selections for any and all items requiring finish color for project.
 - 2. Quality Control Set: Maintain returned final set of samples at project site, in suitable condition and available for quality control comparisons by Architect and Owner. Written approval from Owner is required before the work is begun for any finish requiring color review.
- G. Reusable Samples: Returned samples which are intended or permitted to be incorporated into Work must be in undamaged condition at time of use.

PART 3 - EXECUTION

3.01 SUBMITTAL PREPARATION

- A. Permanently mark each submittal to identify project, date, Contractor, subcontractor, submittal name and similar information to distinguish it from other submittals. Show Contractor's executed review and approval marking.
- B. Indicate project, date, "To: "; "From: "; names of subcontractors, suppliers, manufacturers, required references, category and type of submittal, purpose, description, distribution record and signature of transmitter.
- C. Indicate drawing number and specifications section number to which submittal applies.

3.02 ARCHITECTS ACTION ON SUBMITTALS

- A. Architect will respond to submittals from Contractor by completing the "LETTER OF TRANSMITTAL" form.
- B. Architect's Submittal Review: Submittal review does not relieve Contractor(s) of compliance with Contract Documents or local codes. Review is only for conformance with the design intent of the Project and compliance with information given in the Contract Documents. The contractor is responsible to coordinate and to confirm all dimensions for use at the site. The contractor is responsible for coordination of the work of all trades.
- C. Architect's Action: Where action and return is required or requested, Architect will review each submittal and mark per the following, and where possible return within fifteen (15) working days of receipt. When a submittal must be coordinated with submittals of other trades, Contractor is responsible for gathering all information and forwarding to Architect as a single submittal.
- D. Architect's Response:
 - 1. Final Unrestricted Release: Work may proceed, provided it complies with notations and corrections on submittal and with Contract Documents, when submittal is returned with the following: **Marking: "Reviewed"**.
 - 2. Final-But-Restricted Release: Work may proceed, provided it complies with notations and corrections on submittal and with Contract Documents, when submittal is returned

with the following: **Marking: "Reviewed and Noted".**

3. Returned for Resubmittal: Do not proceed with work. Revise submittal in accordance with notations thereon, and resubmit without delay to obtain a different action marking. Do not allow submittals with the following marking (or unmarked submittals where a marking is required) to be used in connection with performance of the Work:

Marking: "Revise and Resubmit".

4. Other Action: Where submittal is returned for other reasons, with Architect explanation included, it will not be marked or marked "Revise and Resubmit".

END OF SECTION 01 33 00

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PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Requirements and limitations for cutting and patching of Work.

1.02 RELATED SECTIONS

- A. Section 01 11 00 - Summary of Work (Work by Owner or by separate Contractors)
- B. Section 07 84 00 - Firestopping.
- C. Individual Product Specification Sections:
 - 1. Cutting and patching incidental to work of the section.
 - 2. Advance notification to other sections of openings required in work of those sections.
 - 3. Limitations on cutting structural members.

1.03 SUBMITTALS

- A. Submit written request in advance of cutting or alteration which affects:
 - 1. Structural integrity of any element of Project.
 - 2. Integrity of weather exposed or moisture resistant element.
 - 3. Efficiency, maintenance, or safety of any operational element.
 - 4. Visual qualities of sight exposed elements.
 - 5. Work of Owner or separate Contractor.
- B. Include in request:
 - 1. Identification of Project.
 - 2. Location and description of affected Work.
 - 3. Necessity for cutting or alteration.
 - 4. Description of proposed Work and Products to be used.
 - 5. Alternatives to cutting and patching.
 - 6. Effect on work of Owner or separate Contractor.
 - 7. Written permission of affected separate Contractor.
 - 8. Date and time work will be executed.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Primary Products: Those required for original installation.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine existing conditions prior to commencing Work, including elements subject to damage or movement during cutting and patching.
- B. After uncovering existing Work, assess conditions affecting performance of work.
- C. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

- A. Provide temporary supports to ensure structural integrity of the Work. Provide devices and methods to protect other portions of Project from damage.
- B. Provide protection from elements for areas which may be exposed by uncovering work.
- C. Maintain excavations free of water.

3.03 CUTTING

- A. Execute cutting and fitting including excavation and fill if required, to complete the Work.
- B. Remove and replace defective or nonconforming work.
- C. Remove samples of installed work for testing when requested.
- D. Provide openings in the Work for penetration of mechanical and electrical work.
- E. Employ skilled and experienced installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
- F. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

3.04 PATCHING

- A. Execute patching to complement adjacent Work. Match with existing finish where exposed to view unless noted otherwise.
- B. Fit Products together to integrate with other Work.
- C. Execute work by methods to avoid damage to other Work, and which will provide appropriate surfaces to receive patching and finishing.
- D. Employ skilled and experienced installer to perform patching for weather exposed and moisture resistant elements, and sight exposed surfaces.
- E. Restore work with new Products in accordance with requirements of Contract Documents.
- F. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- G. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire resistant material in accordance with Section 07 84 00 to full thickness of the penetrated element.
- H. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.

END OF SECTION 01 73 29

PART 1 - GENERAL

1.01 CLEANING AND WASTE REMOVAL

- A. Progress Cleaning:
1. The premises and the job site shall be maintained in a reasonable neat and orderly condition and kept free from accumulations of waste materials and rubbish during the entire construction period. Remove crates, cartons, and other flammable waste materials or trash from the work areas at the end of each working day. Do not allow debris to blow onto adjoining properties. Respond immediately to request from adjoining property owners to remove any debris that does manage to show up on adjoining properties. Collect and remove waste materials, debris, and rubbish from site weekly, daily if necessary and dispose off-site.
 2. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
 3. Broom and vacuum clean interior areas prior to start of surface finishing and continue cleaning to eliminate dust.
- B. Final Cleaning:
1. Use cleaning materials and agents recommended by manufacturer or fabricator of surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property, or that might damage finished surfaces.
 2. Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit of Work to condition expected from a commercial building cleaning and maintenance program. Comply with manufacturer's published instructions.
 3. Complete following cleaning operations before requesting inspection for Substantial Completion, where applicable to project scope:
 - a. Clean Project Site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste materials, litter and foreign substances. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits. Rake grounds to a smooth even-textured surface.
 - b. Remove tools, construction equipment, machinery, and surplus material from Project Site.
 - c. Remove snow and ice to provide safe access to building.
 - d. 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.
 - e. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - f. Broom clean concrete floors in unoccupied spaces.
 - g. Vacuum clean carpet and similar soft surfaces, removing debris and excess nap. Shampoo if required.
 - h. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other substances that are noticeable vision-obscuring materials. Replace chipped, scratched, or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces. Do not use razor blades to clean glass. Any scratches on the glass caused by the cleaning process will be cause for the removal and

- replacement of the damaged glass at the Contractor's expense.
- i. Remove labels that are not permanent labels.
- j. Touch-up and otherwise repair and restore marred exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored, or that show evidence of repair or restoration. Do not paint over "UL" and similar labels, including mechanical and electrical name plates.
- k. Wipe surfaces of mechanical and electrical equipment, and other similar equipment. Remove excess lubrication, paint and mortar droppings and other foreign substances.
- l. Plumbing fixtures are to be cleaned to a sanitary condition, free of stains, including stains resulting from water exposure.
- m. Replace all disposable filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills. Clean ducts, blowers, and coils if units were operated without filters during construction.
- n. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned out bulbs, and defective and noisy starters in fluorescent and mercury vapor fixtures.
- o. Leave Project clean and ready for occupancy.
- 4. Engage an experienced licensed exterminator to make a final inspection, and rid Project of rodents, insects, and other pests. Comply with regulations of local authorities having jurisdiction.
- 5. Remove temporary protection and facilities installed during construction to protect previously completed installations during remainder of construction.
- 6. Comply with governing regulations and safety standards for cleaning operations. Remove waste materials from Project Site and dispose of in accordance with requirements of local authorities having jurisdiction.
 - a. Extra materials of value that remain after completion of construction and have become the Owner's property are to be stored as directed by Owner.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION - Not Used

END OF SECTION 01 74 23

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Demolition and removal work required for construction and connecting new Work to existing building and for remodeling [**reconstructing**] existing building. Work also includes barricades, temporary protection, dust protection, removal from site trash and debris from demolition work, and repairing existing hardscape/softscape damaged during the course of the work.
- B. Extent of selective demolition work is generally indicated on drawings. Selective demolition not shown on the drawings may be determined by examination of existing facilities and the proposed new and remodeled [**reconstructed**] work. Existing items not shown on the plans of proposed work and preventing the execution of proposed work are in the scope of the selective demolition work.
- C. Refer to the mechanical and electrical and plumbing drawings for extent of demolition work required in adjacent areas for accommodation of renovation work. If no drawings show the extent of demolition, the Contractor must determine the extent of work and include it in his scope of work.
- D. Degree of patching to be performed in a given area will be determined by the proposed new finish of that area.
- E. Areas of the existing floor will require patching and leveling where ceramic tile, other flooring, partitions, plumbing fixtures, and mechanical equipment are removed. Some existing partitions to be removed may extend below the floor surface which will require patching. If the floor level on one side of a partition to be removed differs from the floor level on the other side, a cementitious floor leveler will be required to transition between the two.
- F. Disconnecting, removal and/or relocation and reconnecting of existing mechanical, electrical and fire protection work including equipment, piping and wiring are included in this Contract.

1.02 RELATED DOCUMENTS

- A. Applicable portions of the Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, and Addenda issued prior to the execution of the Contract, other documents listed in the Agreement and Modifications issued after the execution of the Contract shall apply to this Section. The general requirements for this work are in Division 1 of the Specifications.

1.03 SCHEDULES

- A. Before commencing any alteration work, submit for review and approval of the Architect, a schedule showing the commencement, the order, and the completion dates for the various parts of this work.
- B. Before starting any work relating to existing utilities that will temporarily discontinue service to the existing building, notify the Owner 5 days in advance and obtain the Owner's approval before proceeding with this phase of work. Do not disconnect or disrupt service without Owner's prior approval.

1.04 HAZARDOUS MATERIAL ABATEMENT

- A. During the construction of this project, if work involving hazardous material is suspected, or encountered, Contractor shall notify Owner or Owner's representative immediately and Owner, with his own forces or by separate contract is responsible for complete investigation, removal and disposition of hazard material in accordance with applicable laws and regulations.

PART 2 - PRODUCTS

2.01 BARRICADE AND SUPPORT MATERIALS

- A. Before starting demolition and removal work, furnish and erect necessary barricades. Barricades shall provide for safe passage at all times. Provide temporary protection to keep existing building weathertight. Dust proof areas that are to be kept in use in manner to permit necessary passage for personnel and the protection of equipment. During process of demolition and removal, install temporary supports and bracing, to prevent building [**and equipment**] damage.
- B. If approved by Architect, materials from demolition work may be used for construction of temporary protective barricades, temporary partitions, noise barriers and dust barriers and for temporary non-structural supports. Where suitable materials are not available from demolition work, furnish materials of proper type and construction to perform function specified above.

2.02 FIRESTOPPING IN EXISTING CONSTRUCTION

- A. Demolition may uncover unsealed penetrations in fire rated floor, wall and ceiling assemblies. Examine the site for the location of these items and provide approved firestop sealant systems.
- B. Any new penetration in fire rated floors, walls, ceilings and roof will be sealed with approved sealant to maintain fire rating.

2.03 OTHER MATERIALS

- A. Provide materials, not specifically described but required for proper completion of work of this Section, selected by Contractor subject to Architect's approval.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Make such explorations and probes as are necessary to ascertain required protection measures before proceeding with alteration work. Give particular attention to shoring and bracing requirements so as to prevent any damage to existing construction.
- B. Provide, erect, and maintain catch platforms, lights, barriers, weather protection, warning signs, and other items as required for proper protection of the workmen engaged in alteration operations, and adjacent construction.
- C. Provide and maintain weather protection at exterior openings so as to fully protect the interior premises against damage from the elements until such openings are closed by new construction.
- D. Provide and maintain temporary protection of the existing building where demolition, removal, and new work is being done, connections made, materials handled, or equipment moved.

- E. Take necessary precautions to prevent dust and dirt from rising by wetting demolished masonry, concrete, plaster, gypsum board, sprayed fireproofing and similar debris, or by other means. Protect unaltered portions of the existing building affected by the operations under this section by dust-proof partitions and other adequate means.
- F. Do not close or obstruct walkways or passageways without the authorization of the Owner. Do not store or place materials in passage-way or other means of egress. Conduct operations with minimum traffic interference.
- G. Owner will be continuously occupying areas of the building immediately adjacent to areas of selective demolition. Conduct selective demolition work in manner that will minimize need for disruption of Owner's normal operations. Provide minimum of 72 hours advance notice to Owner of demolition activities which will severely impact Owner's normal operations.

3.02 UTILITY SERVICE

- A. Maintain existing utilities indicated to remain, keep in service, and protect against damage during demolition operations.
- B. Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by authorities having jurisdiction. Provide temporary services such as emergency power, fire alarm, heating and air conditioning, during interruptions to existing utilities, as acceptable to Owner and governing authorities. Allow no interruption in service unless coordinated with Owner at least 24 hours in advance.
- C. Disconnect and seal utilities serving interior area to be demolished, prior to start of demolished work.
- D. Protect smoke and fire detectors from construction damage, dust and false alarms.
- E. Request Owner to identify any data/communication wiring above the ceiling that should be removed. Remove this wiring.
- F. Remove all abandoned conduit and wiring above ceiling.

3.03 INSTALLATION/APPLICATION/PERFORMANCE

- A. Provide alteration work as indicated on the drawings or required for the work of this Contract. Be responsible for any damage that may be caused by such work to any part or parts of existing structures or items designated for reuse or salvage. Perform patching, restoration, and new work in accordance with applicable technical sections of the Specifications.
- B. Where alterations occur, or new and old work join, cut, remove, patch, repair, or refinish the adjacent surfaces or as required by the involved conditions, and leave in as good a condition as existed prior to the commencing of the work. Refinish painted surfaces from intersection to intersection unless indicated otherwise. Materials and workmanship employed in the alterations, unless otherwise indicated or specified, shall conform to that of the original work. Materials not specifically described but required for a complete and proper installation of the work, shall be new, first quality of their respective kinds, as selected by Contractor subject to the approval of the Architect. Alteration work shall be performed by the various respective trades that normally perform the particular items of work.
- C. Finish new and adjacent existing surfaces as specified for new work. Clean existing surfaces of dirt, grease and loose paint before refinishing.
- D. Where alterations occur in areas to be completed during later phases of the work only prepare

adjacent surfaces as necessary and complete finishing during proper phase of the work.

- E. If unanticipated mechanical, electrical or structural elements which conflict with intended function or design are encountered, investigate and measure both nature and extent of the conflict. Submit report to Owner's Representative in written, accurate detail. Pending receipt of directive from Owner's Representative rearrange selective demolition schedule as necessary to continue overall job progress without delay.

3.04 SALVAGE

- A. Certain items and materials removed from existing building in demolition work are to be relocated or reused by Contractor in new construction work under this Contract. Items and materials for relocation or reuse and which are damaged by careless handling in removal may be rejected by Architect if considered unsuitable for re-use. Replace rejected items at Contractor's expense. Salvable materials, removed in demolition work and not for relocation or re-use or not turned over to the Owner for disposition, become property of Contractor and shall be hauled away from site as they are removed.
- B. In all cases of interior demolition, door hardware, light fixtures, emergency lighting, art work, furniture, window treatments such as blinds, drapes, curtains and operating hardware, signage and graphics and other interior decor items are to be carefully removed and turned over to Owner unless designated to be cleaned or refurbished and reinstalled.

3.05 REMOVAL OF DEBRIS AND CLEANING

- A. Remove and legally dispose of rubbish and debris found in demolition area at start of the Work that resulted from demolition activities or were deposited on site by others during the duration of contract. Keep project area and public right-of-way reasonably clear at all times. Upon completion of work remove temporary construction, equipment, salvaged materials, trash and debris leaving entire project area in a neat and clean condition.

3.06 PROTECTION AND REPAIR

- A. Erect temporary barricades and fencing required to protect existing and new site construction including but not limited to new and existing walks, drives, roads, curb and gutter, etc. during construction activities.
- B. Allow no heavy traffic on new or existing paving unless authorized in writing by Owner.
- C. Contractor is responsible for restoring all existing site construction, including softscape (landscape) and hardscape, that is damaged during construction to new condition.
- D. If it is necessary to cut or trench across any existing paving (including walks), Contractor is responsible for restoring damaged areas to new condition.

END OF SECTION 02 41 19

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. Except for that specifically excluded below, furnish and combine materials for all the work indicated on the Drawings or herein specified to be of plain or reinforced concrete, its installation with forms and reinforcement, and its curing and finishing. Shop drawings, tools, ways, apparatus, and equipment necessary for concrete production, installation, and finish are included. The work under this Section includes, but is not limited to, the following:
 - 1. Slabs-on-grade.
 - 2. Furnishing and installing joint fillers, dams, and similar items required in conjunction with the concrete work.
 - 3. Installing items furnished by other trades and required to be embedded in the concrete work.
 - 4. Housekeeping pads and curbs for equipment.
 - 5. All other items of concrete and related work shown on the Drawings, specified herein, or needed to make the work of this Section complete.
- B. The following are excluded from the work specified in this Section:
 - 1. Furnishing of certain metal inserts and other embedded items installed under this Section, but supplied by other trades, including, but not limited to, stone masonry anchors.
 - 2. Furnishing and installing inserts and pipe sleeves for mechanical trades to be furnished and installed by mechanical contractors.
- C. Specification Sections that directly relate to the work of this Section include, but are not limited to, the following:
 - 1. 01 81 13 "Sustainable Design Requirements".
 - 2. Division 05 "Metals".
 - 3. Division 07 "Thermal and Moisture Protection".
 - 4. Division 09 Section "Finishes".
- D. Notify all other trades responsible for installing inserts, sleeves, etc., when ready for such installation and for final checking immediately before concrete is placed. Cooperate with such trades to obtain proper installation. Leave openings in walls for pipe, ducts, etc., for mechanical and electrical work as shown on Drawings or required by layout of systems.

1.2 REFERENCED STANDARDS

- A. Follow the guidelines contained in the latest editions of the following codes, specifications, and standards, including references contained in each document, except where more-stringent requirements are shown or specified.
 - 1. American Association of State Highway and Transportation Officials (AASHTO):

- a. AASHTO T260 – Methods of Sampling and Testing for Total Chloride Ion in Concrete and Concrete Raw Materials
2. American Concrete Institute (ACI):
 - a. ACI 117 – Standard Specification for Tolerances for Concrete Construction and Materials
 - b. ACI 211.1 – Recommended Practice for Selecting Proportions for Normal Weight Concrete
 - c. ACI 214 – Recommendation for Evaluation of Compression Test Results of Field Concrete
 - d. ACI 301 – Standard Specification for Structural Concrete
 - e. ACI 304 – Recommended Practice for Measuring, Mixing and Placing Concrete
 - f. ACI 305 – Recommended Practice for Hot Weather Concreting
 - g. ACI 306 – Recommended Practice for Cold Weather Concreting
 - h. ACI 306.1 – Standard Specification for Cold Weather Concreting
 - i. ACI 308 – Recommended Practice for Curing Concrete
 - j. ACI 309 – Recommended Practice for Consolidation of Concrete
 - k. ACI 311 – Recommended Practice for Concrete Inspection
 - l. ACI 315 – Manual of Standard Practice for Detailing Reinforced Concrete Structures
 - m. ACI 318 – Building Code Requirements for Reinforced Concrete
 - n. ACI 347 – Guide to Formwork for Concrete
 - o. ACI 515 – A Guide to the Use of Waterproofing, Dampproofing, Protective, and Decorative Barrier Systems for Concrete
 - p. ACI 613 – Recommended Practice for Selecting Proportions for Concrete
 - q. ACI Concrete Craftsman Series
3. ASTM International (ASTM):
 - a. ASTM C31 – Standard Method of Making and Curing Concrete Test Specimens in the Field.
 - b. ASTM C33 – Standard Specification for Concrete Aggregates.
 - c. ASTM C39 – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 - d. ASTM C94 – Standard Specification for Ready-Mixed Concrete.
 - e. ASTM C143 – Standard Method of Test for Slump of Portland Cement Concrete.
 - f. ASTM C150 – Standard Specification for Portland Cement.
 - g. ASTM C173 – Standard Method of Test for Air Content of Freshly Mixed Concrete by the Volumetric Method.
 - h. ASTM C192 – Method of Making and Curing Concrete Compression and Flexure Test Specimens in the Laboratory.
 - i. ASTM C231 – Method of Test for Air Content of Freshly Mixed Concrete by the Pressure Method.
 - j. ASTM C260 – Standard Specification for Air-Entraining Admixtures for Concrete.
 - k. ASTM C309 – Standard Specification for Liquid Membrane – Forming Compounds for Curing Concrete.
 - l. ASTM C494 – Standard Specifications for Chemical Admixtures of Concrete.
 - m. ASTM C595 – Standard Specification for Blended Hydraulic Cement.
 - n. ASTM D1751 – Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction
 - o. ASTM D1752 – Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction

Bill and Hillary Clinton National Airport (LIT)
ABP Fire Suppression Improvements

- p. ASTM E329 – Standard Recommended Practice for Inspection and Testing Agencies for Concrete, Steel and Bituminous Materials as Used in Construction
- 4. Concrete Reinforcing Steel Institute:
 - a. Manual of Standard Practice
- 5. National Ready Mixed Concrete Association (NRMCA):
 - a. NRMCA Check List for Certification of Ready Mixed Concrete Production Facilities

1.3 SUSTAINABLE DESIGN REQUIREMENTS

- A. Concrete and/or steel materials must meet the requirements of the following credits:
 - 1. Construction Waste Management: Concrete waste must be source separated and recycled, or ground and used as fill if and as directed by the Geotechnical Engineer (must be weighed and documented).
 - 2. Recycled Content, (postconsumer + one-half preconsumer): Must contain minimum of 85% postconsumer recycled content for steel and a minimum of 3% postindustrial recycled content for concrete.
 - 3. Regional Materials, 10% Extracted, Processed & Manufactured Regionally: All aggregate, water, and sand material must be extracted/processed/manufactured within 500 mi of the project site. The weight percent of regionally extracted material in concrete must be provided.
- B. Floor finishes must meet the requirements:
 - 1. Low-Emitting Materials, Paints and Coatings: Must meet the applicable VOC limits detailed in Division 1.

1.4 SUBMITTALS

- A. General:
 - 1. All submissions shall be in accordance with the submission schedule, which shall be developed and agreed between the Architect and Construction Manager at the commencement of the project.
 - 2. Make submittals in compliance with the Conditions of the Contract and Division 1 Section "Submittal Procedures".
 - 3. Review of submittals is of a general nature only, and the responsibility for conformance to intent of drawings shall remain with the Contractor. Review does not imply or state that the fabricator has correctly interpreted the construction documents.
- B. Submit the following action submittals for review and approval:
 - 1. Concrete Mix Design for Each Type of Concrete. The Contractor shall warrant by the submission of the design mixes that such mixes are totally representative of the concrete that he intends to supply to meet the requirements of the Contract Documents. Submit new design mixes for review and approval when any change in materials is required or needed. Include the following information for each concrete mix design:
 - a. Method used to determine the proposed mix design (per ACI 301, Article 3.9).
 - b. Compressive Strength at Seven and Twenty-Eight Days: Submit strength test records in accordance with ACI 318 Chapter 5; mix design materials, conditions, and proportions for concrete used for record of tests; standard

- deviation calculation; and determination of required average compressive strength.
 - c. Gradation of Fine and Coarse Aggregates: Testing data confirming proposed coarse aggregate meets ASTM C33 class designation. Include ASTM test results
for aggregates subject to freeze-thaw environment. Include ASTM test results for susceptibility of aggregates to alkali-silica reaction.
 - d. Proportions of all ingredients including all admixtures to be added either at the time of batching or at the jobsite.
 - e. Water-cementitious-materials ratio.
 - f. Slump tested in accordance with ASTM C143.
 - g. Air content of freshly mixed concrete by the pressure method, ASTM C231, or the volumetric method, ASTM C173.
 - h. Unit weight of concrete – ASTM C138.
 - i. Mill test reports of fly ash chemical and physical analysis and certification of compliance with ASTM C618, Class C or F, if used.
 - j. Manufacturer's Spec Data Sheets of each concrete admixture, including brand name, manufacturer, and dosage rate range.
 - 2. Shop drawings for reinforcement detailing, fabricating, bending, and placing concrete reinforcement. Check the shop drawings prior to submission to the Architect for conformity of details to the Contract Documents and as coordinated with other work. The signature of the Construction Manager indicating that the drawings have been checked will be required. The Contractor shall be wholly responsible for the conformity of dimensions and details of the shop drawings to the Contract Documents. Comply with ACI 315 – Manual of Standard Practice for Detailing Reinforced Concrete Structures – showing bar schedules, stirrup spacing, bent bar diagrams, and arrangement of concrete reinforcement. Include special reinforcing required for openings through concrete structures. Use 1/4 in. scale for elevations of walls and beams.
 - 3. Product data for proprietary materials and items, including, but not limited to, the following:
 - a. Reinforcement
 - b. Forming accessories
 - c. Admixtures
 - d. Patching compounds
 - e. Curing paper
 - f. Curing compounds
 - g. Nonshrink grout
 - h. Construction and isolation joint filler
 - i. Joint filler for saw cut joints
 - 4. Proposed methods for curing cast-in-place concrete.
 - 5. Proposed layout of construction and control joints in slabs.
- C. Sustainable Design Submittals:
- 1. Product Data: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content.
 - a. Include statement indicating costs for each product having recycled content.
 - 2. Waste Management Records: For separation and recycling of recorded weights of steel and concrete waste.
 - 3. Regionally extracted material weight and source records.
 - 4. VOC Product Data: For floor treatments, form-facing materials, and reinforced vapor barrier.

- D. Submit the following informational submittals for record:
1. Proposed Schedule of Concrete Placement: The Contractor shall keep a permanent log of the dates and times of concrete placement and where on the project the concrete was cast. This log shall be made available to the Architect for inspection, upon request.
 2. Qualifications of Concrete Foreman showing five years' experience with this type of concrete installation.
 3. Tickets for each batch of concrete delivered to the jobsite containing the following information:
 - a. The compressive strength of the concrete being delivered.
 - b. The volume of concrete in the delivery truck.
 - c. The time the concrete was batched (i.e. the time that water was discharged into the delivery truck to mix with the cement and aggregates).
 - d. List of admixtures.
 - e. Slump of concrete as placed.
 - f. Volume of water added to the delivery truck after initial batching.
 - g. Location where the concrete is being placed (e.g., foundation walls along Grid Line A, between Grids 1 and 4).
 4. Hot-weather concreting procedures describing methods that will be used to retard initial set (such as using ice in addition to mixing water) and prevent moisture loss during placement and curing.
 5. Cold-weather concreting procedures describing methods that will be used to protect freshly placed concrete from freezing.

1.5 QUALITY ASSURANCE

- A. Foreman's Qualifications: Concrete work shall be done under the supervision of an experienced concrete foreman having at least five years of foreman experience with cast-in-place concrete, similar to that used on this project.
- B. The Contractor shall perform all work in strict accordance with all applicable laws and regulations of the building code and with all other authorities having jurisdiction. All such requirements shall take precedence over the requirements of the Specifications, except in cases where the requirements of the Specifications are more exacting or stringent.
- C. Concrete Mix Design: The Contractor shall employ an independent testing laboratory, acceptable to the Owner, to perform material evaluation tests and to design concrete mixes or, when acceptable to the Engineer, provide copies of recently made material tests and mix designs.
1. If, at any time during construction, the concrete resulting from the approved mix design deviates from Specification requirements, the Contractor shall have his laboratory modify the design, subject to approval, until the specified concrete is obtained.
- D. Testing of materials and inspections of installed work shall be completed throughout the duration of the project, in accordance with the structural test and inspection program and as directed by the Engineer. The Contractor shall provide free and safe access to material stockpiles and facilities for inspectors.
1. Retesting of rejected materials or reinspection of deficient work shall be done at the Contractor's expense.

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ABP Fire Suppression Improvements

- E. The Contractor is responsible for correction of concrete work that does not conform to the specified requirements, including strength, mix proportions, air-void system, tolerances, and finishes. Correct deficient concrete as directed by the Engineer.
- F. All finishing crewmembers shall be ACI Certified Concrete Flatwork Technicians and Finishers. The supervisor shall be an ACI Certified Flatwork Technician and shall have input to the crew's placement and finishing procedures regarding the application of ACI Standards
for quality flatwork. The ACI Standards that shall be observed are contained in the ACI – Concrete Craftsman Series.
- G. The Architect may reject cast-in-place concrete that exhibits the following defects:
 - 1. Bulging: Concrete surfaces that bulge due to insufficiently secured formwork, undersized ties, or flat bar clamps.
 - 2. Wavy Concrete: Concrete surfaces that exhibit waves along plywood joints due to moisture migration into unsealed cuts of plywood sheets causing swellings.
 - 3. Spalling: Concrete spalling due to shale, alkali reactivity, rusting steel too close to the surface, carbonation, improper removal of formwork, expansion of cast-in steel during the welding process, or other reasons.
 - 4. Cracking and Crazing: Concrete cracking and crazing due to lack of control joints or high water/cement ratio above 0.50.
 - 5. Air Holes: Air holes resulting from improper vibration and excessive heights of individual layers of pours between vibrations. Air holes due to spreading of concrete with vibrators rather than moving buckets or hoses.
 - 6. Honeycombing: Concrete honeycombing including loss of fines from leaking formwork or other causes.
 - 7. Discoloration: Concrete discoloration caused by any reason, including inconsistent concrete mix, different sources of cement and aggregates, temperature variation between individual pour and curing phases, improper and inconsistent use of vibrators, variation of time span of concrete in formwork, form oils, and migration of plasticizer into concrete from exposed sealant beads on formwork and around cast-in items such as electrical outlet boxes.
 - 8. Visible Pour Joints: Visible pour joints in concrete resulting from leaking formwork due to lack of gaskets and insufficient overlap with old concrete preventing proper tightening of formwork. Placement of concrete layers in excessive heights and spreading concrete with vibrator.
 - 9. Debris in Concrete: Concrete that includes debris, whether caused by insufficient cleaning of formwork or lack of cleanout and access doors at base of formwork.
- H. Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.
- I. ACI Publications: Comply with the latest revisions of the following documents unless modified by requirements in the Contract Documents:
 - 1. ACI 301 – Specification for Structural Concrete, Sections 1 through 5.
 - 2. ACI 117 – Specifications for Tolerances for Concrete Construction and Materials.
- J. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.
- K. Conduct a preinstallation conference or conference call at Project site to comply with requirements in Division 1 Section "Project Meetings".

Bill and Hillary Clinton National Airport (LIT)
ABP Fire Suppression Improvements

1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
 - a. Contractor's superintendent
 - b. Independent testing agency responsible for concrete design mixtures
 - c. Concrete subcontractor
 - d. Special inspection and testing agency retained by the Owner
 2. The agenda of the meeting or conference call shall include the following:
 - a. Special inspection and testing and inspecting agency procedures for field quality control
 - b. Concrete finishes and finishing
 - c. Cold- and hot-weather concreting procedures
 - d. Curing procedures
 - e. Construction of contraction and isolation joints, and joint-filler strips
 - f. Semirigid joint fillers
 - g. Forms and form removal limitations
 - h. Shoring and reshoring procedures
 - i. Vapor barrier installation
 - j. Anchor rod and anchorage device installation tolerances
 - k. Steel reinforcement installation
 - l. Floor and slab flatness and levelness measurement
 - m. Concrete repair procedures
 - n. Concrete protection.
- L. The Owner will employ a Special Inspector to oversee and administer, and an independent Testing Agency(s) to perform, a Program of Structural Tests and Inspections for compliance with Chapter 17 of the 2006 International Building Code. The SER will prepare a statement of structural tests and inspections, specifying the tests and inspections to be performed throughout the construction of this project. Submission and approval of this statement must be complete prior to beginning construction.
1. The Special Inspector will organize and direct the test and inspection program. All inspection and test reports shall be submitted to the Contractor, the Construction Manager (CM), the Owner's Representative, and the SER. The Contractor shall be responsible for understanding the testing and inspection program and notifying the Testing Agency and the Special Inspector when work is ready for tests and/or inspections. The Contractor will provide safe access to the site for representatives of the Testing Agency, the Special Inspector, and the SER. Inspections and tests of the Structural Tests and Inspection Program will not relieve the Contractor of responsibility for supervision, testing, and inspection for quality control of the work.
 2. The Testing Agency and Special Inspector shall submit written reports to the Contractor, the Construction Manager (CM), the Owner's Representative, and the SER within two business days of all inspections that describe any construction that does not conform to the Contract Documents. The Special Inspector shall reinspect all nonconforming construction after the Contractor has corrected the nonconforming construction and shall prepare a written report of the reinspection within two business days of the reinspection.
 3. The Owner's Representative will provide testing and inspection reports to the local building official when requested by the local building official. Upon completion of the construction, the independent Special Inspector will make a final report on the satisfactory completion of the Program for Structural Tests and Inspection to the building official, the SER, and the Owner's Representative.

PART 2 - PRODUCTS

2.1 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials of the same type, brand, and source throughout the Project except at below-grade concrete:
 - 1. Portland Cement: ASTM C150, Type I/II, gray. Supplement with the following:
 - a. Fly Ash: ASTM C618, Class F.
 - b. Ground Granulated Blast-Furnace Slag: ASTM C989, Grade 100 or 120.
 - c. Low alkali.
- B. Cementitious Material: Use the following cementitious materials of the same type, brand, and source at below-grade concrete:
 - 1. Portland Cement: ASTM C150, Type II gray. Supplement with the following:
 - a. Fly Ash: ASTM C618, Class F.
 - b. Ground Granulated Blast-Furnace Slag: ASTM C989, Grade 100 or 120.
 - c. Limit C3A content to 5% per ASTM C-150.
- C. Normal-Weight Aggregates: ASTM C33 coarse aggregate. Provide aggregates from a single source with documented service record data of at least ten years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.
 - 1. Maximum Coarse-Aggregate Size: 3/4 in., nominal typical 1-1/2 in. for pavement slabs.
 - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- D. Water: ASTM C94, potable.
- E. Sustainable Design Requirements:
 - 1. Recycled Content: Fly ash shall have a minimum of 3% post industrial content.
 - 2. Regional Materials: Concrete materials shall be manufactured regionally (within a radius of 500 mi) and must be composed of materials extracted, harvested, or recovered within a 500 mi radius of the project.

2.2 ADMIXTURES

- A. General Admixture Requirements:
 - 1. The concrete supplier and Contractor shall use manufacturer's product identified in this Section or submit alternate manufacturer product for approval by the Architect.
 - 2. All admixtures used in the concrete shall be produced by a single manufacturer.
 - 3. The concrete supplier and Contractor shall certify compatibility of all ingredients in each mix design. Use admixtures in strict accordance with manufacturer's recommendations.
 - 4. The concrete supplier and Contractor shall account for admixture volume in the concrete mix proportions in accordance with admixture manufacturer's recommendations.
 - 5. Do not use calcium chloride or admixtures containing more than 0.1% chloride ions.
- B. Air-Entraining Admixture: ASTM C260, certified by manufacturer to be compatible with other required admixtures. Do not add air-entraining admixtures to interior flatwork. Subject

Bill and Hillary Clinton National Airport (LIT)
ABP Fire Suppression Improvements

to compliance with requirements, provide one of following, or approved equivalent:

1. Air-Tite, Cormix Construction Chemicals.
 2. Air-Mix or Perma-Air, Euclid Chemical Co.
 3. Darex AEA or Daravair, W.R. Grace & Co.
 4. MB-VR or Micro-Air, Master Builders, Inc.
 5. Sealtight AEA, W.R. Meadows, Inc.
 6. Sika AER, Sika Corp.
- C. Water-Reducing Admixture: ASTM C494, Type A. Subject to compliance with requirements, provide one of following, or approved equivalent:
1. Chemtard, ChemMasters Corp.
 2. PSI N, Cormix Construction Chemicals.
 3. Eucon WR-75, Euclid Chemical Co.
 4. WRDA, W.R. Grace & Co.
 5. Pozzolith Normal or Polyheed, Master Builders, Inc.
 6. Metco W.R., Metalcrete Industries.
 7. Prokrete-N, Prokrete Industries.
 8. Plastocrete 161, Sika Corp.
- D. Water-Reducing and Retarding Admixture: ASTM C494, Type D. Subject to compliance with requirements, provide one of following, or approved equivalent:
1. PSI-R Plus, Cormix Construction Chemicals.
 2. Eucon Retarder 75, Euclid Chemical Co.
 3. Daratard-17, W.R. Grace & Co.
 4. Pozzolith R, Master Builders, Inc.
 5. Protard, Prokrete Industries.
 6. Plastiment, Sika Corporation.
- E. Water-Reducing, Accelerating Admixture: ASTM C494, Type E. Subject to compliance with requirements, provide one of following, or approved equivalent:
1. Q-Set, Conspec Marketing & Manufacturing Co.
 2. Lubricon NCA, Cormix Construction Chemicals.
 3. Accelguard 80, Euclid Chemical Co.
 4. Daraset, W.R. Grace & Co.
 5. Pozzutec 20, Master Builders, Inc.
 6. Accel-Set, Metalcrete Industries.
- F. High-Range Water-Reducing Admixture: ASTM C494, Type F or Type G. Subject to compliance with requirements, provide one of following, or approved equivalent:
1. Super P, Anti-Hydro Co., Inc.
 2. Cormix 200, Cormix Construction Chemicals.
 3. Eucon 37, Euclid Chemical Co.
 4. WRDA 19 or Daracem, W.R. Grace & Co.
 5. Rheobuild or Polyheed, Master Builders, Inc.
 6. Superslump, Metalcrete Industries.
 7. PSPL, Prokrete Industries.
 8. Sikament 300, Sika Corp.
- G. Non-Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated non-set-accelerating anodic inhibitor or mixed cathodic and anodic inhibitor capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete. Subject to compliance with requirements, provide one of following, or approved equivalent:
1. Axim Concrete Technologies; Catexol CN-Cl.

Bill and Hillary Clinton National Airport (LIT)
ABP Fire Suppression Improvements

2. Grace Construction Products, W.R. Grace & Co.; DCI-S.
3. Master Builders, Inc.; Rheocrete 222+.
4. Sika Corporation; FerroGard-901.

2.3 CURING MATERIALS

- A. Moisture-Retaining Cover: ASTM C171, polyethylene film or white burlap-polyethylene sheet.
- B. Curing Paper: ASTM C 171, opaque appearance, for all concrete flatwork.
- C. Water: Potable.

2.4 RELATED MATERIALS

- A. Adhesive Rebar Anchors/Dowels:
 1. Epcon Ceramic 6 Epoxy Rebar Anchor by ITW Ramset/Red Head.
 2. Hilti HY-150 System.
 3. Approved equal providing same or higher allowable tensile and shear loads at the indicated embedment, spacing, and edge distance.
- B. Nonshrink Grout: 8,000 psi prepared at fluid consistency "Masterflow 928 Grout" by Master Builders, "Five Star" by U.S. Grout Corp., "Sika Grout 212" by Sika Corp., or approved equal.

2.5 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.
 1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Other Cementitious Materials: Cementitious materials other than portland cement shall not exceed the following percentages of total weight of cementitious materials:
 1. Fly Ash: 25%.
 2. Combined Fly Ash and Pozzolan: 25%.
 3. Ground Granulated Blast-Furnace Slag: 30%.
 4. Combined Fly Ash or Pozzolan and Ground Granulated Blast-Furnace Slag: 50% portland cement minimum, with fly ash or pozzolan not exceeding 25%.
- C. Limit water-soluble chloride-ion content in hardened concrete to 0.30% by weight of cement.
- D. Admixtures: Use admixtures according to manufacturer's written instructions.
 1. Use water-reducing, high-range water-reducing, or plasticizing admixture in all 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 corrosion-inhibiting admixture in concrete where indicated.

2.6 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Interior Slabs-on-grade: Proportion normal-weight-concrete mixture as follows:
 - 1. Minimum Compressive Strength: 5,000 psi at twenty-eight days.
 - 2. Maximum Water-Cementitious-Materials Ratio: 0.40.
 - 3. Fly Ash Content: Fly ash shall constitute a minimum of 10% of the total weight of cementitious materials.
 - 4. Slump Limit: 8 in. for concrete with verified slump of 2 to 4 in. before adding water-reducing, high-range water-reducing, or plasticizing admixture, ± 1 inch.
 - 5. Air Content: 6%, $\pm 1.5\%$ at point of delivery for 1-1/2-in. nominal maximum aggregate size.
- B. Proportion all concrete in accordance with ACI 301.
- C. The specified twenty-eight-day design strength is a minimum standard. The water-cementitious-materials ratio shall not exceed the specified value, including any water added to meet specified slump in accordance with the requirements of ASTM C94. Weight of fly ash shall be included with the weight of portland cement to determine the water-cementitious- materials ratio.

2.7 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.8 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C94M and furnish batch ticket information.
 - 1. When air temperature is between 85 and 90°F, reduce mixing and delivery time from 1-1/2 hrs to 75 min.; when air temperature is above 90°F, reduce mixing and delivery time to 60 min.

PART 3 - EXECUTION

3.1 GENERAL

- A. Coordinate the installation of joint materials, floor drains, and other related materials with placement of forms and reinforcing steel.

3.2 EMBEDDED ITEMS

- 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.
 - 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."

2. Install dovetail anchor slots in concrete structures as indicated and in coordination with the work of other trades.
3. Install embed plates in concrete structures as indicated and in coordination with the work of other trades.

3.3 REMOVING AND REUSING FORMS

- A. General: Formwork for sides of grade beams and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50°F for 24 hrs 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 reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent each time a form is reused.
- 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 exposed concrete surfaces unless approved by Architect.

3.4 SUBGRADE AND SUBBASE PREPARATION

- A. Soil Formed and Soils Supported Slabs-on-Grade:
 1. Subgrade Preparation: Proof roll to obtain firm, even surface, following recommendations in the geotechnical report. Remove and replace uncompactable materials. Fill and consolidate soft areas as directed by Geotechnical Consultant. Compact to obtain even subgrade at 95% of maximum dry density.
 2. Subbase: Spread and compact per the recommendations in the geotechnical report,
 - a 12 in. thick layer of gravel or crushed stone placed and compacted per the recommendations in the geotechnical report; recompact as directed in the field by Geotechnical Consultant.
 3. Set vapor retarder directly under the underside of slab to be poured at all interior slabs.
- B. Pile Caps/Grade Beam Bases: Prepare base as directed by the Geotechnical Consultant in the field and as required for stabilizing the surface.
- C. Do not place any slabs-on-grade or pile caps or grade beams without the approval of the base by the Geotechnical Consultant in the field.

3.5 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
 - 1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- C. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be 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. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
 - 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
 - 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 in. into preceding 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 mixture constituents to segregate.
- D. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
 - 1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 - 2. Maintain reinforcement in position on chairs during concrete placement.
 - 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
 - 4. Slope surfaces uniformly to drains where required.
 - 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
- E. 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 average high and low temperature is expected to fall below 40°F or three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
 - 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- F. Hot-Weather Placement: Comply with ACI 301 and as follows:
 - 1. Maintain concrete temperature below 90°F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is the Contractor's option.

2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

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. Architectural 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.
 1. Apply to concrete surfaces exposed to public view or to be covered with a coating or covering material applied directly to concrete.
- C. Related Unformed Surfaces: At 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, restraighening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraighening until surface is left with a uniform, smooth, granular texture.
 1. Apply a float finish where surface is to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
- C. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand-trowel 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 to be covered with paint, or another thin-film-finish coating system.
- D. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and elsewhere as indicated.
 1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route or as indicated for slopes to drains. Coordinate required final finish with the Architect before application.
- E. Raked Finish: Apply a raked finish to portions of slabs to be covered with housekeeping pads and curbs.

- F. Finish Tolerances: Finish surfaces to the following tolerances, according to ASTM E1155, for a randomly trafficked floor surface:
1. Suspended slab specified thicknesses are minimum values. Place concrete level with additional concrete volume as required for flatness and levelness tolerance.
 2. Minimum specified overall values in accordance with ACI 117 for structural slabs on grade floors as follows: Flatness FF 35 and of levelness FL 35; with minimum local values of flatness FF 24 and of levelness FL 24.
 3. Minimum specified overall values in accordance with ACI 117 for suspended slabs on metal deck: Flatness FF 35 with minimum local value FF 24.

3.8 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown as required for equipment. Coordinate sizes and locations of bases with equipment manufacturer. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.

3.9 CONCRETE PROTECTING AND CURING

- A. General: Cure concrete according to ACI 308R-01. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306R-88 for cold-weather protection and ACI 305R-99 for hot-weather protection during curing.
- B. Unformed Surfaces: Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
1. Initial Curing: When concrete bleed rate, concrete temperature, ambient temperature, relative humidity, wind speed, and solar heating create a risk of premature drying, conduct initial curing using evaporation retarder or fogging during concrete placement and finishing.
 2. Intermediate Curing: When concrete finishing is completed before final set of the concrete and when final curing methods might damage the concrete either mechanically or by raising the water/cement ratio of the near-surface region, conduct intermediate curing using evaporation retarder or fogging.
 3. Final Curing: Begin final curing immediately after finishing is complete and after the concrete has reached final set and will not be damaged by final curing operations. Conduct final curing using moisture curing or moisture retaining cover.
 4. Final Curing for Flatwork: Curing paper for a minimum of seven days; do not use curing compounds.

- C. 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 the remainder of the curing period.
- D. Cure formed concrete by one or a combination of the following methods:
 - 1. Evaporation Retarder: Apply evaporation retarder according to manufacturer's written instructions.
 - 2. Fogging: Continuously fog mist above the concrete surface to elevate the relative humidity of the air above the concrete surface.
 - 3. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12 in. lap over adjacent absorptive covers.
 - 4. 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 in., 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.
 - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
 - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
 - c. Cure concrete surfaces to receive floor coverings with a moisture-retaining cover. Do not use curing compounds on floors.

3.10 LIQUID FLOOR TREATMENTS

- A. Seal Coat: Where indicated, uniformly apply a continuous seal coat of sealing compound to hardened concrete by power spray or roller according to manufacturer's written instructions.

3.11 GROUTING

- A. Pack grout solidly between bearing surfaces and level plates or base plates so that no voids remain. Neatly finish exposed surfaces, protect grout, and allow grout to cure. Comply with manufacturer's written installation instructions for shrink-resistant grout.

3.12 CONCRETE SURFACE REPAIRS

- A. It is the intention of this Specification to require forms, mixture of concrete, and workmanship so that concrete surfaces, when exposed, will require no patching. Any concrete that is not formed as shown on the drawings or for any reason is out of alignment or level, or shows a defective surface, shall be removed from the job at the Contractor's expense, unless the Architect grants permission to repair the defective area at the Contractor's expense. Permission to patch any such area shall not be considered a waiver of the Architect's right to require a complete removal of defective work if the repair does not, in his opinion, satisfactorily restore the quality of the concrete. The Architect shall be the sole judge of acceptability.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two-and-one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
 - 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 in. in any dimension in solid concrete, but not less than 1 in. in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
 - 2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
 - 3. On all wall surfaces, remove all fins, flash, and any other protuberances to provide a smooth surface. Grind where required to produce a smooth surface compatible with foundation wall dampproofing or waterproofing.
 - 4. Patch tie holes on all formed concrete surfaces exposed to view.
 - 5. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
 - 1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 in. wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 - 2. After concrete has cured at least fourteen days, correct high areas by grinding.
 - 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
 - 4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
 - 5. Repair defective areas, except random cracks and single holes 1 in. or less in

diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4 in. clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

6. Repair random cracks and single holes 1 in. or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hrs.
- E. Perform structural repairs of concrete, subject to the Architect's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to the Architect's approval.

3.13 QUALITY ASSURANCE

- A. Testing and Inspecting: The Owner will engage an independent special inspector and a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Inspections: Specific tasks to be performed by the Special Inspector and Testing Agency are described in a statement of special inspections prepared by the Structural Engineer of Record.
- C. Floor Flatness and Levelness Testing: For slab-on-grade and each suspended slab, submit test data in accordance with ASTM E 1155 indicating compliance with specified flatness and levelness tolerances.

END OF SECTION 03 30 00

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Furnish and erect light gauge steel framing and accessories.

1.02 RELATED DOCUMENTS

- A. Applicable portions of the Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, and Addenda issued prior to the execution of the Contract, other documents listed in the Agreement and Modifications issued after the execution of the Contract shall apply to this Section.
The general requirements for this work are in Division 1 of the Specifications.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. In accordance with Section 01 33 00.
1. Shop Drawings:
 - a. Submit shop drawings showing complete details for the fabrication and erection of members. Manufacturer's professional engineer shall be licensed in the state where proposed project is located.
 - b. Submit details, schedules, procedures, and diagrams showing the sequence of erection.
 - c. Provide setting drawings, templates, instructions and directions for installation of anchorage devices.
 - d. Submit shop drawings for review prior to starting any work. Work performed prior to shop drawing review is at contractors risk.
 - e. **Contract Document electronic files (including all drawings, specifications, addenda and supplemental information) will not be made available to Bidders or Sub-bidders before the award of a Contract. CAD files will be available to the Contractor or Sub-contractors with a release letter or per AIA Document C106™ - 2013 Digital Data Licensing Agreement, after the award of a Contract.**
- B. Substitutions will not be considered prior to the award of the General Contract.

1.04 REFERENCES

- A. American Iron and Steel Institute (AISI)
1. "Specification for the Design of Cold-Formed Steel Structural Members" .
 2. "Cold-Formed Steel Design Manual" (Latest).
- B. American National Standards Institute (ANSI)
1. ANSI A58.1 - "Roof, Wind and Snow Loads".
- C. American Society for Testing and Materials (ASTM):
1. ASTM A446 - Steel Sheet, Zinc-coated (galvanized) by Hot-Dip Process, Structural (Physical) Quality.
 2. ASTM A570 Hot-Rolled Carbon Steel Sheet & Strip, Structural Quality.
 3. ASTM A525 - Sheet Steel, Zinc-Coated (Galvanized) by the Hot-Dip Process, General Requirements.
 4. ASTM A611 - "Standard Specification for Steel, Cold-Rolled Sheet, Carbon, Structural."
 5. ASTM C955 - "Standard Specification for Load Bearing Steel Studs, Runners (Track),

Bracing, and Bridging."

- D. American Welding Society (AWS):
 - 1. AWS D1.1 - "Structural Welding Code" and D1.3 - "Specifications for Welding Sheet Steel in Structures."
 - 2. AWS - "Standard Qualification Procedure".
- E. Metal Lath/Steel Framing Association (ML/SFA) - "Lightweight Steel Framing Systems Manual," Latest Edition.
- F. American Society of Civil Engineers (ASCE) - "Minimum Design Loads for Buildings and Other Structures: Chapter 6 - Wind Loads".

1.05 PERFORMANCE REQUIREMENTS

- A. Contractor is responsible for design, fabrication and erection of steel stud framing to meet the requirements of the latest adopted Local Code.
- B. Compute all structural properties in accordance with AISI "Specifications for the Design of Cold Formed Steel Structural Members."
- C. Provide weldments as required in accordance with American Welding Society (AWS) AWS D1.3 "Structural Welding Code - Sheet Steel".

1.06 SYSTEM DESCRIPTION

- A. Design Requirements: The supplier shall design and/or verify the size and strength of all light gauge cold-formed Metal Framing members and connections in accordance with the ML/SFA Lightweight Steel Framing Systems Manual.
 - 1. Design shall use the superimposed design loads specified in the "Design Criteria" section of the "Structural General Notes" in the contract drawings.
 - 2. Design shall be based upon information shown on the drawings and specified herein.
 - 3. Maximum deflection of exterior wall systems shall not exceed L/600 for Masonry Veneer and L/360 for EIFS Veneer.
 - 4. 18 gage studs are the minimum allowed for framing that supports masonry.
- B. Design shall conform to: AISI Specification for the Design of Cold-Formed Steel Structural Members. Wall bridging shall be designed to provide resistance to minor axis bending and rotation of wall studs. Designated selected exterior and/or interior walls shall be designed to provide frame stability and lateral load resistance. All connections (member to member, and member to structure) shall be designed and detailed.
- C. Qualification of Field Welding: Qualify welding process and welding operators in accordance with AWS "Standard Qualification Procedure".

1.07 DELIVERY AND STORAGE

- A. Protect steel studs from rusting and damage.
- B. Deliver to project site in manufacturer's unopened containers or bundles, fully identified with name, brand, type and grade.
- C. Store off the ground in a dry, ventilated space.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Provide products manufactured by one of the following manufacturers or by a current member of the Steel Stud Manufacturers Association.
 - 1. Consolidated Systems Incorporated, 4900 Hungerford Road, Memphis, Tennessee 38118, Phone (901) 365-0226
 - 2. Dietrich Industries Inc., 500 Grant Street, Suite 226, Pittsburgh, Pennsylvania 15219, Phone (412) 281-2805
 - 3. Marino@WARE, 400 Metuchen Road, South Plainfield, NJ, 800-627-4661.
 - 4. Telling Industries, 1400 Southwire Road, Osceola, AR 72370, 888-711-3124.
 - 5. The Steel Network, Inc., Telephone: 888-474-4876.
 - 6. Approved equal.

2.02 GENERAL REQUIREMENTS

- A. Provide type, size, gauge and physical properties as described by the manufacturer's load and height tables and in accordance with the current local building code. All section properties shall be calculated in accordance with the AISI Specification for the Design of Cold-Formed Steel Structural Members (latest edition).
- B. Structural calculations specifically related to this project and performed by the manufacturer's professional engineer will indicate depths, gages and spacings of studs required to meet deflection and load bearing requirements. Professional engineer shall be licensed in the state where proposed project is located.
- C. At all instances where radius steel stud and drywall construction is shown on drawings it is intended that the radius be smooth not faceted. Contractor is required to provide smooth face radius by whatever means necessary.
- D. Runners: Match studs; type recommended by stud manufacturer for floor and ceiling support of studs, and for vertical abutment of drywall work at other work.

2.03 MATERIALS

- A. All structural members shall be formed from steel conforming to ASTM A653-94.
- B. All structural members shall be zinc coated in accordance with ASTM A924, G-60 coating.
- C. System Components: With each type of steel stud required, utilize runners (tracks), shoes, clips, angles, ties, fasteners, door jamb reinforcers, bridging and accessories for the applications indicated, as needed to product a complete metal stud system in both vertical and horizontal planes for interior and exterior conditions.

2.04 FABRICATION

- A. General: Framing components may be prefabricated prior to erection. Fabricate components plumb, square, true to line and braced against racking with joints welded. Perform lifting of prefabricated components in a manner to prevent damage or distortion.
- B. Fastenings: Attach similar components by welding. Attach dissimilar components by bolting, or screw fasteners, as standard with manufacturer.
- C. Cutting of steel framing members may be accomplished with a saw or shear. Torch cutting of load

carrying members is not permitted. Cut framing components squarely for attachment to perpendicular members, or as required for an angular fit against abutting members. Hold members positively in place until fastened.

- D. Wire tying of framing components is not permitted.

PART 3 - EXECUTION

3.01 ERECTION

- A. Anchor tracks securely to supporting structure to transfer imposed loads.
- B. Provide complete, uniform and level bearing support for bottom track at each bearing stud location.
- C. At intersection and abutting track joints, anchor abutting track pieces securely to a common structural element, or splice them together.
- D. Splices in axial loaded studs not permitted.
- E. Framed Wall Openings: Include properly designed header and multiple (or heavier) studs at each edge of opening, to compensate for those removed.
- F. Diagonal Bracing: Install at wall locations used as "shear walls" for frame stability and to resist wind and lateral loads. Anchor bracing securely for uplift and horizontal shear. Position additional stud(s) as required to resist the vertical component.
- G. General:
1. Install continuous tracks sized to match studs. Align tracks accurately to the layout at base and top of studs. Secure tracks as recommended by the stud manufacturer for the type of construction involved, except do not exceed 24" o.c. spacing for nail or power-driven fasteners, nor 16" o.c. for other types of attachment. Provide fasteners at corners and end of tracks.
 2. Set studs plumb, except as needed for diagonal bracing or required for no-plumb walls or warped surfaces and similar requirements.
 3. Where stud system abuts structural columns or walls anchor ends of stiffeners to support structure.
 4. Install supplementary framing, blocking and bracing in the metal framing system wherever walls or partitions are indicated to support handrails, bumper guards, wall mounted door stops, fixtures, equipment, services, casework, heavy trim and furnishings, and similar work requiring attachment to the wall or partition. Where type of supplementary support is not otherwise indicated, comply with the stud manufacturer's recommendations and industry standards in each case, considering the weight or loading resulting from the item supported.
 5. Secure studs to top and bottom runner tracks by either welding or screw fastening at both inside and outside flanges.
 6. Frame wall openings larger than 2'-0" square with double stud at each jamb of frame except where more than 2 are either shown or indicated in manufacturer's instructions. Install runner tracks and jamb studs with stud shoes or by welding, and space jack studs same as full-height studs of the wall. Secure stud system all around to wall opening frame in the manner indicated.
 7. Frame both sides of expansion and control joints, as shown for the wall system, with a separate stud and do not bridge and joint with components of the stud system.

END OF SECTION 05 40 00

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Furnish and install insulation and related items specified.

1.02 RELATED DOCUMENTS

- A. Applicable portions of the Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, and Addenda issued prior to the execution of the Contract, other documents listed in the Agreement and Modifications issued after the execution of the Contract shall apply to this Section.
The general requirements for this work are in Division 1 of the Specifications.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. In accordance with Section 01 33 00.
- B. Substitutions will not be considered prior to the award of the General Contract.

1.04 PRODUCT HANDLING

- A. Protection:
1. Deliver materials to job site and store in safe dry place with labels intact and legible at time of installation.
 2. Protect building insulation materials before, during, and after installation. Protect installed work and materials of other trades.
- B. Replacements: In event of damage, immediately make repairs and replacements necessary to approval of Architect and at Contractor's expense.

1.05 REFERENCES

- A. Concealed Installations: Flame Spread rating of not more than 75 and a smoke developed rating of not more than 450 when tested in accordance with ASTM E84.
- B. Exposed Installations: Flame Spread rating of not more than 25 and a smoke developed rating of not more than 450 when tested in accordance with ASTM E84.

PART 2 - PRODUCTS

2.01 BATT INSULATION

- A. Fiberglass Building Insulation Manufacturers:
1. Certainteed, 800-233-8990
 2. Johns Manville, 800-866-3234
 3. Knauf Insulation, 800-825-4434
 4. Owens Corning Fiberglass, 800-GET-PINK

Bill and Hillary Clinton National Airport (LIT)
ABP Fire Suppression Improvements

- B. Material: Formaldehyde-free Fiberglass type bearing the UL Classification marking as to fire resistance conforming to Federal Specification HH-I-521F, and ASTM C-665:
 - 1. Un-faced, Type I in walls

2.02 ACOUSTICAL INSULATION

- A. In partitions, provide un-faced Owens-Corning Pink Next Gen™ Fiberglas™ Sound Attenuation Batts (SAB) or approved equal complying with ASTM C 665, Type I and ASTM E 136. Flame spread rating shall not exceed 25 and smoke developed shall not exceed 50 when tested complying with ASTM E 84. Approved equal manufacturers:
 - 1. Certaineed **NoiseReducer™** Sound Attenuation and Acoustical Ceiling Batts.
 - 2. Knauf Insulation EcoBatt® Insulation with ECOSE® Technology.
 - 3. Johns Manville Unfaced or ComfortTherm® Batts and Rolls.
 - 4. ROCKWOOL Safe'n'Sound® Fire & Soundproof Insulation available in 3" and 6" thicknesses. Mineral wool batt insulation conforms to ASTM C167.

2.03 OTHER MATERIALS

- A. Provide materials including fasteners and retainers, not specifically described but required for complete and proper installation of building insulation, selected by Contractor subject to approval of Architect.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

- A. Inspection: Carefully inspect installed work of other trades and verify that work is complete to point where this installation may properly commence.
- B. Discrepancies: Do not proceed with installation in areas of discrepancy until discrepancies are fully resolved.

3.02 INSTALLING BATT AND BLANKET INSULATION

- A. Install vapor barriers flat against framing members, without buckles or wrinkles and secure in place to avoid leakage in air borne water vapor.
- B. After piping and wiring is in place, install and support blanket and batt insulation in position required, and coordinate with framing.
- C. Remove insulation and vapor barriers torn, displaced, water soaked, and damaged. Replace with new material.

3.03 INSTALLING OTHER INSULATION

- A. Install materials not specifically set forth above in strict accordance with manufacturer's instructions.

END OF SECTION 07 21 00

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This section includes firestopping for through-penetrations and joints in or between the following fire-resistance rated assemblies, including both blank openings, linear openings, and openings containing penetrating items:
- B. Provide UL or equivalent approved firestopping system for the closures of openings in walls, floors, and roof decks against penetration of flame, heat, and smoke or gases in fire resistant rated construction.
 - 1. Floor-ceiling assemblies.
 - 2. Roof-ceiling assemblies.
 - 3. Walls and partitions.
 - 4. Smoke barriers.
 - 5. Construction enclosing compartmentalized areas.
- C. This Section describes the requirements for furnishing and installing firestopping for fire-rated construction. Contractor is responsible for identifying various conditions requiring firestopping material and for submitting proposed UL Tested Assemblies for Architects review.

1.02 RELATED DOCUMENTS

- A. Applicable portions of the Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, and Addenda issued prior to the execution of the Contract, other documents listed in the Agreement and Modifications issued after the execution of the Contract shall apply to this Section.
The general requirements for this work are in Division 1 of the Specifications.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. In accordance with Section 01 33 00.
 - 1. Material Safety Data Sheets: Submit MSDS for each firestop products.
 - 2. Shop Drawings: Show typical installation details for methods of installation. Indicate which firestop materials will be used where and thickness for different hourly ratings.
 - 3. Installer Documentation: Submit document from Firestop Manufacturer wherein Manufacturer recognizes, i.e. approves installer for said Manufacturer's Firestop products.
 - 4. Prepare job mock-up of the material proposed for use in the project as directed by Architect. Approved mock-ups may be left in place as part of the finished project and will constitute the standard for remaining work, including aesthetics. It is recommended that the Authority Having Jurisdiction (AHJ) or Fire Marshal review and comment on the job mock-up and contractor is to notify architect of AHJ observations.
- B. Substitutions will not be considered prior to the award of the General Contract.

1.04 QUALITY ASSURANCE

- A. Firestopping materials shall conform to Flame (F) and Temperature (T) ratings as required by local building code and as tested by nationally accepted test agencies per ASTM E 814 or UL

1479 fire tests. The F rating must be a minimum of one (1) hour but not less than the fire resistance rating of the assembly being penetrated. T rating, when required by code authority, shall be based on measurement of the temperature rise on the penetrating item(s). The fire test shall be conducted with a minimum positive pressure differential of 0.01 inches of water column.

- B. Firestopping material shall be asbestos free and free of any PCBs.
- C. Do not use any product containing solvents or that requires hazardous waste disposal.
- D. Do not use Firestop Products which after curing, dissolve in water.
- E. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991 or been evaluated by UL and found to comply with UL's "Qualified Firestop Contractor Program Requirements." Submit qualification data.
- F. Inspector Qualifications: Contractor to engage a qualified inspector to perform inspections and final reports. The inspector to meet the criteria contained in ASTM E699 for agencies involved in quality assurance and to have a minimum of two years' experience in construction field inspections of firestopping systems, products, and assemblies. The inspector to be completely independent of, and divested from, the Contractor, the installer, the manufacturer, and the supplier of material or item being inspected. Submit inspector qualifications.

1.05 PRODUCT DELIVERY, STORAGE AND HANDING

- A. Deliver material in the manufacturers' original, unopened containers or packages with manufacturer's name, product identification, lot numbers, UL-labels, and mixing and installation instructions, as applicable.
- B. Store materials in the original, unopened containers or packages, and under conditions recommended by manufacturers.
- C. All Firestop materials shall be installed prior to expiration of shelf life.

1.06 PROJECT CONDITIONS

- A. Conform to Manufacturer's printed instructions for installation and when applicable, curing in accordance with temperature and humidity. Conform to ventilation and safety requirements.

1.07 WARRANTY

- A. Firestop Contractor shall warranty that firestopping systems used meet firestopping requirements as herein specified.

1.08 SEQUENCING

- A. Coordinate this work as required with work of other trades.
- B. Firestopping shall precede gypsum board finishing.

1.09 PROTECTION

- A. Where firestopping is installed at locations which will remain exposed in the completed work, provide protection as necessary to prevent damage to adjacent surfaces and finishes, and protect as necessary against damage from other construction activities.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Provide materials from one of the following manufacturers:
 - 1. 3M
 - 2. Cafco
 - 3. Hilti
 - 4. STI Firestop
 - 5. Approved Equal.

2.02 MATERIALS

- A. Provide mortars, sealants, caulks, putty, collars, pillows, wrap strips, composite sheets and related materials as required by the UL Design Assembly proposed for each individual application.
- B. Accessories:
 - 1. Forming/Damming Materials: Mineral fiberboard or other type recommended by manufacturer.
 - 2. Primer, Sealant and Solvent Cleaner: As recommended by manufacturer.
- C. Seal all penetration of sound isolating construction with non-hardening material.
- D. At sound isolating construction with multiple penetrations in a relatively small area, provide Nelson Class 200 multi-cable transit system as manufactured by Nelson Firestop Products, 1-800-331-7325, or approved equal.

2.03 SAFING INSULATION

- A. Provide semi-rigid product designed for use as a fire stop that is non-combustible and non-corrosive to steel as manufactured by Thermafiber Div. of USG Interiors; Cafco Industries Ltd.; Roxul, or approved equal product combining semi-refractory mineral fiber manufactured from slag with thermosetting resin binders to comply with ASTM C665, Type I; minimum density of 4.0 pcf; passing ASTM E136 for combustion characteristics and with Fire Hazard Classification when tested according to ASTM E84; flame spread of 15 or less, fuel contribution of 0 and smoke development of 0.
- B. Curtain Wall Assembly, Spandrel Panels, and Perimeter Joint Protection: Provide Intertek Design No. CEJ 322 P or propose alternate system meeting design conditions, to include the following:
 - 1. Reinforcing angle at horizontal butt joints
 - 2. Perimeter Fire Barrier Reinforcement Angle
 - 3. Curtain Wall Insulation, 2" thick (aluminum foil scrim on interior side of room)
 - 4. Impaling Screws
 - 5. Elastomeric Firestop Spray
 - 6. Other components required for a complete system

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine the areas and conditions where Firestops are to be installed and notify the architect of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected by the contractor in a manner acceptable to the architect.
- B. Verify that environmental conditions are safe and suitable for installation of Firestop product(s).

3.02 CONDITIONS REQUIRING FIRESTOPPING

- A. General:
 - 1. Provide firestopping for conditions specified whether or not firestopping is indicated, and, if indicated, whether such material is designated as insulation, safing, or otherwise.
 - 2. Insulation types specified in other Sections shall not be installed in lieu of firestopping material specified herein.
- B. Building Exterior Perimeters:
 - 1. Where exterior facing construction is continuous past a structural floor, and a space would otherwise remain open between the inner face of the wall construction and the outer perimeter edge of the structural floor, provide firestopping to equal the fire resistance of the floor assembly. Mineral wool by itself is not an acceptable firestop, neither is mineral wool used with beads of caulking applied along length of mineral wool/curtain wall or mineral wool/floor slab junctures. If mineral wool is part of firestop system, the mineral wool must be completely covered by appropriate thickness of UL listed Firestop Sealant.
 - 2. Firestopping shall be provided whether or not there are any clips, angles, plates, or other members bridging or interconnecting the facing and floor systems, and whether or not such items are continuous.
 - 3. Where an exterior wall of composite type construction passes a perimeter structural member, such as a girder, beam, or strut, and the finish on the interior wall face does not continue up too close with the underside of the structural floor above, thus interrupting the fire-resistive integrity of the wall system, and a space would otherwise remain open between the interior face of the wall and the lower edge of the structural member, provide firestopping to continuously fill such open space.
- C. Interior Walls and Partitions:
 - 1. Where a wall or partition is continuous past a structural floor, such as at stairwells and vertical shafts, and a space would otherwise remain open between the wall face and perimeter edge of the adjoining structural floor, provide firestopping.
 - 2. Provide firestopping whether or not there are any clips, angles, plates, or other members bridging or interconnecting the wall and floor systems, and whether or not such items are continuous.
 - 3. Where the top edge of a fire-rated wall or partition abuts and is at right angle to fluted-type metal decking, and the construction is such that would otherwise leave the flute spaces open, provide firestopping.
 - 4. Where the bottom track or plate of a partition meets the concrete slab provide firestopping sealant.
 - 5. Where the bottom track or plate of a partition meets the top of the concrete block wall below the drywall partition provide firestopping sealant.
- D. Penetrations:

1. Penetrations include conduit, cable, wire, pipe, duct, electrical boxes, fire extinguisher cabinets, toilet accessories or other elements which pass through or penetrate one or both sides of a fire rated floor, wall, or partition.
 - a. If "5 sided" gypsum board enclosures are omitted where metal electrical back boxes not exceeding 16 square inches occur at one side only of a wall within a single stud cavity; provide fire stopping material described in this Section to completely encompass the back box and its annular space.
 2. Except for floors on grade, where a penetration occurs through a structural floor or roof and a space would otherwise remain open between the surfaces of the penetration and the edge of the adjoining structural floor or roof, provide firestopping to fill such spaces in accordance with ASTM E 814.
 3. Where penetrations occur at fire-rated walls or partitions of solid-type construction, provide firestopping to completely fill spaces around the penetration, in accordance with ASTM E 814.
 4. Where penetrations occur at fire-rated walls or partitions of hollow-type construction, provide firestopping to completely fill spaces around the penetration, on each side of the wall or partition, in accordance with ASTM E 814.
 5. These requirements for penetrations shall apply whether or not sleeves have been provided, and whether or not penetrations are to be equipped with escutcheons or other trim. If penetrations are sleeved, firestop annular space - if any - between sleeve and wall of opening.
- E. Provide firestopping to fill miscellaneous voids and openings in fire-rated construction in a manner essentially the same as specified above.

3.03 INSTALLATION

- A. General:
1. Installation of Firestops shall be performed by applicator/installers qualified and trained by the manufacturer. Installation shall be performed in strict accordance with manufacturer's detailed installation procedures.
 2. Apply Firestops in accordance with fire test reports, fire resistance requirements, acceptable sample installations, and manufacturer's recommendations.
 3. Coordinates with plumbing, mechanical, electrical and other trades to assure that all pipe, conduit, cable, and other items which penetrate fire related construction have been permanently installed prior to installation of Firestops, schedule and sequence the work to assure that partitions and other construction which would conceal penetrations are not erected prior to the installation of Firestops.
 4. At gypsum board fire walls the entire gap between the floor slab up to the bottom edge of the gypsum board is to be filled 100% and continuous.
- B. Dam Construction: Install dams when required to properly contain Firestopping materials within openings and as required to achieve required fire resistance rating. Combustible damming material must be removed after appropriate curing. Incombustible damming materials may be left as a permanent component of the Firestop system.
- C. Field Quality Control:
1. Prepare and install firestopping systems in accordance with manufacturer's printed instructions and recommendations.
 2. Follow safety procedures recommended in the Material Safety Data Sheets.
 3. Finish surfaces of firestopping which is to remain exposed in the completed work to a uniform and level condition.
 4. All areas of work must be accessible until inspection by the applicable Code authorities.
 5. Correct unacceptable firestops and provide additional inspection to verify compliance with this specification at no additional cost.

3.04 CLEANING

- A. Remove spilled and excess materials adjacent to firestopping without damaging adjacent surfaces.
- B. Leave finished work in neat, clean condition with no evidence of spillovers or damage to adjacent surfaces.

END OF SECTION 07 84 00

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Furnish labor, materials, tools, and equipment required to completely close (with caulking compound or sealant) all joints to give a finished appearance. Items to be caulked or sealed include but are not limited to the following:
1. Hollow metal frames.
 2. Exterior doors, louvers, windows and any other openings in exterior walls.
 3. Interior fixed glass.
 4. Penetrations by piping, conduit and similar items.
 5. Plumbing fixtures.
 6. Millwork.
 7. Flooring, including saw-cut concrete slab-on-grade.
 8. Paving and sidewalk joints.
 9. Dissimilar finishes.
 10. Joints shown on drawings or specified to be caulked or sealed.
 11. All joints or gaps between similar or dissimilar materials that do not receive closure trim are to be caulked/sealed with the appropriate material as listed in Part 2 of this Section.

1.02 RELATED DOCUMENTS

- A. Applicable portions of the Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications and Addenda issued prior to the execution of the Contract, other documents listed in the Agreement and Modifications issued after the execution of the Contract shall apply to this Section.
The general requirements for this work are in Division 1 of the Specifications.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. In accordance with Section 01 33 00.
- B. Substitutions will not be considered prior to the award of the General Contract.
- C. Installer qualifications.
- D. Contractor certification.
- E. Manufacturer's installation instructions for each product used.
- F. Cured samples of exposed sealants for each color.
- G. Manufacturer's Literature and Data:
1. Primers
 2. Sealing compound, each type, including compatibility when different sealants are in contact with each other.
- H. Manufacturer warranty.

1.04 REFERENCES

- A. ASTM E84 (UL 723): Surface Burning Characteristics
- B. ASTM E814 (UL 1479) and ULC-S115: Standard Test Method for Fire Tests of Through-Penetration Fire Stops
- C. ASTM E1966 (UL 2079): Standard Test Method for Fire-Resistive Joint Systems
- D. ASTM E90: Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements

1.05 QUALITY ASSURANCE

- A. Qualifications of Applicators: Use workmen thoroughly skilled and specially trained in techniques of caulking, and completely familiar with manufacturer's published recommendations for caulking material used.
- B. Rejection of Installed Caulking: Lack of skill by caulking installers is sufficient ground for Architect to reject installed caulking and to require its removal and complete recaulking at Contractor's expense.
- C. Guarantee: Guarantee caulking materials and workmanship, in writing for 2 years after substantial completion date. Repair at Contractors expense any defects developing within guarantee period.
- D. Submit manufacturer's product data sheets and color selection information for every brand and type of sealant, caulk and accessory item proposed for use on this project.
- E. Refer to Underwriters Laboratories, Inc. (UL) Volume 2 with Hourly Ratings for Joint Systems, Through-Penetration Firestop Systems and Electrical Circuit Protective Systems and Duct Assemblies.

1.06 PRODUCT HANDLING

- A. Protection: Protect caulking materials before, during, and after installation. Protect installed work and materials of other trades. In event of damage, immediately make repairs and replacements necessary at Contractor's expense.
- B. Storage: Store caulking materials and equipment under conditions recommended by manufacturer. Do not use materials stored for period of time exceeding maximum recommended material shelf-life.

1.07 JOB CONDITIONS

- A. Inspection: Carefully inspect installed work of trades and verify work is complete to point where this installation may properly commence.
- B. Discrepancies: Do not proceed with installation in areas of discrepancy until discrepancies are fully resolved.
- C. Do not install sealants under adverse weather conditions, or when temperatures are not within manufacturer's recommended limitations for installation. Install sealants only when forecasted weather conditions are favorable for proper cure and development of high early bond strength.

1.08 MOCK-UP

1. Provide a mock-up of each type of sealant using materials, colors, and techniques approved for use on the project. Approved mock-ups may be incorporated into the Work.

PART 2 - PRODUCTS

2.01 MATERIALS FOR CAULKING AND SEALING

- A. Select caulking materials for specific locations complying with manufacturer's recommendations. Provide caulking, sealant and accessory items in color(s) selected to match adjacent materials or as selected by Architect from manufacturer's complete line.
- B. Silicone Sealant: Single component, non-sag, gun grade product meeting ASTM C920, Type S, Grade NS, Class 25.
 1. Silicone Sealant 790/791/795 by Dow-Corning Corp.
 2. Spectrum 1 by Tremco
 3. 890 FTS/864 NST by Pecora Corporation
 4. Approved Equal
- C. Mildew-Resistant Silicone Sealant: Single component, non-sag, gun grade product meeting ASTM C920, Type S, Grade NS, Class 25.
 1. Silicone Sealant 786 by Dow-Corning Corp.
 2. Sanitary 1700 by GE.
 3. Approved equal.
- D. Acrylic Latex Caulk (interior only): General purpose, gun grade, non-sag, paintable, non-staining latex sealant complying with ASTM C834.
 1. AC-20 + Silicone by Pecora.
 2. Acrylic Latex by Tremco.
 3. Approved equal.
- E. Acoustical Sealant: General purpose, gun grade, non-sag, paintable, non-staining latex sealant complying with ASTM C834.
 1. SHEETROCK® Brand Acoustical Sealant by U.S. Gypsum
 2. AC-20® FTR Acoustical and Insulation Sealant by Pecora Corporation
 3. STOPGAP by Auralex Acoustics
 4. Sashco Big Stretch Caulk
 5. Green Glue Noiseproofing Sealant
 3. Approved equal.
- F. Polyurethane Sealant (for vertical surfaces): Single component, non-sag, gun grade product meeting ASTM C920, Type S, Grade NS, Class 35.
 1. MasterSeal® NP 1™ (formerly Sonolastic® NP 1™).
 2. Vulkem 921 by Mameco.
 3. Dynatrol I by Pecora.
 4. Dymonic by Tremco.
 5. QSC-102 by Carlisle.
 6. Approved equal.

- G. Polyurethane Sealant (for horizontal surfaces): Single component, non-priming, self-leveling, pourable grade product meeting ASTM C920, Type S, Grade P, Class 25.
1. MasterSeal® SL 1™ (formerly Sonolastic® SL 1™).
 2. Vulkem 45 by Mameco.
 3. NR-201 by Pecora.
 4. THC-901 by Tremco.
 5. QSC-131 by Carlisle.
 6. Approved equal.

2.02 SEALANT BACKER RODS

- A. Sealant Backer Rod for general use except at floor and deck joints: Tremco Open Cell Polyurethane, or approved equal, open cell type as recommended by sealant manufacturer for compatibility with sealant.
- B. Sealant Backer Rod for use at horizontal floor and deck joints: MasterSeal® 920 by BASF, or approved equal closed cell type as recommended by sealant manufacturer for compatibility with sealant. MasterSeal® 921 by BASF may be used where appropriate.
- C. Provide rod sized and shaped to control joint depth for sealant placement, break bond of sealant at bottom of joint, form optimum shape of sealant bead on back side, and provide a highly compressible backer to minimize possibility of sealant extrusion when joint is compressed.

2.03 MISCELLANEOUS MATERIALS

- A. Joint Cleaner Compound: Use type recommended by sealant and caulking compound manufacturer for joint surfaces to be cleaned.
- B. Joint Primer/Sealer: Use type recommended by sealant manufacturer for joint surfaces to be primed or sealed.
- C. Bond Breaker Tape: Use self adhesive polyethylene tape or plastic tape recommended by sealant manufacturer. Apply to sealant-contact surfaces where bond to substrate or joint filler must be avoided for proper performance of sealant.
- D. Joint Filler: W.R. Meadows, Sealtight Standard Cork, Expansion Joint Filler produced from clean, selected, granulated cork bonded with a phenolic resin, or approved equal meeting ASTM D 1752, Type II.

2.04 GENERAL APPLICATION GUIDE

- A. Interior caulking, except joints with ceramic tile, metal, glass and aluminum: Acrylic Latex Caulk.
- B. Sound rated walls, partitions and ceilings: Acoustical Sealant.
- C. Interior and Exterior joints with metal, glass and aluminum: Silicone sealant.
- D. Joints with ceramic tile and plumbing fixtures: Mildew resistant Silicone sealant.
- E. Horizontal and Vertical building joints: Polyurethane sealant.

PART 3 - EXECUTION

3.01 CHOICE OF CAULKING MATERIAL

- A. Use sealant and caulking materials best suited to the installation and recommended by caulking material manufacturer.

3.02 INSPECTION

- A. Installer must examine substrates, (joint surfaces) and conditions under which joint sealer work is to be performed. Do not proceed with joint sealer work until unsatisfactory conditions are corrected.

3.03 JOINT PREPARATION

- A. Clean joint surfaces immediately before installation of gaskets, sealants and caulking compounds. Remove dirt, insecure coatings, moisture and substrates which could interfere with gasket seal and bond of sealant or caulking compound. Etch concrete and masonry joint surfaces when recommended by sealant manufacturer. Roughen vitreous and glazed joint surfaces recommended by sealant manufacturer.
- B. Prime or seal joint surfaces where required, and when recommended by sealant manufacturer. Confine primer/sealer to areas of sealant bond. Do not allow spillage and migration onto adjoining surfaces.

3.04 INSTALLATION

- A. Comply with manufacturer's printed instructions except when more stringent requirements are specified, and except when manufacturer's technical representative directs otherwise.
- B. Set joint filler units at depth and position in joint as required to coordinate with other work, including installation of bond breakers, backer rods and sealants. Do not leave voids or gaps between ends of joint filler units.
- C. Install sealant backer rod except when required to be omitted or recommended to be omitted by sealant manufacturer for application required.
- D. Install bond breaker tape when required by manufacturer's recommendations to ensure liquid-applied sealants will perform as intended.
- E. Employ proven installation techniques, which ensure sealants are deposited in uniform, continuous ribbon without gaps or air pockets, and with complete "wetting" of joint bond surfaces equally on opposite sides. Except as otherwise required, fill sealant rabbet to a slightly concave surface, slightly below adjoining surfaces. Where horizontal joints occur between a horizontal surface and vertical surface, fill joint to form a slight cove, so joint will not trap moisture and dirt.
- F. Install liquid-applied sealant to depths required and as recommended by sealant manufacturer.
- G. Spillage: Do not allow sealants and compounds to overflow from joint confines or to spill onto adjoining work, or to migrate into voids of exposed finished. Clean adjoining surfaces to eliminate evidence of spillage without damaging adjoining surfaces.

- H. Recess edges of exposed joint fillers slightly behind adjoining surfaces, unless otherwise required, so compressed units will not protrude from joints.
- I. Acoustical Sealant Application: Comply with recommendations of ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.
 - 1. Where sound rated walls and partitions are penetrated by pipe, conduit, duct, etc.; pack annular space with acoustical fiberglass insulation until flush with both faces of wall. Seal both sides and the entire annular space between the penetrating item and the wall board with acoustical sealant. Also, seal at top and bottom edges of acoustical walls and partitions where wall board abuts a horizontal surface. Joint is to be full and continuous from slab to gypsum board edge at bottom of gypsum board walls.
 - 2. Do not allow any rigid material or connection to bridge the separation between the acoustical construction and the penetrating item. Upon inspection, if bridging is found to exist, all sealed penetrations may be ordered removed and resealed at Contractor's expense.

3.05 CURE AND PROTECTION

- A. Cure sealants and caulking compounds in compliance with manufacturer's instructions and recommendations, to obtain high early bond strength, internal cohesive strength and surface durability. Cure and protect sealants in manner which will minimize increases in modulus of elasticity and accelerated aging effects.

END OF SECTION 07 92 00

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Provide hollow metal doors, door frames and window frames required.

1.02 RELATED DOCUMENTS

- A. Applicable portions of the Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, and Addenda issued prior to the execution of the Contract, other documents listed in the Agreement and Modifications issued after the execution of the Contract shall apply to this Section.
The general requirements for this work are in Division 1 of the Specifications.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. In accordance with Section 01 33 00.
- B. Substitutions will not be considered prior to the award of the General Contract.

1.04 REFERENCES

- A. ANSI A224.1 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
- B. ANSI A250.3 - Test Procedure and Acceptance Criteria for Factory-Applied Finish Painted Steel Surfaces for Steel Doors and Frames.
- C. ANSI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors and Hardware Reinforcements.
- D. ANSI/ISDI-104 -Water Penetration Performance Standard for Insulated Steel Door Systems.
- E. ANSI/ISDSI-103 - Acoustical Performance Standard for Insulated Steel Door Systems.
- F. ANSI/ISDSI-105 - Mechanical Performance Standard for Insulated Steel Door Systems.
- G. ANSI/SDI 100 - Recommended Specifications for Standard Steel Doors & Frames; Steel Door Institute.
- H. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- I. ASTM B 117 - Standard Method of Salt Spray (Fog) Testing.
- J. ASTM C 236 - Standard Test Method for Steady-State Thermal Performance of Building Assemblies by Means of a Guarded Hot Box.
- K. ASTM D 1735 - Standard Practice for Testing Water Resistance of Coating Using Water Fog Apparatus.

- L. ASTM E 90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions.
- M. ASTM E 152 - Standard Methods of Fire Tests of Door Assemblies.
- N. ASTM E 283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
- O. ASTM E 331 - Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure.
- P. NFPA 80 - Standard for Fire Doors and Windows.
- Q. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies.
- R. SDI 105 - Recommended Erection Instructions for Steel Frames
- S. SDI 111 - Recommended Standard Details - Steel Doors and Frames.
- T. SDI 113 - Test Procedure and Acceptance Criteria for Apparent Thermal Performance for Steel Door and Frame Assemblies.
- U. SDI 114 - Test Procedure and Acceptance Criteria for Acoustical Performance for Steel Door and Frame Assemblies.
- V. SDI 116 - Test Procedure and Acceptance Criteria for Rate of Air Flow Through Closed Steel Door and Frame Assemblies.
- W. Warnock Hersey International Inc. (WHI) - Certification Listings.
- X. Uniform Building Code (UBC).
- Y. UL 10B - Standard for Fire Tests of Door Assemblies.
- Z. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Underwriters Laboratory Inc.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Member of Steel Door Institute (SDI) or Hollow Metal Manufacturers Association (HMMA).
- B. Use skilled workmen thoroughly trained and experienced and completely familiar with specified requirements and methods needed for proper performance of work of this Section.
- C. Codes and Standards:
 - 1. Manufacture labeled units in strict accordance with specifications and procedures of Underwriters Laboratories, Inc. Labels must be affixed to rated assemblies.
 - 2. In guarantee and Shop Drawings, apply and use definitions and nomenclature established in American National Standards Institute publication A 123.1 "Nomenclature for Steel Doors and Steel Door Frames."
 - 3. ANSI/SDI A250.8-2017 - Specifications for Standard Steel Doors and Frames.
 - 4. Fire-Rated Units: **Affix metal plates to jamb side or top of door and/or frame stating the appropriate fire rating. Paper labels will not be accepted. Do not apply paint or stain over metal labels. Mask off the label before applying finish and remove masking after finish is dry.**

1.06 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Protection:
 - 1. Deliver, store, and handle hollow metal units to prevent damage and deterioration.
 - 2. Provide packaging of cardboard or containers, separators, banding, spreaders, and paper wrappings to completely protect hollow metal units during transportation and storage.
 - 3. Store units upright, in protected dry area, at least one inch off ground and with at least 1/4" air space between individual pieces. Protect primed and hardware surfaces.
 - 4. Protect installed work and materials of other trades.
 - 5. Avoid use of non-vented plastic or canvas shelters which could create humidity chamber. If cardboard wrapper on door becomes wet, remove carton immediately. Provide 1/4" spaces between stacked units to promote air circulation.
- B. Replacements: Inspect hollow metal work upon delivery for damage. Minor damages may be repaired provided finish items are equal in all respects to new work, otherwise, remove and replace damaged items as directed at Contractor's expense.

1.07 WARRANTY

- A. Provide Manufacturer's standard warranty, effective on date of purchase, against defects in product workmanship and materials; minimum 12 months for doors and frames.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Fabricate hollow metal items rigid, neat in appearance, and free from defects, warp, or buckle.
- B. Provide clean cut, straight and true molded members with well-formed and aligned miters.
- C. Dress exposed weld joints smooth for a seamless appearance at frames. **[and doors.]** Provide interlocking visible edge seams at door panel corners, not at middle of door edge.
- D. Door Clearances: Maximum 1/8" at jambs and heads, 1/8" at meeting edges of pairs of doors, and 3/4" at bottom from finished floor line.
- E. **Close top and bottom edges of exterior doors flush. Seal against water penetration with flush steel channel fillers.**

2.02 ACCEPTABLE MANUFACTURERS

- A. Provide hollow metal units by the following or other approved equal manufacturer:
 - 1. Amweld
 - 2. Ceco Door Products
 - 3. Curries Company
 - 4. Mesker Door
 - 5. Pioneer
 - 6. Republic

2.03 FACTORY PREPARATION

- A. Prepare units to receive hardware scheduled in "Hardware" Section of these specifications and in accordance with ANSI/DHI A 115.
- B. Cut, mortise, reinforce, drill, and tap units at factory, except drill and tap for surface applied hardware at job when hardware is applied.
- C. Prepare door frames for rubber silencers to be provided with frames.

2.04 SHOP PRIME COAT FOR FIELD FINISHED DOORS AND FRAMES

- A. Clean, treat, and prime exposed surfaces of hollow metal units, including galvanized surfaces. All exterior doors and frames shall be galvanized.
- B. Clean steel surfaces free of mill scale, rust, oil, grease, dirt, and foreign materials before applying paint.
- C. Apply shop coat of rust-inhibiting prime paint of even consistency to provide uniformly finished surface ready to receive finish paint.

2.05 FULL FLUSH TYPE DOORS

- A. Construct exterior/interior doors to the designs and gages specified:
 - 1. **Exterior Doors:** Hot dipped galvanized steel, ASTM A 653, ZF180, Class A60 coating, 16 gauge Extra Heavy Duty (except where heavier gauge required), with closed tops.
 - a. Include galvanized components and internal reinforcements.
 - 2. **Interior Doors:** Hot Dipped galvanized steel, ASTM A 653, ZF120, Class A40 coating, 18 gauge Heavy Duty (except where heavier gauge required), with no exposed face seams.
- B. Core material at interior doors is to be either water-resistant honeycomb insulation core glued in place, rigid insulation core glued in place or rigid insulation core foamed in place. Core material at exterior doors is to be either rigid insulation core glued in place or rigid insulation core foamed in place.
 - 1. Honeycomb Insulation Core (Glued, Interior Only): Crushing strength of not less than 4,000 psf, and with lamination to withstand not less than 1,500 psf surface shear.
 - 2. Rigid Insulation Core (Glued, Interior or Exterior): Polystyrene slab, density not less than 1.0 pounds per cubic foot.
 - 3. Rigid Insulation Core (Foamed-in-Place, Interior or Exterior): Nonburning type having compressive strength and shear strength of not less than 20 psi, an insulation to steel bonding strength at least equal to the strength of the insulation, be dimensionally stable within plus or minus 5% volume after 24-hour exposure to temperatures ranging from minus 15° F. to 200° F., have no voids exceeding 1/2" in any direction, and have density of not less than 1.8 pounds per cubic foot.
- C. Provide doors complete with glazed panels where required. Glass is specified in Section 08 80 00.
- D. Louvers: Not less than 20 gauge, with inverted V- or Y-shaped blades, set into 18 gauge frame. Provide fusible link, overlapping, operable blades on fire-rated doors.
- E. Astragals: All pairs of doors on which the active leaf has latching hardware shall be provided with overlapping astragals. Exceptions are pairs of doors equipped with vertical rod exit devices and where open back strikes are provided.

1. Exterior openings are to have astragals applied in such a manner as to cover the gap at the meeting stiles at the exterior side.
2. Doors are to be sized to allow a 1/8" clearance between the meeting edges when an astragal is a part of the assembly as well as when there is no astragal required.
3. The door supplier shall coordinate the need for astragals based upon the hardware specified and the label requirements of the door manufacturer. Shop drawings shall clearly indicate the type of astragals and where they are to be provided.
4. The astragals can be either shop or field applied. Field applied astragals are to be shipped with necessary mounting fasteners.

2.06 FIRE DOORS

- A. At fire rated openings, furnish doors bearing Underwriters' Laboratories or Warnok-Hersey label for fire rating required. Furnish overlapping metal astragal on pairs of fire doors except where equipped with approved rim type exit hardware and provided with a removable mullion.
- B. For 1-1/2 hour (B) and 1 hour (B) doors used in stairway enclosures the average temperature developed on the unexposed side shall not exceed 450 degrees F at the end of 30 minutes of standard fire test exposure when tested in accordance with ASTM E 2074. The label attached to the door shall indicate compliance with this requirement.

2.07 METAL DOORS WITH VISION PANELS

- A. Construct from "Flush Type Doors" and factory prepare to receive glass vision panels. Furnish non-removable glazing stops on outside of exterior doors and on secure side of interior doors. Furnish glazing beads on inside side of glass panels. Muntins, if required, to interlock at intersections and be securely fastened to door. Glass requirements specified in Section 08 80 00 - Glazing of these specifications.
- B. All doors occurring in a smoke partition are to have an approved, rated vision panel of not less than 100 square inches.

2.08 WELDED DOOR FRAMES

- A. Construct exterior/interior welded door frames to the designs and gages specified:
 1. **Exterior Door Frames:** Hot dipped galvanized steel, ASTM A 653, ZF180, Class A60 coating, 16 gauge Extra Heavy Duty (except where heavier gauge required), with closed tops.
 - a. Include galvanized components and internal reinforcements.
 - b. **Overhead Rain Drip Guard:** Provide Anodized or Dark Bronze Aluminum Drip Strip 1.5" high x 2.5" wide x required length(s) by NGP, including stainless steel furnished fasteners. Coordinate with Door Hardware Schedule in Section 08 71 00 - Door Hardware. Rain Drip not required where exterior cover provided.
 2. **Interior Door Frames:** Hot Dipped galvanized steel, ASTM A 653, ZF120, Class A40 coating, 18 gauge Heavy Duty (except where heavier gauge required), with no exposed face seams.
- B. Secure headers and jambs at corners by external welding of faces. Grind smooth to provide invisible joints.
- C. Provide frames with minimum of 3 anchors per jamb for adjoining wall construction and floor anchors for attachment at floor. Construct anchors using minimum 18 gauge steel.

- D. At fire rated openings, furnish frames bearing Underwriters Laboratories, Inc. or Warnock-Hersey, International, Inc. label for fire rating required with anchors approved for type installation required.

2.09 FIXED GLASS METAL FRAMES

- A. Fabricate hollow metal framing using 14 gauge cold rolled steel conforming to ASTM Designation A 366. Apply steel tube glass stops with flush head, countersunk screws, spaced maximum of 12" o.c. unless otherwise required. Fit joints neatly, miter at corners, and make welds invisible by grinding smooth. Provide tamper-proof type anchors.
- B. Anchor frames to wall construction with anchors set not less than 2'-0" o.c. around perimeter of frame.
- C. Glass requirements specified in Section 08 80 00.
- D. At fire rated openings, furnish frames bearing Underwriters Laboratories or Warnock-Hersey International, Inc. label for fire rating required with anchors approved for type installation required.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

- A. Examine areas and conditions for work of this Section. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.02 INSTALLATION

- A. Install hollow metal units in strict accordance with approved Shop Drawings and manufacturer's recommendations.
- B. Set frames accurately, plumbed, aligned, and securely anchored.
- C. Install finish hardware in strict accordance with manufacturers' recommendations. Eliminate hinge-bound conditions, making items operate smoothly with secure locking and latching.

3.03 ADJUST AND CLEAN

- A. Immediately after installation, sand smooth rusted and damaged prime coat. Apply compatible touch-up air-drying primer.
- B. Check and adjust operating finish hardware items, leaving hollow metal units undamaged and in proper operating condition.
- C. Excessive filing or grinding of strike plate will not be accepted. Filing and grinding not to exceed 1/8" in any direction.

3.04 RELOCATED ITEMS

- A. Carefully remove existing hollow metal doors, frames and hardware indicated to be relocated under this Contract. Securely reinstalling in new locations, plumb, in true alignment, with doors and hardware working properly.

END OF SECTION 08 11 13

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Provide doors and grilles specified including hardware, operating devices, and accessories for complete installation.

1.02 RELATED DOCUMENTS

- A. Applicable portions of the Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications and Addenda issued prior to the execution of the Contract, other documents listed in the Agreement and Modifications issued after the execution of the Contract shall apply to this Section.
The general requirements for this work are in Division 1 of the Specifications.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. In accordance with Section 01 33 00.
- B. Substitutions will not be considered prior to the award of the General Contract.

1.04 GUARANTEE

- A. Warranty provisions for Work under this Contract are specified in General Conditions. Supplementary to General Conditions, furnish written guarantee stating work is guaranteed to serve intended purpose under normal use and that defects in materials and workmanship within 1-year period after Contract substantial completion date will be repaired, replaced or made good at Contractor's expense.

PART 2 - PRODUCTS

2.01 MANUFACTURER

- A. Provide doors manufactured by Overhead Door Corp., Dallas, Texas, 1-800-275-3290 or approved equal.
 - 1. ASTA AMERICA by Janus International, 800-423-0659.
 - 1. Clopay Commercial Door Products, 800-225-6729.
 - 2. Raynor Worldwide, 888-598-4790.
 - 3. Wayne-Dalton, 855-493-3667.
 - 4. Cornell Innovative Door Solutions, 877-640-8825.

2.02 INSULATED ROLLING FIRE DOORS

- A. Rolling Fire service Doors: FireKing Model 635 Insulated Rolling Fire Doors.
1. Label: Provide fire doors certified with the following listing.
 - a. Rolling fire doors up to 120 sf with the width of the opening not exceeding 12 feet and height of the opening not exceeding 10 feet shall receive the FM 1-1/2-Hour Class B Label when installed on dry wall jambs.
 2. Curtain: Interlocking roll-formed slats. Windlocks shall be attached to each end of alternate slats to prevent lateral movement.
 - a. Flat profile type F-265 with back cover and mineral wool filling internal space. For doors thru 24 feet high and 24 feet wide, fabricated of:
 - 1) 24 gauge galvanized steel.
 3. Finish:
 - a. Galvanized Steel: Slats and hood galvanized steel to ASTM A 653 finished with a rust-inhibitive roll coating process, including bonderizing, a 0.2 mils thick baked prime paint, and a 0.6 mils thick baked top coat..
 - 1) Polyester Top Coat.
 - (a) Gray polyester.
 4. Bottom Bar:
 - a. Two structural steel angles 1-1/2 inch by 1-1/2 inch by 1/8 inch minimum.
 5. Guides: Three structural steel angles mounted to the face of the jamb. Guides also include locking bar or wind bar.
 - a. Fastening Guides to Non-Masonry Fire Walls: Comply with the manufacturer's listing.
 6. Brackets:
 - a. Hot rolled steel to support counterbalance, curtain and hood.
 7. Finish; Bottom Bar, Guides, and Brackets:
 - a. Finish: Black powdercoat finish.
 8. Counterbalance: Helical torsion spring type housed in a steel tube or pipe barrel, supporting the curtain with deflection limited to 0.03 inch per foot of span. Counterbalance is adjustable by means of an adjusting tension wheel.
 9. Hood:
 - a. Fabricate of 24 gauge galvanized primed steel minimum for wall openings thru 19 feet wide.
 - b. Provide one intermediate support bracket for wall openings over 13 feet 6 inches wide.
 10. Manual Operation:
 - a. Floor resettable chain hoist.
 11. Automatic Closure Standard Fire Door: UL approved release mechanism equipped with a 165 degree fusible link.
 - a. Doors equipped with chain hoist release mechanism, requiring only one sash chain to be routed to the operated side (sash chain not required to be routed to adjusting wheel side.)
 - 1) Release mechanism includes planetary gear differential system.
 - 2) Door will close by a thermally actuated link rated @165 degrees F, or by an optional listed releasing device, or by manually activating the release handle.
 - 3) All counterbalance spring tension shall be maintained when the release mechanism is activated.
 - 4) After closing release handle manually, the door shall be able to be reset by one person from one side of the door (re-engaging the release handle). No tools shall be required to reset the release mechanism.

- 12. Governor: If required by size of chain hoist doors, provide a viscous governor to regulate the rate of descent of the door in a quiet manner. Use an engagement type that is not engaged during normal door operation, but after cable release, will retard the speed during automatic door closure to under 24 inches per second and not less than 6 inches per second per NFPA 80.
- 13. Locking:
 - a. Two interior bottom bar slide bolts for manually operated doors.
- 14. Wall Mounting Condition:
 - a. Face-of-wall mounting.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine substrates and conditions under which overhead rolling doors are to be installed. Do not proceed until unsatisfactory conditions are corrected.

3.02 INSTALLATION

- A. Install door and operating equipment, complete with necessary hardware, jamb and head mold strip, anchors, inserts, hangers, and equipment supports complying with final Shop Drawings, and manufacturer's installation instructions.
- B. Lubricate, test, and adjust doors to provide easy operation, proper closing, and secure locking.
- C. Instruct Owner in operation and maintenance of doors.
- D. Touch up scuffs and abrasions in finish paint.

END OF SECTION 08 33 00

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PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Furnish and install glass and glazing materials and accessories for both factory and field glazed assemblies specified.

1.02 RELATED DOCUMENTS

- A. Applicable portions of the Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, and Addenda issued prior to the execution of the Contract, other documents listed in the Agreement and Modifications issued after the execution of the Contract shall apply to this Section.
The general requirements for this work are in Division 1 of the Specifications.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. In accordance with Section 01 33 00.
- B. Substitutions will not be considered prior to the award of the General Contract.
- C. Samples:
 - 1. Size: 305 mm by 305 mm (12 inches by 12 inches) of each type specified.
 - 2. Tinted glass.
 - 3. Reflective glass.

1.04 QUALITY ASSURANCE

- A. Qualifications of Installers: Provide at least one person thoroughly trained and experienced in skills required, completely familiar with referenced standards and requirements of this work and to personally direct installation performed under this Section.
- B. Applicable Standards For Glass and Glazing Work: Conform to the "Manual of Glazing" of the Flat Glass Marketing Association, requirements of Federal Specification DD-G-451c and Safety Standard 16 CFR 1201 of the U.S. Consumer Products Safety Commission.
- C. Manufacturers: Fabrication processes, including low emissivity and reflective coatings, insulating, laminated, silk-screening and tempering shall be manufactured by a single manufacturer with a minimum of ten (10) years of fabrication experience and meet ANSI / ASQC 9002 1994.

1.05 APPLICABLE PUBLICATIONS

- A. ANSI Z97.1-14: Safety Glazing Material Used in Building Safety Performance Specifications and Methods of Test.
- B. ASTM C1036-21: Standard Specification for Flat Glass
- C. ASTM C1048-12: Heat-Treated Flat Glass-Kind HS, Kind FT Coated and Uncoated Glass.
- D. Code of Federal Regulations (CFR): 16 CFR 1201-10 Safety Standard for Architectural Glazing Materials.
- E. International Building Code - Chapter 24: Glass and Glazing

1.06 DELIVERY, STORAGE AND HANDLING

- A. Protection: Protect glass and glazing materials before, during, and after installation. Protect installed work and materials of other trades.
- B. Storage and Protection: Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun or other causes.
- C. Replacements: In event of damage, immediately make repairs and replacements necessary and at Contractor's expense.

PART 2 - PRODUCTS

2.01 GLASS TYPES

- A. No manufacturer logos are allowed on any glass, except as required by governing codes and standards. Provide certification to General Contractor that tempered, heat strengthened, annealed, laminated, etc. glass was used where required.
- B. Annealed float glass shall comply with ASTM C1036, Type I, Class 1 (clear), Class 2 (tinted), Quality-Q3.
- C. Heat-Strengthened float glass shall comply with ASTM C1048, Type I, Class 1 (clear), Class 2 (tinted), Quality Q3, Kind HS.
- D. Tempered float glass shall comply with ASTM C1048, Type I, Class 1 (clear), Class 2 (tinted), Quality Q3, Kind FT.
- E. Heat-treated glass with elastomeric coating complying with ASTM C1048, Condition C (other coated glass), Type I (transparent glass, flat), Quality Q3 (glazing select) and with other requirements as specified.
- F. GANA/GTA 89-1-31, "Specification for Environmental Durability of Fully Tempered or Heat-Strengthened Spandrel Glass with Applied Opacifiers", and with other requirements as specified.
- G. Provide type glass and thickness required and as follows:
 - 1. **Clear Annealed Float Glass:** 1/4" thick unless otherwise shown.
 - 2. **Clear Tempered Float Glass:** 1/4" thick unless otherwise shown. Conform to Safety Standard 16 CFR 1201 of the Consumer Products Safety Commission.
 - 3. **"Low-E" Coating:** Vitro Architectural Glass Solarban® 60 (2) Optigray® + Clear, VLT 50, SHGC 0.30, Insulating Glass Unit (IGU) or approved equal.
 - 4. **Spandrel Glass:** Heat strengthened, 1/4" polished plate/float glass, with water-based silicone elastomeric coating in shade selected by Architect from manufacturer's standard color line. OPACI-COAT-300® #3-4094 Graylights, Vitro Solarban 60 (2), Optigray® + Clear Glass Insulating Unit.
 - 3. **Plastic Glazing:** 1/4" thick unless otherwise shown. Conform to Safety Standard 16 CFR 1201 of the Consumer Products Safety Commission.

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1. **Clear Annealed Float Glass:** 1/4" thick unless otherwise shown.
2. **Clear Tempered Float Glass:** 1/4" thick unless otherwise shown. Conform to Safety Standard 16 CFR 1201 of the Consumer Products Safety Commission.
3. **Tinted Annealed Float Glass:** 1/4" thick, Vitro Architectural Glass "Solar Gray" ["Solar Bronze"], or approved equal.
4. **Tinted Heat-Strengthened Float Glass:** 1/4" thick, Vitro Architectural Glass "Solar Gray" ["Solar Bronze"], or approved equal.
5. **Tinted Tempered Float Glass:** 1/4" thick, Vitro Architectural Glass "Solar Gray" ["Solar Bronze"], or approved equal, meeting requirements of Safety Standard 16 CFR 1201 of the Consumer Products Safety Commission.
6. **Polished Wire Glass:** 1/4" thick, clear glass with 1/2" square (horizontal-vertical) wire pattern meeting ASTM C1063 and ANSI Z97.1 (latest edition).
6. **Light Diffusing Insulating Glass:** OKALUX Type 23/25 with 60% light reflection, SHGC 0.25 and .029 Shading Coefficient minimum.
7. **Ultra Clear Low-Iron Glass:** Starphire Ultra-Clear™ Low Iron Glass by PPG, Krystal Klear™ by AGC Glass Company, or approved equal.
5. **Laminated Security Glazing:** 1-1/8" thick clear glass-clad polycarbonate, meeting UL Level 3. Provide "Secur-Tem + Poly" SP311, by Global Security Glazing, 1-866-412-6977, or approved equal.
7. **Bullet Resistant Glazing (BRG-1):** Armor-Gard™ 3/4" thick clear [tinted] glass-clad polycarbonate, meeting UL Level I, Code SP175, 7.84 lbs/SF, Protection Level 9mm Full Metal Copper Jacket with Lead Core. Provide Secur-Tem + Poly® by Global Security Glazing, 1-800-633-2513, or approved equal.
7. **Bullet Resistant Glazing (BRG-1):** Armor-Gard™ 15/16" thick clear [tinted] glass-clad polycarbonate, meeting UL Level 2, Code SP293, 10.34 lbs/SF, Protection Level .357 Magnum Jacketed Lead Soft Point. Provide Secur-Tem + Poly® by Global Security Glazing, 1-800-633-2513, or approved equal.
7. **Laminated Security Glazing (LSG-1):** 15/16" thick glass-clad polycarbonate, meeting H.P. White requirements for Level A Ballistics and Level I Forced Entry resistance. Provide "Secur-Tem + Poly" #2117, by Global Security Glazing, 1-866-412-6977, or approved equal.
7. **Laminated Security Glazing (LSG-1):** 9/16" thick glass-clad polycarbonate, meeting H.P. White requirements for Level A Ballistics and Level I Forced Entry resistance. Provide "Secur-Tem + Poly" #2117, by Global Security Glazing, 1-866-412-6977, or approved equal.
8. **Laminated Glass:** 11/16" thick glass-clad polycarbonate, meeting H.P. White requirements for Level A Ballistics and Level II Forced Entry resistance. Provide "Secur-Tem + Poly" #2116, by Global Security Glazing, 1-800-633-2513, or approved equal.

8. **Fire Rated Clear Detention and Bullet Resistant Safety Glass:** 1-1/4" to 2" thick glass clad polycarbonate, meeting HP White requirements for Level A Ballistics and Level I-TP-0500.02 Protection Level. Provide Inferno-Lite® ULTIMAX 45 Fire Resistant Glazing, by Global Security Glazing, 1-800-633-2513, or approved equal. Maximum Exposed Area shall be 3,419 square inches.
9. **Bullet Resistant Glazing:** 15/16" thick glass clad polycarbonate, meeting UL 752 for Level II (HPSA). Provide Armor-Gard™ Secur-Tem + Poly® #SP293, by Global Security Glazing, 1-800-323-8776, or approved equal.
10. **Laminated Fire Resistant Glazing:** 7/8" thick glass clad polycarbonate, meeting H.P. White requirements for Level A Ballistics and Level I Forced Entry resistance, 45 minute rating. Provide Inferno-Lite® FRP200, by Global Security Glazing, 1-800-323-8776, or approved equal.
10. **Laminated Fire Resistant Glazing:** 13/16" thick glass clad polycarbonate, meeting H.P. White requirements for Level A Ballistics and Level I Forced Entry resistance, 90 minute rating. Provide Inferno-Lite® FRP400, by Global Security Glazing, 1-800-323-8776, or approved equal.
11. **Mirror Glass:** Nominal 6.0-mm (0.23-inch) thick, conforming to ASTM C 1036, Type I, Class 1, Quality-Q2, and with silvering, electro-plated copper coating, and protective organic coating.
 - a. Provide tempered glass, where indicated or required.
12. **Sound-retardant Glass:** 1" thick "Acousta-Pane 45" by Global Security Glazing, or approved equal, providing sound transmission class of not less than STC 43 when tested in accordance with ASTM E 90 by an acoustical testing laboratory.
13. **Spandrel Glass:** Heat strengthened, 1/4" polished plate/float glass, rendered opaque with a water-based silicone elastomeric spandrel coating in shade selected by Architect from manufacturer's standard color line. OPACI-COAT-300® #3-1371 West Lake, Vitro Solarban® 60 (2), Solargray® + Clear Glass Insulating Glazing Unit.
13. **Spandrel Glass:** Heat strengthened, 1/4" polished plate/float glass, coated with ceramic frit in shade selected by Architect from manufacturer's standard color line. OPACI-COAT-300® #6-3842 Sailor's Blue, Vitro Solarban 90 (2), OPTIBLUE® + Clear Glass Insulating Unit.
13. **Polycarbonate Plastic Glazing:** 3/8" thick clear colorless, Makrolon® AR Abrasion and UV Resistant polycarbonate sheet, or approved equal. Sheffield Plastics, Inc., 119 Salisbury Road, Sheffield, MA 01257, 1-800-254-1707.
13. **Acrylic Plastic Sheet:** 1/4" 1/8" AT TELLER'S WORK COUNTERS IN BANKS thick clear colorless, "Plexiglass MC" ECONOMY "Plexiglass G" PREMIUM by Rohm and Haas Co., or approved equal.
14. **"Low-E" Coating:** Vitro Architectural Glass Solarban 60®, or approved equal.
"Low-E" Coating: Vitro Architectural Glass "Solarban z50 (2)".
14. **"Low-E" Coating:** Vitro Architectural Glass Solarban® 90 (2) Acuity™ + Acuity™, SHGC 0.23, Insulating Glass Unit (IGU) or approved equal.
14. **Solar Control Low-E Clear Insulating Glass:** Vitro Architectural Glass Solarban® 70 (2) + Clear (SHGC 0.27) IGU or approved equal.

14. **Solar Control Low-E Clear Insulating Glass:** Vitro Architectural Glass Solarban® 70 (2) Solargray® + Clear (SHGC 0.19) IGU or approved equal.
14. **Solar Control Low-E Clear Insulating Glass:** Vitro Architectural Glass Solarban® 70 (2) + Satin Frosted Tempered (SHGC 0.19) IGU or approved equal.
14. **"Low-E" Coating:** Vitro Architectural Glass Solarban® 60 (2) Clear + Clear (SHGC 0.39) IGU, or approved equal.
14. **"Low-E" Coating:** Vitro Architectural Glass Solarban® 60 (2) Optigray® + Clear (SHGC 0.30) IGU, or approved equal.
14. **"Low-E" Coating:** Vitro Architectural Glass Solargray® + Solarban® 60 (3) (SHGC 0.29) IGU, or approved equal.
14. **"Low-E" Coating:** Vitro Architectural Glass Solarban® 60 (2) Solargray® + Clear (SHGC 0.25) IGU, or approved equal.
3. **Spandrel Glass:** Heat strengthened, 1/4" polished plate/float Insulating Glass Unit, with opacifying coating in shade selected by Architect from manufacturer's standard color line as provided by OPACI-COAT-300®.
4. **"Low-E" Coating (Primary):** Solarban® R100 (2) Pacifica® + Clear Insulating Glass Unit by Vitro Architectural Glass, or approved equal.
15. **Transparent Mirror:** Nominal 6.0-mm (0.23-inch) thick, conforming to ASTM C 1376, Type I, Class 1, Quality q2, and with silvering, electro-plated copper
16. **Tempered Patterned Glass:** Provide 1/4" thick glass conforming to ASTM C 1036 with "Smooth/Rough" texture to be selected by Architect from a minimum of six standard styles.
17. **Metal Insulated Window Panels:** Provide 1-inch thick laminated metal faced panels with insulating core material as manufactured by Mapes Industries, Inc..
 - a. Finish: Kynar/Hylar - AAMA 665.2-92-resin based - 70%.
 - b. Color: As specified from manufacturer's standards [Custom].
17. **Metal Insulated Window Panels:** Provide 1-inch thick laminated metal faced panels with insulating core material as manufactured by Mapes Industries, Inc..
 - a. Finish: Kynar/Hylar - AAMA 665.2-92-resin based - 70%.
 - b. Color: Champagne Metallic.
 - c. Insulating Core: [2-lb density polystyrene] [1.7-lb density Isocyanurate] [Expanded Perlite] .
18. **One-Way Reflective Mirror Glass:** ASTM C1036, Type 1 transparent flat, Class 1 (clear), Quality q3 (Glazing Select); 1/4" thick. Provide tempered glazing where required by building codes. Pilkington Mirropane™, or equal.
19. **Lead Glass:** Nuclear Associates, 516-741-7717, CLEAR-Pb® Lead-Plastic X-Ray Shielding. Provide equivalent thickness required in accordance with Physicist's report bound after Section 13 49 23.
20. **Projection Room Window Glass:** Provide "water white" tempered glass with hydrophobic coating.
21. **Tempered Patterned Glass:** Provide 1/4" thick "Pattern+ Etch" Clear Float monolithic glass conforming to ASTM C1048-04 as manufactured by 3form Infinite Glass, 800-726-0126. Pattern to be selected by Architect.
22. **Laminated Security Glazing:** 7/16" thick clear glass-clad polycarbonate, meeting HP

White Level I-TP-0500.02 protection Level. Provide Secur-Tem + Poly® #2119, by Global Security Glazing, 1-866-412-6977, or approved equal.

23. **Laminated Sloped and Overhead Glazing for Point-Supported Canopies:** 13/16" thick, 3/8" Heat-Strengthened Glass (tinted) + 0.060" PVB layer + 3/8" Heat-Strengthened Glass, by Oldcastle Building Envelope™, or approved equal. Maximum size 40 SF.
24. **Laminated Sloped and Overhead Glazing for Skylights:** 15/16" thick IGU, 1/4" Solarban® R100® OPTIBLUE® (2) Heat-Strengthened Glass (tinted) + 1/2" airspace + Laminate (0.060" PVB layer + 1/4" Heat-Strengthened Glass), by Vitro Architectural Glass, or approved equal. Maximum size 50 SF.
6. **Ultra Clear Low-Iron Glass:** Starphire Ultra-Clear™ Low Iron Glass by Vitro Architectural Glass, Krystal Klear™ by AGC Glass Company, or approved equal.

SEE UAMS ROC FOR COMPLETE LISTINGS

Curtain Wall Back Pans (also Hilti Firestop back pans in unitized CW assemblies). 3" thick mineral wool is standard but also 2" to 5". Galvanized G90 (standard) in 22 gauge (standard). Back pans to be designed to minimize field installation time and fastened to curtain wall, steel substrate or block substrate. Provide specialized shapes and custom punching or notching as required to suit specific applications. All corners of back pans shall be tabbed, sealed and spot welded to deliver superior performance as a vapor barrier behind opaque glazing areas. Provide non-penetrating stick pins.

2.1 SECURITY GLAZING CATEGORIES

A. Polycarbonate: Laminated or monolithic polycarbonate shall be extruded UV stabilized but when laminated uses various layers of urethane interlayers and thickness to achieve required performance levels. Polycarbonate laminates shall have a flexural strength of not less than 13,500 PSI: (ASTM D-790) 180 degrees F continuous service temperature. Products must conform to all applicable IBC building codes with a CC-1 flammability performance rating.

B. Glass Clad Polycarbonate: Shall be laminated glass and polycarbonate construction using urethane interlayers and manufactured in accordance with ASTM C1349-10. All bullet-resistant glass clad products shall be "no spall" and listed with UL. Note bow and warp tolerances for non-symmetrical layups on larger sizes and required frame modifications.

C. Insulated Glass Clad Polycarbonate: Shall be insulated using strengthened glass when needed to allow for heat build up in the air space, conforming to ASTM E2188, E2189 and E2190 for insulated glass units.

2.2 SECURITY GLAZING TYPES

- A. **Type SG-1:** 1/2" nominal, laminated tempered glass (limited to 5" slit openings) no containment rating.
- B. **Type SG-2:** 1/2" nominal, monolithic mar-resistant polycarbonate, ASTM F1915 Security Grade 4 (10 min) rated, Sabic MR-10 or approved equal. Clear.
- C. **Type SG-3:** 3/8" nominal, 2 ply laminated polycarbonate, ASTM F1915 Security Grade 3 (20 min) rated, Lexgard MPC- 375 or approved equal. Clear.
- D. **Type SG-4:** 1/2" nominal, 3 ply laminated polycarbonate, ASTM F1915 Security Grade 2 (40 min) rated, Lexgard MPC-500 or approved equal. Clear.
- E. **Type SG-5:** 3/4" nominal, 3 ply laminated polycarbonate, ASTM F1915 Security Grade 1 (60 min)

- rated, Lexgard RC-750 or approved equal. Clear.
- F. **Type SG-6:** 1" nominal 4 ply laminated polycarbonate, ASTM F1915 Security Grade 1 (60 min) rated, Lexgard MP-1000 or approved equal. Clear.
- G. **Type SG-7:** 1-1/4" nominal, 4 ply laminated polycarbonate, ASTM F1915 Security Grade 1 (60 min) and WMFL Level 1 (60 min+.44 mag) rated, Lexgard SP-1250 or approved equal. Clear.
- H. **Type SG-8:** 9/16" nominal, glass clad polycarbonate, ASTM F1915 Security Grade 4 (10 min) rated, SecurTem+Poly 2117 or approved equal. Clear.
- I. **Type SG-9:** 11/16" nominal, glass clad polycarbonate, ASTM F1915 Security Grade 3 (20 min) rated, SecurTem+poly 2116 or approved equal. Clear.
- J. **Type SG-10:** 3/4" nominal, glass clad polycarbonate, ASTM F1915 Security Grade 2 (40 min) rated, SecurTem+Poly SP-019 or approved equal. Clear.
- K. **Type SG-11:** 1" nominal, glass clad polycarbonate, ASTM F1915 Security Grade 1 (60 min) rated, SecurTem+Poly SP-028 or approved equal. Clear.
- L. **Type SG-12:** 1-1/2" nominal, glass clad polycarbonate, ASTM F1915 Security Grade 1 (60 min) and WMFL Level I (60 min & .44 mag) rated, SecurTem+Poly SP-035 or approved equal. Clear.
- M. **Type SG-BR-13:** 1-1/8" nominal, glass clad polycarbonate, UL 752 Level III (3 shots .44 mag) Global Security Glazing SecurTem+Poly SP-311 or approved equal. Note; glass must be installed to the attack side so bullet strikes the glass first. Clear.
- N. **Type SG-BR-14:** 1-3/16" nominal, glass clad polycarbonate, UL 752 Level IV (single shot .30-06) Global Security Glazing SecurTem+Poly SP-412 or approved equal. Note: Glass must be installed to the attack side so bullet strikes the glass first. Clear.
- O. **Type SG-FR-15:** 3/4" nominal, wire glass clad polycarbonate, UL 9/10 rated for 45 min fire with hose stream and ASTM F1915 Security Grade 4 (10 min) containment, Global Security Glazing Inferolite FRP-4510 or approved equal. Note: Product contains safety rated wire glass, alignment of which is not guaranteed, installation must include use of either Blazeseal tape or Metacaulk 950 caulk.
- P. **Type SG-FR-16:** 15/16" nominal, wire glass clad polycarbonate, UL9/10 rated for 45 min fire with hose stream and ASTM F1915 Security Grade 3 (20 min) containment, Global Security Glazing Inferolite FRP-4520 or approved equal. See note for SG-FR-15.
- Q. **Type SG-FR-17:** 1" nominal, wire glass clad polycarbonate, UL9/10 rated for 45 min fire with hose stream and ASTM F1915 Security Grade 2 (40 min) containment, Global Security Glazing Inferolite FRP-4540 or approved equal. See note for SG-FR-15.
- R. **Type SG-FR-18:** 1-1/8" nominal, wire glass clad polycarbonate, UL 9/10 for 90 min fire with hose stream and ASTM F1915 Security Grade 1 (60 min) containment, Global Security Glazing Inferolite ICGCP -2416WW90 or approved equal. See note for SG-FR-15.
- S. **Type SG-AG-19:** 1-1/4" nominal, air gap unit, UL 752 Level III, (3 shots .44 mag) and 40 min ASTM F1915 Security Grade 2 (40 min), Global Security Glazing AG-3500 or approved equal. Clear. Note: product must be installed with glass to the attack side, "air-gap" units are not "insulated" units and are designed for ballistic/containment protection.

2.02 FIRE RATED GLASS

- A. Approved Manufacturers:
 - 1. PYRAN® Platinum L as manufactured by SCHOTT Technical Glass Solutions and distributed by SAFTI FIRST Fire Rated Glazing Solutions, 888-653-3333. Amber-tinted glass will not be accepted.
 - 2. Vision Control® with Pilkington Pyrostop® and distributed by Technical Glass Products. Composition: Multiple sheets of Optiwhite high visible light transmission glass laminated with intumescent interlayer.
- B. Properties:
 - 1. Thickness: 3/8 inch overall
 - 2. Weight: 4 lbs./sq. ft.
 - 3. Appearance: Must have neutral coloration free of amber tints.
 - 4. Fire-rating: 20 minutes to 3 hours for doors; 20 minutes to 60 minutes for other applications, with hose stream.
 - 5. Impact Safety Resistance: Must meet CPSC 16 CFR 1201 Category I and II.
 - 6. STC Rating: Approximately 36 dB.
 - 7. Positive Pressure Test: UL 10C, UBC 7-2 and 7-4; passes.
- C. Labeling: Each piece of Fire-rated glazing material shall be labeled with a permanent logo including name of product, manufacturer, testing laboratory and fire rating.
- D. Fire Rating: Fire rating listed and labeled by UL for fire rating scheduled at opening locations on drawings, when tested in accordance with ASTM E 152 and ASTM E 163; NPFA 252 and NFPA 257; UL 9, UL 10B and UL 10C.
- E. Glazing Compound for Fire-rated Glazing Materials: Silicone Sealant, One-part neutral curing silicone, medium modulus sealant, Type S; Grade NS; Class 25 with additional movement capability of 50 percent in both extension and compression (total 100 percent); Use (Exposure) NT; Uses (Substrates) G, A, and O as applicable. Available Products:
 - 1. Dow Corning 795 - Dow Corning Corp.
 - 2. Silglaze-II 2800 - General Electric Co.
 - 3. Spectrem 2 - Tremco Inc.
- F. Setting Blocks: Neoprene, EPDM, or silicone; tested for compatibility with glazing compound; of 70 to 90 Shore A hardness.
- G. Cleaners, Primers, and Sealers: Type recommended by manufacturer of glass and gaskets.

2.03 TRANSLUCENT GLAZED PANELS

- A. Manufacturer: CPI International, 847-816-1060, or approved equal.
- B. Provide CPI Pentaglas 12mm dry glazing system with Ice White finish. Panel to be a homogeneous insulating single panel with two isolated air spaces and "U" value of 0.55. Provide panelized assemblies in aluminum frames.

- C. Metal Materials:
1. Extruded aluminum ANSI/ASTM B221; 6063-T6: 6063-T5 or 6005-T5.
 2. Flashing:
 - 1) 5005 H34 aluminum 0.04" minimum thickness.
 - 2) Sheet metal flashings, closures, claddings are to be furnished shop formed to profile - when lengths exceed 10 ft. in nominal 10-ft lengths. Field trimming of the flashing and field forming the ends is necessary to suit as-built conditions. Sheet metal ends are to overlap at least 6-in. to 8-in., set in a full bed of sealant and riveted if required.
 3. All fasteners to be stainless steel or cadmium plated steel.
 4. All exposed aluminum finish shall be standard color, coordinated during submittal reviews.

2.04 HERMETICALLY SEALED INSULATING GLASS ASSEMBLIES

- A. Manufacturer is used in this section to refer to a firm that produces primary glass or fabricated glass as defined in the referenced standards.
1. Guardian Industries
 2. Oldcastle Glass
 3. Pilkington
 4. Viracon Architectural Glass
 5. Vitro Architectural Glass
 6. Approved equal
- B. Insulating glass units are certified through the Insulating Glass Certification Council (IGCC) to ASTM E 2190 Standard Specification for Insulating Glass Unit Performance and Evaluation.
- C. The following are assemblies comprised of the components listed above.
1. **"Low-E" Coated Tinted/Tempered Assembly:** 1" thick panels consisting of 1/4" clear tempered float glass on interior and 1/4" thick tinted tempered float glass on exterior with 1/2" air space and coating on #2 surface.
 2. **"Low-E" Coated Tinted/Heat-Strengthened Assembly:** 1" thick panels consisting of 1/4" clear annealed float glass on interior and 1/4" thick tinted float glass on exterior with 1/2" air space and coating on #2 surface.
 5. **Clear/Tempered Assembly:** 1" thick panels consisting of 1/4" clear tempered float glass on interior and 1/4" thick clear tempered float glass on exterior with 1/2" air space.
 6. **Clear/Annealed Assembly:** 1" thick panels consisting of 1/4" clear annealed float glass on interior and 1/4" thick clear annealed float glass on exterior with 1/2" air space.
 7. **Spandrel Assembly:** 1" thick panels consisting of 1/4" spandrel glass on interior and 1/4" thick tinted heat strengthened float glass on exterior with 1/2" air space. Ceramic frit to be applied to #4 surface.
 8. **Spacers:** Aluminum in Black Finish. Verify color selection with architect before fabrication.
- C. The following are assemblies comprised of the components listed above.
1. **Tinted/Tempered Assembly:** 1" thick panels consisting of 1/4" clear tempered float glass on interior and 1/4" thick tinted tempered float glass on exterior with 1/2" air space.
 2. **Tinted/Annealed Assembly:** 1" thick panels consisting of 1/4" clear annealed float glass on interior and 1/4" thick tinted annealed float glass on exterior with 1/2" air space.
 3. **"Low-E" Coated Tinted/Tempered Assembly:** 1" thick panels consisting of 1/4" clear tempered float glass on interior and 1/4" thick tinted tempered float glass on exterior with 1/2" air space and coating on #2 surface.

4. **"Low-E" Coated Tinted/Heat Strengthened OR Annealed Assembly:** 1" thick panels consisting of 1/4" clear annealed float glass on interior and 1/4" thick tinted annealed (if Gray or Bronze) OR heat strengthened (if Green) float glass on exterior with 1/2" air space and coating on #2 surface. **USE FOLLOWING IF GREEN TINT IS USED.** Manufacturer to verify Heat Strengthening requirement for tinted exterior lite by Thermal Stress Analysis.
5. **Clear/Tempered Assembly:** 1" thick panels consisting of 1/4" clear tempered float glass on interior and 1/4" thick clear tempered float glass on exterior with 1/2" air space.
6. **Clear/Annealed Assembly:** 1" thick panels consisting of 1/4" clear annealed float glass on interior and 1/4" thick clear annealed float glass on exterior with 1/2" air space.
7. **Spandrel Assembly:** 1" thick panels consisting of 1/4" spandrel glass on interior and 1/4" thick tinted heat strengthened float glass on exterior with 1/2" air space. Ceramic frit to be applied to #4 surface.
8. **Spacers:** Aluminum in Black Finish. Verify color selection with architect before fabrication.

2.05 FLAT GLASS

- A. Flat Glass:
 1. Shall comply with ASTM C1036-21 Standard Specification for Flat Glass, Type 1, Class 1, (clear) or Class 2 (tinted, heat-absorbing and light-reducing) and Quality q3.
 2. ASTM C 1048 Heat Treated Flat Glass, Kind HS or FT (remove ASTM Standard C 1048 if annealed glass), Condition A (un-coated), B (spandrel glass, one surface coated), or C (other coated glass).
 - a. Heated Treated Flat Glass to be by horizontal (roller hearth) process with inherent rollerwave distortion parallel to the bottom edge of the glass as installed.
 - b. Maximum peak-to-valley rollerwave 0.003" in the central area and 0.008" within 10.5' of the leading and trailing edge.
 - c. For clear or low-iron glass 1/4" to 3/8" thick without ceramic frit or ink, maximum + or - 100mD (millidiopter) over 95% of the glass surface.
 - d. Maximum bow and warp 1/32" per lineal foot.
 - e. All tempered architectural safety glass shall conform with ANSI Z97.1 and CPSC 16 CFR 1201.
 - f. For all fully tempered glass, provide heat soak testing conforming to EN14179 which includes a 2 hour dwell at 290C±10C.

2.02 POLYCARBONATE SHEET

- A. Approved Manufacturers:
 1. Provide products of Plaskolite, Address: 400 West Nationwide Blvd Ste 4., Columbus, OH 43215; Telephone: (877) 413-7957; (413) 229-8711
Email plaskolite@Plaskolite.com Website: www.sheets.Plaskolite.com
 2. Provide Lexan® by SABIC, 1-800-323-3783, 1 Plastics Avenue, Pittsfield, MA 01201.
- B. General Purpose Plastic Glazing: Smooth solid polycarbonate sheet complying with ANSI Z97.1 and the following:
 1. Material: TUFFAK® GP by Plaskolite
 2. Thickness: 0.220 inches (5.588 mm).
 3. Color: Clear A00.

2.06 GLAZING ACCESSORIES

- A. Provide glazing accessories required to complete glazing work that are compatible with various components of the glazing system(s), and subject to approval of Architect.
- B. Glazing Sealants: Provide Tremco "Proglaze", Bostik "Chem-Calk 2000", Pecora "836", Dow Corning Silicon 795, or approved equal. Color to be selected by Architect from manufacturer's standard line.
- C. Glazing Tapes: Provide Tremco "Pre-shimmed 440", Bostik "Chem Tape 60", Pecora "Shim-Seal", or approved equal. Color to be selected by Architect from manufacturer's standard line.
- D. Setting Blocks: Neoprene or other resilient blocks of 70 to 90 Shore A durometer hardness, adhesive backed on one face only and tested for compatibility with specified glazing sealants.
- E. Spacers: Neoprene or other resilient blocks of 40 to 50 Shore A durometer hardness and tested for compatibility with specified glazing sealants.
- F. Compressible Filler Rod: Closed-cell or waterproof jacketed foam of polyethylene, butyl rubber, neoprene, polyurethane or vinyl, tested for compatibility with specified glazing sealants, of 5 to 10 psi compression strength (25% deflection), recommended by sealant manufacturer for use in glazing channel to prevent sealant exudation from the channel.

2.07 ARCHITECTURAL WINDOW FILM

- A. Provide Fasara™ - Opaque White SH2MA OW Decorative / Privacy Glazing Film by 3M as indicated on the drawings. Contact the authorized 3M window film dealer.
- B. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and workmanship. Finish areas to be designated by Architect. Do not proceed with remaining work until workmanship, color, and sheen are approved by the Architect. Refinish mock-up area as required to produce acceptable work.

PART 3 - EXECUTION

3.01 GLASS SIZES

- A. Measure sizes for glass from actual frames, doors and windows. Contract requires glass to be set in place, and Contractor assumes responsibility for correct sizes. Use sizes shown on Drawings for estimating only as approximate dimensions.

3.02 GLAZING SURFACES

- A. Glaze only dry surfaces, free from dust or ice. Clean dirty surfaces with cloth saturated with turpentine or mineral spirits before glazing. Remove loose dirt particles and mortar from recesses prior to installation of glass and glazing materials.

3.03 SETTING GLASS

- A. Set glass to provide equal bearing for entire width of each pane. Contractor responsible for broken glass due to improper setting. Set using glazing stops furnished by door or fixed framing manufacturer unless otherwise shown or specified. Accurately set glass to fit frame, with all edges smooth. Sharp ragged edges are not acceptable. Cushion glass in fixed interior view windows with felt strips around entire perimeter.

3.04 CLEANING GLASS

- A. Contractor shall employ services of a professional window washer at completion of all work to wash glass which has been installed under this contract, removing all stains.
- B. Clean glass on both sides after painting operations are complete and dry. Do not use acid solutions or caustic soaps to clean glass.
- C. Do not use razor blades to clean glass. Any scratches on the glass caused by the cleaning process will be cause for the removal and replacement of the damaged glass at the Contractor's expense.

3.05 SETTING AND CLEANING PLASTIC SHEET

- A. Due to relatively high co-efficient of thermal expansion, make allowances in sizing of plastic sheets complying with manufacturer's instructions. Do not clean with abrasive or highly alkaline cleaners. Do not scrape with razor blades or sharp instruments.

END OF SECTION 08 80 00

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Provide metal supports and fastenings, gypsum board, and related accessories specified.
- B. Refer to the mechanical and electrical and plumbing drawings for extent of patching and repair work required in adjacent areas for accommodation of renovation work. The finish and fire rating of areas where demolition will be necessary and not specifically shown or noted on Drawings is required to match the existing conditions.

1.02 RELATED DOCUMENTS

- A. Applicable portions of the Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, and Addenda issued prior to the execution of the Contract, other documents listed in the Agreement and Modifications issued after the execution of the Contract shall apply to this Section.
The general requirements for this work are in Division 1 of the Specifications.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. In accordance with Section 01 33 00.
- B. Substitutions will not be considered prior to the award of the General Contract.

1.04 QUALITY ASSURANCE

- A. Qualifications of Installers: Use only skilled and experienced gypsum drywall installers. Fully supervise at all times helpers and apprentices used for drywall work with thoroughly skilled gypsum drywall installers.
- B. Manufacturers' Recommendations: Manufacturers' recommended use of materials, fastenings, and methods of installation is basis for acceptance or rejection of drywall and cementitious backer units work where not specifically otherwise shown or detailed.

1.05 REFERENCE STANDARDS

- A. ASTM C475-15, Joint Compound and Joint Tape for Finishing Gypsum Board.
- B. ASTM E580 - Suspension Systems in Areas Requiring Seismic Restraint.
- C. ASTM C1396-14a, Standard Specification for Gypsum Board.
- D. ASTM C840-13, Standard Specification for Application and Finishing of Gypsum Board.
- E. ASTM C1178-18, Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel.
- F. ASTM C1325-18, Standard Specification for Fiber-Mat Reinforced Cementitious Backer Units. (Non-asbestos)

- G. ASTM C645-18, Standard Specification for Nonstructural Steel Framing Members.
- H. ASTM C754-04, Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
- I. Gypsum Association publications:
 - 1. GA-214-2021, "Levels of Finish for Gypsum Panel Products".
 - 2. GA-216-2021, "Application and Finishing of Gypsum Panel Products".
 - 3. GA-600, "Fire Resistance Design Manual".
 - 4. GA-800, "Materials Handling Manual".

1.06 FIRE RESISTANCE RATINGS AND IDENTIFICATION

- A. Where gypsum drywall systems with fire resistance ratings are indicated or are required to comply with governing regulations, provide materials and installation methods identical to applicable assemblies which have been tested and listed by recognized authorities, including Underwriters Laboratories, Warnock-Hersey and Factory Mutual.
- B. All joints in fire rated gypsum board construction are required to be taped and floated. This includes all joints in concealed and exposed partitions, ceilings and other applications where gypsum board is utilized as a fire barrier. All screws are to be floated over.
 - 1. Do not use self adhesive Tape at fire rated construction. Provide standard Tape and Drywall Mud.
- C. All rated partitions are to extend to the underside of the roof or floor deck above and are to be sealed at the point of intersection with the deck in accordance with requirements of Section 07 84 00 - Firestopping.

1.07 PRODUCT HANDLING

- A. Protection: Protect gypsum drywall materials before, during, and after installation. Protect installed work and materials of other trades.
- B. Replacements: In event of damage, immediately make repairs and replacements necessary and at Contractor's expense.

PART 2 - PRODUCTS

2.01 GYPSUM MATERIALS

- A. **Manufacturers:** Use products and materials by one of the following manufacturers:
 - 1. United States Gypsum
 - 2. National Gypsum Company
 - 3. Georgia-Pacific Company
 - 4. Temple-Inland, Inc.
 - 5. Certainteed
 - 6. James Hardie Building Products
 - 7. Approved Equal
- B. **Gypsum Wallboard:** Conform to ASTM C1396, have tapered edges and furnished in largest practical sheet size to minimize number of joints. Provide thickness as indicated on Drawings; typically provide 5/8" thickness at walls.

- C. **Fire Retardant Gypsum Board:** 5/8" fire retardant gypsum board conforming to UL Design Numbers listed on drawings for type and manufacturer.
- D. **Finish:** In general, all gypsum board walls are to be taped and floated for a smooth finish. A slight egg-shell texture may be acceptable if approved by Architect prior to application. Heavy "knockdown" texturing is not acceptable.
 - 1. All screw and/or nail heads are to be floated smooth both above and below ceiling line.
 - 2. Refer to Drywall Finishing Council document titled, "Recommended Specification For Preparation of Gypsum Board Surfaces Prior To Texture Application. When subjected to critical lighting, a Level 5 gypsum board finish as defined in GA-214-2021 ("Levels of Finish for Gypsum Panel Products") is recommended.
 - 3. For Levels 3, 4, and 5, job-site mock-up(s) shall be used to determine acceptance of the finish within the building. The design professional shall specify the mockup procedure and mock-up construction details within the project documents, unless waived in writing. Finish joints, edges, corners, and fastener heads in accordance with ASTM C840. **Use Level 4 finish for all finished areas open to public view.** Level 5 skim coating is required at areas exposed to severe lighting conditions, gloss, semi-gloss, or enamel paint applications. Refer to the drawings for specific area locations.

2.02 WALL AND PARTITION FRAMING

- A. Provide type, size, gauge and physical properties as described by the manufacturers load and height tables and in accordance with the current local building code. All section properties shall be calculated in accordance with the AISI Specification for the Design of Cold-Formed Steel Structural Members (latest edition).
- B. Structural calculations specifically related to this project and performed by the manufacturer's structural engineer will indicate depths, gages and spacings of studs required to meet deflection and load bearing requirements.
- C. At all instances where radius steel stud and drywall construction is shown on drawings it is intended that the radius be smooth not faceted. Contractor is required to provide smooth face radius by whatever means necessary.
- D. Runners: Match studs; type recommended by stud manufacturer for floor and ceiling support of studs, and for vertical abutment of drywall work at other work.
- E. Install supplementary framing, blocking and bracing in the metal framing system wherever walls or partitions are indicated to support work requiring attachment to the wall or partition. Where type of supplementary support is not otherwise indicated, comply with the stud manufacturer's recommendations and industry standards in each case, considering the weight or loading resulting from the item supported.
 - 1. Screw attach blocking between studs for support of surface mounted items.
 - a. Plumbing fixtures.
 - b. Toilet partitions.
 - c. Wall cabinets.
 - d. Toilet accessories
 - e. Hardware.
 - f. Architectural woodwork.
 - g. Grab bars.
 - h. Handrails and railings.
 - i. Signage.
 - j. Other items requiring backing for attachment.

2.03 METAL FURRING MEMBERS

- A. "Hat" Type Channels: ASTM C 645, 25 gage minimum, hat-shaped, depth and thickness as indicated. Provide 22 gage min. Galvalume® (GVM) Vented Hat Channel (HCV) at exterior rainscreen for spacing between insulation and exterior cladding.
- B. "C" Type Channels: 16 gauge, 1-1/2" deep cold rolled steel channels painted black and weighing not less than 475 lbs. per 1,000 LF.
- C. Z-Furring Members: Manufacturer's standard Z-shaped furring members with slotted or nonslotted web, fabricated from 26-gage galvanized steel, steel sheet complying with ASTM A 525 or ASTM A 568; with a minimum base metal (un-coated) thickness of 0.0179 inch, face flange of 1-1/4 inch, wall-attachment flange of 7/8 inch, and of depth required to fit insulation thickness indicated.
- D. Furring Brackets: Serrated-arm type, adjustable, fabricated from corrosion-resistant steel sheet complying with ASTM C 645, minimum thickness of base (un-coated) metal of 0.0329 inch, designed for screw attachment to steel studs and steel rigid furring channels used for furring.

2.04 ACOUSTICAL INSULATION

- A. In partitions, provide un-faced Owens-Corning Sound Attenuation Batt (SABs) Insulation, or approved equal, complying with ASTM C 665, Type I and ASTM E 136. Flame spread rating shall not exceed 25 and smoke developed shall not exceed 50 when tested complying with ASTM E 84.

2.05 DIRECT CEILING SUSPENSION SYSTEMS

- A. Manufacturer: Chicago Metallic, or approved equal.
- B. System: Provide Chicago Metallic Drywall Furring System(s) as follows:
 - 1. Typical System: 640-C or 660-C as recommended by manufacturer.
 - 2. Fire Rated System: Fire front 650-C or 670-C as recommended by manufacturer.
- C. Provide all runners, tees, cross channels, cross tees, wall track, hanger wire and accessories required for a complete installation.
- D. Where ceiling is subject to wind uplift, provide adequate bracing above ceiling to prevent uplift.

2.06 FASTENERS

- A. Drywall Screws: Self-drilling type, 1" long for single layer application of gypsum board to metal studs and furring channels and of longer length for multiple layer installation.
- B. Powder-Actuated Fasteners: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.
- C. Furring Anchorages: 16-gage galvanized wire ties, manufacturer's standard wire-type clips, bolts, nails or screws as recommended by furring manufacturer and complying with C754.

2.07 PROTECTIVE COATING

- A. Galvanized steel studs, runners (track), rigid (hat section) furring channels, "Z" shaped furring channels, and resilient furring channels, with coating designation of G40 or equivalent.

2.08 ACCESSORIES

- A. Casing Bead: "Goldbond" No.500 galvanized steel by National Gypsum Co., or approved equal. Furnish and install metal reveal strips where shown and detailed.
- B. Corner Beads: 0.014 inch thick, hot dip galvanized steel with 1" flanges with 1/16" radius nose with large openings in flange similar to 5/8" diameter holes 7/8" on center.
- C. Control and Expansion Joints: "Sheetrock" zinc control joint No.093 by USG, or approved equal. Provide safining and/or acoustical insulation behind control joints as required for adjacent partition construction. Use fire rated control joints in partitions requiring a fire rating.

2.09 OTHER MATERIALS

- A. Provide materials, not specifically described but required for complete and proper installation of gypsum drywall, selected by Contractor subject to approval of Architect.

PART 3 - EXECUTION

3.01 GENERAL PROVISIONS

- A. Comply with specified requirements, manufacturer's instructions and recommendations, and referenced standards.
- B. In cold weather, heat building to provide uniform temperature of 50° to 70° and provide ventilation to eliminate excess moisture.
- C. Deliver materials to job in original unopened containers or bundles and store protected from damage and exposure to the elements.
- D. Provide casing beads where edges of gypsum board meet dissimilar materials.
- E. Cooperate with carpenters in placing of backing and blocking required for millwork, fixtures, fittings, and accessories.
- F. Make cut-outs in panels for pipes, fixtures and small openings. Make holes and cut-outs by method that will not fracture wallboard core or tear covering. Cut holes with accuracy so plates, escutcheons and trim cover edges.
- G. Seal cut edges, holes, and areas where wallboard covering is broken, with resistant sealer.
- H. Install trim in strict accordance with manufacturers' recommendations. Install trim plumb, level, and true to line with firm attachment to supporting members.
- I. At any change in direction of gypsum board, provide sufficient auxiliary framing, blocking or nailers to allow secure attachment along every edge of every individual piece of gypsum board. Do not leave any loose edges.

3.02 INSTALLATION OF METAL SUPPORT SYSTEMS

- A. Do not bridge building expansion joints with support system, frame both sides of joints with furring and other support as indicated.
- B. Ceiling Support Suspension System: Install in accordance with manufacturers recommendations.
- C. Wall/Partition Support System
 - 1. Install supplementary framing, blocking and bracing to support fixtures, equipment, services, heavy trim, furnishings and similar work which cannot be adequately supported on gypsum board alone.
 - 2. Isolate stud system from transfer of structural loading to system, both horizontally and vertically. Provide slip or cushioned type joints to attain lateral support and avoid axial loading.
 - 3. Do not attach stud system to ductwork, piping, conduit, etc.
 - 4. Install runners (tracks) at floors, ceiling and structural walls and columns where gypsum drywall stud system abuts other work, except as otherwise indicated.
 - 5. Extend partition stud system through acoustical ceilings and elsewhere as indicated to the structural support and substrate above the ceiling as indicated. Install angle bracing at 4'0" on center from ceiling runner to structure above.
 - 6. Frame door openings with vertical studs securely attached by screws at each jamb either directly to frames or to jamb anchor slips on door frame; install runner track sections (for jack studs) at head and secure to jamb studs. Install angle bracing above ceiling to structural in each direction at strike side of door. Double studs at all door openings.
 - 7. Provide runner tracks of same gage as jamb studs. Space jack studs same as partition studs.
 - 8. Frame openings other than door openings in same manner as required for door openings; and install framing below sills of openings to match framing required above door heads. Opening for duct work, piping must allow clearance for insulation, dampers, etc. Provide double 20 gauge studs at both sides of door openings less than 4'-0" wide and triple 20 gauge studs at door openings greater than 4'-0" wide.
 - 9. Install wall/partition support system to maximum tolerances of 1/8" in 12'-0" measured horizontally and vertically.
 - 10. At rated partitions, provide "5 sided" gypsum board enclosures where items (i.e. toilet accessories, electrical items, fire extinguisher cabinets, etc.) penetrate the surface of the wall, in order to maintain fire resistive integrity of the wall. Provide necessary related blocking.
 - a. "5 sided" enclosures may be omitted where metal electrical back-boxes not exceeding 16 square inches occur at one side only of a wall within a single stud cavity.
 - b. In this case, provide fire stopping material described in Section 07 84 00 to completely encompass the back box and its annular space.
 - c. If 5 sided gypsum board enclosures are not to be provided at any fire rated partitions, all provisions for installation of electrical boxes in rated partitions as described by Underwriters Laboratories shall be adhered to AND prior approval shall be given in written form by the Architect.
 - 11. Provide "5 sided" enclosures similar to those described above at all penetrations into "sound" partitions and insulated exterior walls regardless of size. The provisions for the omission of the 5 sided enclosures at certain fire rated partitions do not apply to these sound and exterior partitions.

3.03 GENERAL GYPSUM BOARD INSTALLATION REQUIREMENTS

- A. Pre-Installation Conference: Meet at the project site with the installers of related work and review the coordination and sequencing of work to ensure that everything to be concealed by gypsum drywall has been accomplished, and that chases, access panels, openings, supplementary framing and blocking and similar provisions have been completed.
- B. Install sound attenuation blankets where indicated, prior to gypsum board unless readily installed after board has been installed.
- C. Locate exposed end-butt joints as far from center of walls and ceilings as possible, and stagger not less than 1'-0" in alternate course of board.
- D. Install ceiling boards in the direction and manner which will minimize the number of end-butt joints, and which will avoid end joints in the central area of each ceiling. Stagger end joints at least 1'-0".
- E. Install wall/partition boards vertically to avoid end-butt joints wherever possible. At stairwells and similar high walls, install boards horizontally with end joints staggered over studs. Do not butt boards to concrete floor. Maintain a minimum 1/4" to a maximum 3/8" space between bottom of board and concrete.
- F. Install exposed gypsum board with face side out. Do not install imperfect, damaged or damp boards. Butt boards together for a light contact at edges and ends with not more than 1/16 inch open space between boards. Do not force into place.
- G. Locate either edge or end joints over supports, except in horizontal applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Position boards so that like edges abut, tapered edges against tapered edges and mill-cut or field-cut ends against mill-cut or field cut ends. Do not place tapered edges against cut edges or ends. Stagger vertical joints over different studs on opposite sides of partitions.
- H. Attach gypsum board to framing and blocking as required for additional support at openings and cutouts. Space between recessed boxes and cut edges shall not exceed 1/8 inches.
- I. Form control joints and expansion joints with space between edges of boards, prepared to receive trim accessories described below in article entitled "INSTALLATION OF DRYWALL TRIM ACCESSORIES".
- J. Cover both faces of partition framing with gypsum board in concealed spaces (above ceilings, etc.) except in chase wall which are braced internally.
- K. Space fasteners in gypsum boards in accordance with referenced standards and manufacturer's recommendations, except as otherwise indicated.

3.04 INSTALLATION OF CEILING ACCESS PANELS

- A. General Contractor is required to coordinate locations and number of access panels with affected trades in order to minimize the number of access panels required.
- B. Provide ceiling access panels in gypsum board ceilings as specified. Provide quantity required for access to the following items commonly found above the ceiling plain:
 - 1. Operable portion of fire, smoke and other dampers
 - 2. Valves and other operable portions of sprinkler system
 - 3. Valves to mechanical, domestic and other piping systems
 - 4. Mechanical devices
 - 5. Fire alarm devices
 - 6. Communication system devices and connection points
 - 7. Sanitary and storm sewer clean outs
- 8. Also included are any other items located above an otherwise inaccessible ceiling that will require adjustment, maintenance, inspection, connection or replacement in whole or in part at any time after the initial installation of the item or the ceiling.

3.05 METHODS OF GYPSUM BOARD APPLICATION

- A. On ceilings:
 - 1. Apply gypsum board prior to wall/partition board application to the greatest extent possible. For single-ply construction, use perpendicular application. For two-ply assemblies use perpendicular application and apply face ply of gypsum board so that joints of face ply do not occur at joints of base ply with joints over framing members.
 - 2. Where screws are used, they shall be spaced not more than 12 in. o.c. for ceilings where the framing members are 16 in. o.c..
 - 3. Screws shall be spaced not more than 12 in. o.c. for ceilings where framing members are 24 in. o.c..
 - 4. For applications on wood or other applications, refer to Gypsum Association GA-216 for fastener type and spacing.
- B. On partitions except shaft wall:
 - 1. Use maximum length sheets practical to minimize end joints.
 - 2. When gypsum board is installed parallel to framing members, space fasteners 12 inches on center in field of the board, and 8 inches on center along edges.
 - 3. For applications on wood or other applications, refer to Gypsum Association GA-216 for fastener type and spacing.
 - 4. When gypsum board is installed perpendicular to framing members, space fasteners 12 inches on center in field and along edges.
 - 5. Stagger screws on abutting edges or ends.
 - 6. For single-ply construction, apply gypsum board with long dimension either parallel or perpendicular to framing members as required to minimize number of joints except gypsum board shall be applied vertically over "Z" furring channels.
 - 7. For two-ply gypsum board assemblies, apply base ply of gypsum board to assure minimum number of joints in face layer. Apply face ply of wallboard to base ply so that joints of face ply do not occur at joints of base ply with joints over framing members.
 - 8. On Z-furring members apply gypsum board vertically (parallel to framing) with no end joints. Locate edge joints over furring members.

3.06 INSTALLATION OF DRYWALL TRIM ACCESSORIES

- A. General: Where feasible, use the same fasteners to anchor trim accessory flanges as required to fasten gypsum board to the supports. Otherwise, fasten flanges to comply with manufacturer's recommendations.
- B. Install metal corner beads at external corners of drywall work. Corner beads are to be completely bedded and taped.
- C. Install metal edge trim whenever edge of gypsum board would otherwise be exposed or semi-exposed, and except where plastic trim is indicated. Provide type with face flange to receive joint compound except where semi-finishing type is indicated. Install L-type trim where work is tightly abutted to other work, and install special kerf-type where other work is kerfed to receive long leg of L-type trim. Install U-type trim where edge is exposed, revealed, gasketed, or sealant-filled (including expansion joints).
- D. Install metal control joints where indicated on drawings. If not indicated on drawings, install in accordance with the following:
 - 1. Interior Partitions: Maximum Single Dimension not to exceed 20 feet. Maximum Single Area not to exceed 400 SF.
 - 2. Interior Ceiling With Perimeter Relief: Maximum Single Dimension not to exceed 40 feet. Maximum Single Area not to exceed 1,600 SF. Install control joint at any change of direction of ceiling framing or support system.
 - 3. Interior Ceiling Without Perimeter Relief: Maximum Single Dimension not to exceed 20 feet. Maximum Single Area not to exceed 400 SF. Install control joint at any change of direction of ceiling framing or support system.

3.07 JOINT TREATMENT

- A. General: Joint treatment for gypsum board surfaces is also described in Section 09 91 00 and may be performed under either the gypsum board or painting subcontract.
- B. **All joints in gypsum board construction are to be taped and floated. This includes work above ceilings, at concealed places and anywhere else joints in gypsum board construction occur.**

3.08 FINISHING OF GYPSUM BOARD

- A. Finish joints, edges, corners, and fastener heads in accordance with ASTM C840. Use Level 4 finish for all finished areas open to public view.
- B. Before proceeding with installation of finishing materials, assure the following:
 - 1. Gypsum board is fastened and held close to framing or furring.
 - 2. Fastening heads in gypsum board are slightly below surface in dimple formed by driving tool.
- C. Finish joints, fasteners, and all openings, including openings around penetrations, on that part of the gypsum board extending above suspended ceilings to seal surface of gypsum board construction. After the installation of hanger rods, hanger wires, supports, equipment, conduits, piping and similar work, seal remaining openings and maintain the integrity of the construction.

3.09 REPAIRS

- A. After taping and finishing has been completed, and before decoration, repair all damaged and defective work, including non-decorated surfaces.
- B. Patch holes or openings 13 mm (1/2 inch) or less in diameter, or equivalent size, with a setting type finishing compound or patching plaster.
- C. Repair holes or openings over 13 mm (1/2 inch) diameter, or equivalent size, with 16 mm (5/8 inch) thick gypsum board secured in such a manner as to provide solid substrate equivalent to undamaged surface.
- D. Tape and refinish scratched, abraded or damaged finish surfaces including cracks and joints in non decorated surface to provide smoke tight construction, fire protection equivalent to the fire rated construction and STC equivalent to the sound rated construction, where applicable.

3.10 CLEANING UP

- A. Do not allow accumulation of scraps and debris arising from work of this Section. Maintain premises in neat and orderly condition at all times. Immediately remove spilled or splashed compound material and all trace of residue from adjoining surfaces.

END OF SECTION 09 21 16

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Furnish and install suspension systems, ceiling boards, panels and tiles, and accessories required for complete installation of acoustical ceilings specified.
- B. Refer to the mechanical and electrical and plumbing drawings for extent of patching and repair work required for accommodation of renovation work. The finish and fire rating of areas where demolition will be necessary and not specifically shown or noted on Drawings is required to match the existing conditions.

1.02 RELATED DOCUMENTS

- A. Applicable portions of the Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, and Addenda issued prior to the execution of the Contract, other documents listed in the Agreement and Modifications issued after the execution of the Contract shall apply to this Section.
The general requirements for this work are in Division 1 of the Specifications.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. In accordance with Section 01 33 00.
- B. Substitutions will not be considered prior to the award of the General Contract.

1.04 APPLICABLE STANDARDS

- A. American Society for Testing and Materials:
 - 1. ASTM A641 - Specification for Steel Sheet, Zinc-Coated (galvanized) Carbon Steel Wire
 - 2. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (galvanized) or Zinc-Iron Alloy-Coated (galvannealed) by the Hot-Dip Process
 - 3. ASTM C423 - Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
 - 4. ASTM C635 - Standard Specification for Metal Suspension Systems for Acoustic Tile and Lay-in Panel Ceilings
 - 5. ASTM C636 - Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings
 - 6. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials
 - 7. ASTM E119 - Fire Test of Building Construction and Materials
 - 8. ASTM E580 - Practice for Application of Ceiling Suspension Systems for Acoustic Tile and Lay-in Panels in Areas Requiring Seismic Restraint
 - 9. ASTM E1111 - Test Method for Measuring Interzone Attenuation of Ceiling Systems
 - 10. ASTM E1264 - Classification for Acoustic Ceiling Products
 - 11. ASTM E1414 - Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum
 - 12. Cisca (Ceilings & Interior Systems Construction Association) - Ceilings Systems Handbook

1.05 PRODUCT HANDLING

- A. Protection: Protect suspended acoustical ceiling materials before, during, and after installation. Protect installed work and materials of other trades.
- B. Replacements: In event of damage, immediately make repairs and replacements necessary and at Contractor's expense.

1.06 EXTRA MATERIALS

- A. Deliver extra materials to Owner. Furnish extra materials, totaling 3% of the total installed, matching products installed as described below, packaged with protective covering for storage and identified with labels clearly describing contents.

PART 2 - PRODUCTS

2.01 SUSPENSION SYSTEMS

- A. Provide steel capped 15/16" exposed tee grid by one of the following:
 - 1. Prelude® XL Armstrong World Industries
 - 2. USG Ceiling Solutions Donn® AX™/AXCE™ System
 - 3. CertainTeed EZ Stab Classic System
 - 4. Chicago Metallic® 200 Snap Grid™ (Basis-of-Design)
- B. Suspension Members: Intermediate type of sufficient strength and rigidity to carry acoustical ceiling units in true and level plane without exceeding 1/32" deflection in any 2 feet of their spans.
- C. Fabrication: Fabricate suspension system components from cold-rolled sheet steel conforming to ASTM A 366. Protect from rust and corrosion with hot dipped galvanized coating.

2.02 ACOUSTICAL TILE (NON-RATED)

- A. Provide tile by Armstrong World Industries, USG Interiors, CertainTeed, Rockfon or equal units approved by Architect. Furnish units with Class 25 flame spread index set forth in Federal Specification SS-S-118b, Class III or Class 1 (0-25) as tested in accordance with ASTM E 84, 12" x 12" x 3/4" thick, beveled edge, non-directional fissured design. Furnish tile with factory applied white paint finish. Approximately 10% of tiles to be access tiles.

2.03 ACOUSTICAL CEILING BOARDS (NON-RATED)

- A. **ACT-1:** 24" x 48" x 7/8", Fine Fissured™ #1755, Square Lay-In, Medium Texture, by Armstrong® World Industries or approved equal product by USG Interiors or CertainTeed. Provide NRC 0.75 + CAC 35. Match existing.

2.04 OTHER MATERIALS

- A. Provide materials, not specifically described but required for complete and proper installation of suspended acoustical ceilings, selected by Contractor subject to approval of Architect.

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

- A. Examine surfaces and conditions affecting proper installation of acoustical materials. Do not proceed until unsatisfactory conditions are corrected.
- B. Do not start acoustical ceiling work until glazing is completed and exterior openings are enclosed.
- C. All wet work, including concrete and masonry work must be completed and dried out before work is started.
- D. Do not install acoustical materials unless uniform temperature in spaces where acoustical tile work is performed is at least 60° F. during and after installation.
- E. Install acoustical ceilings, complete, including component parts necessary to suspend systems from structure.
- F. Install suspension systems to permit border units of greatest possible size where not full size.
- G. Following installation, clean soiled and discolored surfaces. Remove and replace units damaged or improperly installed.

END OF SECTION 09 51 00

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PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Furnish and install resilient base and accessories specified. Clean and protect resilient components after installation.

1.02 RELATED DOCUMENTS

- A. Applicable portions of the Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications and Addenda issued prior to the execution of the Contract, other documents listed in the Agreement and Modifications issued after the execution of the Contract shall apply to this Section.
The general requirements for this work are in Division 1 of the Specifications.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. In accordance with Section 01 33 00.
- B. Substitutions will not be considered prior to the award of the General Contract.
- C. Samples: For each type of product indicated, in manufacturer's standard-size samples of each resilient product color, texture, and pattern required.
- D. Product Schedule: For resilient products. Use same designations indicated on Drawings.
- E. Installation and Maintenance Instructions: Submit manufacturer's published guide for Resilient Top-Set Wall Base.
- F. If required, submit the manufacturer's certification that the wall base has been tested by an independent laboratory and complies with the required fire tests.

1.04 QUALITY ASSURANCE

- A. Installation Qualification: Contractors for floor covering installation should be experienced in managing commercial flooring projects and provide professional installers, qualified to install the various flooring materials specified. An installer is "qualified" if trained, or a certified by manufacturer or a certified INSTALL (International Standards & Training Alliance) resilient floor covering installer.
- B. Mockups: Provide resilient products with mockups specified in other Sections.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver resilient base and installation accessories to Project site in original manufacturer's unopened cartons and containers each bearing names of product and manufacturer, Project identification, and shipping and handling instructions.
- B. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 85 deg F (29 deg C).

- C. Protect products from damage when handling and during construction operations.

1.06 PROJECT CONDITIONS

- A. Install resilient products after other finishing operations, including painting, have been completed.
- B. Maintain ambient temperatures within range recommended by manufacturer, but not less than 65 deg F (18 deg C) or more than 85 deg F (29 deg C) in spaces to receive resilient products during the following time periods:
1. 48 hours before installation.
 2. During installation.
 3. 48 hours after installation.
- C. Maintain the ambient relative humidity between 40% and 60% during installation.
- D. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 85 deg F (29 deg C).

1.07 EXTRA MATERIALS

- A. Deliver to the Owner / Facility Manager maintenance stock, from the same manufactured lot as materials installed. Furnish 120 LF (one carton) for each color and type of wall base installed, and packaged with protective covering for storage and identified with labels clearly describing contents.

PART 2 - PRODUCTS

2.01 RESILIENT WALL BASE

- A. Manufacturer: Johnsonite, Inc., (800) 899-8916, 16910 Munn Road, Chagrin Falls, Ohio 44023. Web: www.tarkettna.com or approved equal.
1. Mannington BurkeBase
 2. Roppe
- B. Furnish homogeneous 4" high, 1/8" thick, set-on type coved base in color(s) selected by Architect. Pre-molded corner units may be used at installer discretion if conditions warrant, but do not place where routine cleaning operations may cause corners to come loose.
1. Traditional Rubber Wall Base
 - a. Manufactured from a proprietary thermoplastic rubber formulation.
 - b. Meets performance requirements for ASTM F 1861 Standard Specification for Resilient Wall Base, Type TP, Group 1.
 - c. ASTM E 648, Standard Test Method for Critical Radiant Flux of 0.45 watts/cm2 or greater, Class I.
 - d. ASTM E 84, Standard Test Method for Surface Burning Characteristics of Building Materials, Class A, Smoke <450.
 - e. Flexibility: Does not crack, break, or show any signs of fatigue when bent around a 1 1/4" diameter cylinder when tested according to ASTM F 137 Standard Test Method for Flexibility of Resilient Flooring Materials protocols.
 - f. Color Stability: Meets or exceeds ASTM F 1861 requirements for color stability when tested to ASTM F 1515 Standard Test Method for Measuring Light Stability of Resilient Flooring protocols.
 - g. Phthalate-free.
 - h. Contains at least 14% pre-consumer recycled content.
 - i. 100% Recyclable.

2.02 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based formulation manufactured and warranted by a reputable manufacturer.
- B. Adhesives: as recommended by Johnsonite to meet site conditions.
 - 1. Johnsonite 960™ Cove Base Adhesive or approved equal for cleaned and prepped porous surfaces. **DO NOT USE AT OUTSIDE CORNER INSTALLATIONS.**
 - 2. Johnsonite 946™ Premium Contact Adhesive or approved equal for cleaned and prepped non-porous surfaces such as stainless steel. **PREFERRED PRODUCT.**
 - a. Use at outside corners to ensure faster set-up, especially at short returns.
 - 3. ULTRASTIK™ All Purpose Tape which is double-sided, scrim-reinforced acrylic adhesive tape for applying base trim, as manufactured by Surface Shields.

2.03 OTHER MATERIALS

- A. Provide materials, including adhesives, not specifically described but required for complete and proper installation of resilient flooring only as recommended by manufacturer of material to which it is applied and subject to approval of Architect.
- B. Covebase Groover recommendation: Model CB-060 as provided by D-Cut Products, Inc., for fabricating outside corners, (630) 916-9100 www.dcutproducts.com

<http://www.dcutproducts.commailto:caryzhang@dcutproducts.com>

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the work.
- B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion and aesthetics of resilient products.
 - 1. **Where existing base material has been removed at existing porous and non-porous wall surfaces, scrape or remove cured adhesives, contact cement or drywall joint compound so that there is a clean and smooth surface before installing new base material.**
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient wall base.
- B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
- C. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- D. Vacuum clean substrates to be covered by resilient products immediately before

installation.

3.03 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's published instructions for installing resilient base. Refer to Installation Video: <https://www.youtube.com/watch?v=QCp2MunOCOY>
For any installation questions call Johnsonite Technical Hotline: 800-899-8916.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths if practicable without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.
- F. Preformed corners: Install preformed Outside Corners where utilized before installing straight pieces.
- G. Field-Made or Job Formed Corners (recommendation):
 - 1. Outside and Inside Corners: Install pre-mitered corners first. Seat the bottom of the wall base snugly to the floor on either side of the corner. Anaerobic adhesive (Super Glue) may be used to adhere the two mitered pieces together. This can eliminate any slight gapping. Butt straight pieces of maximum lengths on either side of the pre-mitered corners. Make sure heights of the corner returns and the straight base match up.
 - 2. Outside corners: Form by bending without producing discoloration (whitening) at bends. DO NOT WHITTLE.
 - a. Fold base in half.
 - b. Make one continuous cut with a sharp cove base gouger or groover.
 - c. Shave both sides, starting halfway down and avoid cutting into original center cut.
 - d. Fold tightly; groove out remaining upper portion. Nip top then affix to wall with Johnsonite 946™ Premium Contact Adhesive.
 - 3. Inside Corners: Use straight pieces of maximum lengths possible. Form 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.

3.04 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.
- B. Perform the following operations immediately after completing resilient product installation:
 - 1. Remove adhesive and other blemishes from exposed surfaces.
 - 2. Damp-mop surfaces to remove marks and soil.
- C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

END OF SECTION 09 65 13

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Provide specified painting and finishing of interior and exterior items.
 - 1. Provide painting of all new exposed steel and iron work, including primed metal surfaces. Paint exposed-to-view pre-finished metal surfaces of items, if required. Refer to drawings for existing metal to be painted.
 - 2. Provide touch-up of pre-finished items to match original finish.
 - 3. **Do not paint** waterproof coatings, water repellent coating, acoustical ceilings, toilet partitions, aluminum with factory applied finish, or pre-finished items, except as noted above.
 - 4. **Do not paint** over any code required metal labels, such as Underwriters' Laboratories and Factory Mutual, or any equipment identification, performance rating, name, or nomenclature plates. Mask off the label before applying finish and remove masking after finish is dry.
- B. Refer to the mechanical and electrical and plumbing drawings for extent of patching and repair work required for accommodation of renovation work. The color and finish of areas where demolition will be necessary and not specifically shown or noted on Drawings is required to match the existing conditions.

1.02 RELATED DOCUMENTS

- A. Applicable portions of the Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, and Addenda issued prior to the execution of the Contract, other documents listed in the Agreement and Modifications issued after the execution of the Contract shall apply to this Section.
The general requirements for this work are in Division 1 of the Specifications.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. In accordance with Section 01 33 00.
- B. Substitutions will not be considered prior to the award of the General Contract.

1.04 DEFINITIONS

- A. Term "paint", as used herein, includes enamels, paints, sealers, fillers, emulsions, varnishes, stains, and other coatings whether used as prime, intermediate, or finish coats.

1.05 QUALITY ASSURANCE

- A. Qualifications of Painters: Use only qualified journeyman painters for mixing and application of paint. In acceptance or rejection of painting, no allowance made for lack of skill on part of painters.
- B. Mockups - Interior: 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.

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1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.
 - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 SF.
 - 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.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.06 PRODUCT HANDLING

- A. Delivery: Deliver paint materials to job site in original unopened containers with labels intact and legible at time of use.
- B. Protection:
 1. Store only approved materials at job site and store only in suitable and designated area restricted to storage of paint materials and related equipment.
 2. Ensure safe storage and use of paint materials and prompt and safe disposal of waste.
 3. Protect paint materials before, during, and after application and protect installed work and materials of other trades.

PART 2 - PRODUCTS

2.01 PAINT MATERIALS

- A. Manufacturers: Provide paints, enamels, stains, varnishes, and admixtures of first line quality by Sherwin Williams or approved equal. Sherwin Williams products specified herein establish minimum quality standards. Approved equal products:
 1. Farrell-Calhoun
 2. PPG Paints
 3. Benjamin Moore
- B. Compatibility:
 1. Paint materials and equipment to be compatible. Finish coats compatible with prime coats, prime coats compatible with surface to be coated, and tools and equipment compatible with coating applied.
 2. Thinners (when used): Use thinners recommended for that purpose by manufacturer of material thinned.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

- A. Inspection: Carefully inspect installed work of other trades and verify work is complete to point where painting work may properly commence. Verify paint finishes may be applied in strict accordance with manufacturer's directions and requirements of these Specifications.
- B. Discrepancies: Do not proceed with installation in areas of discrepancy until discrepancies are fully resolved.

3.02 PREPARATION OF SURFACES

- A. Protection: Completely mask, remove, and adequately protect hardware, accessories, machined surfaces, plates, lighting fixtures, and similar items in contact with painted surfaces not scheduled to receive paint.
- B. Priming: Use primer recommended by manufacturer of coating system. Spot prime exposed nails and metals to be painted with emulsion paints.
- C. Cleaning: Thoroughly clean surfaces receiving paint. Schedule cleaning and painting so dust and contaminants from cleaning process will not fall on wet, newly painted surfaces.
- D. Gypsum Board: Treat and conceal joints, screw heads, and depressions in gypsum board surface in accordance with manufacturer's recommendations and instructions. Painted surfaces must be completely clean and continuously smooth. Treat internal and exterior corners and angles formed by intersection of wallboard surfaces and wallboard edges with joint reinforcements system in accordance with manufacturer's standard installation specifications where intersections and edges do not have metal trim. **All joints in gypsum board construction are to be taped and floated. This includes work above ceilings, at concealed places and anywhere else joints in gypsum board construction occur.** A slight egg-shell texture may be acceptable if approved by Architect prior to application. **Heavy "knockdown" texturing is not acceptable.**
- E. Concrete and Concrete Block: Prepare surfaces in strict accordance with paint manufacturer's instructions and recommendations. Remove chalk, dust, dirt, grease, oils and substances which negatively effect paint adhesion. Perform appropriate tests to determine alkalinity and moisture content of surfaces. If surfaces are found sufficiently alkaline to cause blistering and burning of paint, correct condition before applying paint.
- F. Wood: Clean wood surfaces free of dirt, oil, or foreign substances with scrapers, mineral spirits, and sandpaper. Sandpaper smooth those surfaces exposed to view, and then remove dust. Prime or seal wood requiring job painting immediately upon delivery to job. Prime edges, ends, faces, undersides, and backsides of this wood. Scrape and clean small, dry seasoned knots, and apply thin coat of white shellac or manufacturer's recommended knot sealer, before application of priming coat. After priming, fill holes and imperfections in finish surfaces with putty of plastic wood-filler. Sandpaper smooth when dried.
- G. Primed Ferrous Metals: Clean ferrous metals free of dust, grease and grime. Sand smooth rust spots, mars and abrasions in surfaces. Touch-up shop-applied prime coats which have damage or bare areas. Wire-brush, solvent clean, and touch up with same primer as shop coat.
- H. Non-ferrous Metals: Clean off all oxidation, dust, grease and grime.
- I. Galvanized Metal Surfaces: Clean free of oil and surface contaminates with acceptable non-petroleum based solvent. Touch up bare metal with zinc chromate primer.

3.03 WORKMANSHIP

- A. Do not perform outside painting in extremely cold, frosty, or damp weather. Do not paint in dusty rooms. If required, sprinkle floors, to lay dust. Do not apply coats of paint on either wet or damp surfaces and in no case unless preceding coat is dry and hard.
- B. Clean surfaces before priming. Remove dirt, oil, grease, rust, scale, and foreign matter. Clean with sandpaper, steel scraper, or wire brushes where necessary.

- C. Specified coats are to cover completed painting and finishing work. Where color, stain, or undercoats show through final coat, install additional coats until uniform coverage is obtained.
- D. Vary tints of undercoats slightly for identification of succeeding coats. Ample time of drying required to secure best possible results.
- E. Coats specified are in addition to shop or mill priming required under other Sections of these specifications.
- F. **All cabinet devices that require finish painting are to be painted with doors in the open position and shall be allowed to dry for a minimum of 24 hours in the open position. DO NOT PAINT DOORS CLOSED AND TRIM AFTER DRYING.**
 - 1. **Cabinets that require finish painting include, but are not limited to, wall and ceiling access doors, fire extinguisher/hose/valve cabinets, electrical panel boxes, etc.**
- G. Corridor partitions, smokestop partitions, horizontal exit partitions, exit enclosures, and fire walls shall be effectively and permanently identified with signs or stenciling in a manner acceptable to the authority having jurisdiction. Label each wall at 20'-0" maximum. Such identification shall be above any decorative ceiling and in concealed spaces. Approved wording is to be:

FIRE AND SMOKE BARRIER - PROTECT ALL OPENINGS

3.04 MOISTURE CONTROL

- A. Give back side of interior wood trim in contact with masonry units one application of water repellent preservative.

3.05 PAINT SCHEDULE

- A. Finish surfaces as follows:

	<u>SURFACE</u>	<u>TREATMENT</u>
1.	Interior Ferrous Metals:	<u>1st Coat</u> - SW Pro-Cryl Universal Water Based Primer, B66-310 Series (Touch up only on primed surfaces) <u>2nd & 3rd Coats</u> - SW ProMar 200 Alkyd Eg-Shel B33 or S/G B34 as selected by Architect.
2.	Interior Aluminum:	<u>1st Coat</u> - SW Pro-Cryl Universal Water Based Primer, B66-310 Series (Touch up only on primed surfaces) <u>2nd & 3rd Coats</u> - SW ProMar 200 Alkyd Eg-Shel B33 or S/G B34 as selected by Architect.
3.	Galvanized Metals:	<u>1st Coat:</u> SW B66W00310 - Pro Industrial Pro-Cryl® Universal Acrylic Primer Off White <u>2nd & 3rd Coats:</u> SW B66W01151 Pro Industrial DTM Acrylic Semi-Gloss Extra White.
4.	Int. Gyp. Board - Painted:	<u>1st Coat</u> - SW PrepRite High Build Latex Wall Primer/Surfacers, B28W601

5. **2nd & 3rd Coats - SW**
ProMar 200 Latex Eg-Shel B20-2200 or S/G B31-2200 Enamel as selected by Architect.
Int. Gyp. Board - Glazecoat: SW Water Based Epoxy Resin, B70-200 Series with Gloss Hardener B60V15
6. **Interior Conc. - Painted:** **1st Coat - SW PrepRite**
Masonry Primer, B28W300
2nd & 3rd Coats - SW
ProMar 200 Latex Eg-Shel B20-2200 or S/G B31-2200 Enamel as selected by Architect.
7. **Interior CMU - Painted:** **Prime Coats - SW PrepRite**
Block Filler, B25W25 as required to eliminate all pinholes.
2nd & 3rd Coats - SW
ProMar 200 Latex Eg-Shel B20-2200 or S/G B31-2200 Enamel as selected by Architect.

3.06 PAINTING OF MECHANICAL AND ELECTRICAL WORK

- A. Painting of pipe and duct insulation and un-coated ferrous metal in inaccessible pipe and duct chases, in plumbing chases, and in spaces above ceiling is not required.
- B. Metal Work in Mechanical Room (finish as follows):
1. Clean pre-finished equipment and touch up with enamel to match manufacturer's final coat.
 2. Clean exposed pipe, exposed conduit and electric outlet boxes, hangers and brackets, valve handles, and miscellaneous pipe line devices and give two coats of medium gray enamel.
 3. Clean prime painted or unfinished items of manufactured mechanical and electrical equipment, then prime and finish with two coats of enamel to match other finished items of equipment.
 4. Finish remaining exposed metal items with two coats of light grey enamel.
- C. Paint exposed interior metal work, including ferrous and non-ferrous piping, for heating ventilating, plumbing and electrical equipment, electric cabinets, ventilating grilles, metal access panels. Give exposed metal items one coat of enamel undercoater and one coat of enamel in addition to priming coat.
- D. Give pipe and duct insulation exposed to view one coat glue size and two coats enamel.
- E. Paint all mechanical, electrical and plumbing items that are visible through registers, grilles and diffusers with Flat Black-Out paint.**

3.07 PROTECTION, CLEAN UP, AND TOUCH-UP

- A. Protect all work from paint droppings and spattering by use of masking, drop cloths, removal of items or by other approved methods.
- B. Upon completion, clean paint drops and smears from hardware, glass and other surfaces and items.
- C. Before final inspection, touch-up or refinish painted surfaces which have become damaged or discolored.
1. Perform touch-up work in a manner to produce solid even color and finish texture to match surrounding color and finish texture.

2. Areas that receive touch-up work and do not match surrounding color or finish texture will be refinished at Contractors expense.

3.08 REPAINTING AND REFINISHING

- A. Thoroughly clean existing surfaces in present building to be repainted and give one or more new coats of same type of paint originally used. Clean existing natural finish surfaces, sand and give new coat of varnish or finish originally used. Treat patched and repaired surfaces as new surfaces. For bidding purposes figure two coats of paint as average requirement. Scrape surfaces to be repainted, sand by hand or machine, and prepare to receive new coats.
- B. Paint rooms and areas in existing building noted on drawings to paint existing surfaces or required by Finish Schedule.
- C. Paint all rooms and areas in existing building where cutting and patching occurs. Paint after cutting, patching, and remodeling in rooms and areas is completed. Where cutting and patching is required on only one wall or surface, paint the entire room or area. Where cutting or patching occurs along a corridor wall, paint entire corridor wall from corner to corner or between termination lines designated by Architect.

END OF SECTION 09 91 00

SECTION 21 13 13 - WET-PIPE SPRINKLER SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Pipes, fittings, and specialties.
 - 2. Backflow preventers.
 - 3. Specialty valves.
 - 4. Sprinklers.
 - 5. Alarm devices.
 - 6. Pressure gages.

1.2 DEFINITIONS

- A. Standard-Pressure Sprinkler Piping: Wet-pipe sprinkler system piping designed to operate at working pressure of 175-psig maximum.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Shop Drawings: For wet-pipe sprinkler systems.
 - 1. Include plans, elevations, sections, and attachment details.
 - 2. Include diagrams for power, signal, and control wiring.
 - 3. including hydraulic calculations if applicable.
- A. Delegated-Design Submittal: For wet-pipe sprinkler systems indicated to comply with performance requirements and design criteria, including analysis by the NICET technician responsible for their preparation. NICET minimum certification for system design is Level 3.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer and designer

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For wet-pipe sprinkler systems and specialties to include in emergency, operation, and maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Sprinkler Cabinets: Finished, wall-mounted, steel cabinet with hinged cover, and with space for minimum of six spare sprinklers plus sprinkler wrench. Include number of sprinklers required by NFPA 13 and sprinkler wrench. Include separate cabinet with sprinklers and wrench for each type of sprinkler used on Project.

1.7 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and operators according to 2010 ASME Boiler and Pressure Vessel Code.

1.8 FIELD CONDITIONS

- A. Interruption of Existing Sprinkler Service: Do not interrupt sprinkler service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary sprinkler service according to requirements indicated:
 - 1. Notify Owner no fewer than ten days in advance of proposed interruption of sprinkler service.
 - 2. Do not proceed with interruption of sprinkler service without Owner's written permission.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Sprinkler system equipment, specialties, accessories, installation, and testing shall comply with the following:
 - 1. NFPA 13.
 - 2. NFPA 409.
- B. Standard-Pressure Piping System Component: Listed for 175-psig minimum working pressure.
- C. Delegated Design: Engage a NICET Level 3 (minimum) technician to design wet-pipe sprinkler systems.
 - 1. Sprinkler system design shall be approved by authorities having jurisdiction.
 - a. Margin of Safety for Available Water Flow and Pressure: 10 percent, including losses through water-service piping, valves, and backflow preventers.
 - 2. Maximum Protection Area per Sprinkler: According to UL listing.

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- D. Seismic Performance: Sprinkler piping shall withstand the effects of earthquake motions determined according to NFPA 13.

2.2 BACKFLOW PREVENTERS

- A. Double check assembly or as required by local authority if more stringent.
- B. Design: For horizontal or vertical installation to match application.
- C. Approval: listed for fire protection service.

2.3 STEEL PIPE AND FITTINGS

- A. Standard-Weight, Galvanized- and Black-Steel Pipe: ASTM A53/A53M. Pipe ends may be factory or field formed to match joining method.
- B. Schedule 30, Black-Steel Pipe: ASTM A135/A135M; ASTM A795/A795M,; or ASME B36.10M wrought steel, with wall thickness not less than Schedule 30 and not more than Schedule 40. Pipe ends may be factory or field formed to match joining method.
- C. Thinwall Black-Steel Pipe: ASTM A135/A135M or ASTM A795/A795M, threadable, with wall thickness less than Schedule 30 and equal to or greater than Schedule 10. Pipe ends may be factory or field formed to match joining method.
- D. Schedule 10, Black-Steel Pipe: ASTM A135/A135M or ASTM A795/A795M, Schedule 10 in NPS 5 and smaller; and NFPA 13-specified wall thickness in NPS 6 to NPS 10, plain end.
- E. Nonstandard OD, Thinwall Black-Steel Pipe: ASTM A135/A135M or ASTM A795/A795M thinwall with plain ends and wall thickness less than Schedule 10.
- F. Hybrid Black-Steel Pipe: ASTM A135/A135M or ASTM A795/A795M lightwall, with wall thickness less than Schedule 10 and greater than Schedule 5.
- G. Schedule 5 Steel Pipe: ASTM A135/A135M or ASTM A795/A795M lightwall with plain ends.
- H. Black-Steel Pipe Nipples: ASTM A733, made of ASTM A53/A53M, standard-weight, seamless steel pipe with threaded ends.
- I. Steel Couplings: ASTM A865/A865M, threaded.
- J. Gray-Iron Threaded Fittings: ASME B16.4, Class 125, standard pattern.
- K. Malleable- or Ductile-Iron Unions: UL 860.
- L. Cast-Iron Flanges: ASME 16.1, Class 125.
- M. Steel Flanges and Flanged Fittings: ASME B16.5, Class 150.
 - 1. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch thick ASME B16.21, nonmetallic and asbestos free or EPDM rubber gasket.

- a. Class 125 and Class 250, Cast-Iron, Flat-Face Flanges: Full-face gaskets.
 - b. Class 150 and Class 300, Ductile-Iron or -Steel, Raised-Face Flanges: Ring-type gaskets.
 - 2. Metal, Pipe-Flange Bolts and Nuts: Carbon steel unless otherwise indicated.
 - N. Steel Welding Fittings: ASTM A234/A234M and ASME B16.9.
 - 1. Welding Filler Metals: Comply with AWS D10.12M/D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
 - O. Grooved-Joint, Steel-Pipe Appurtenances:
 - 1. Pressure Rating: 175-psig minimum.
 - 2. Painted Grooved-End Fittings for Steel Piping: ASTM A47/A47M, malleable-iron casting or ASTM A536, ductile-iron casting, with dimensions matching steel pipe.
Grooved-End-Pipe Couplings for Steel Piping: AWWA C606 and UL 213 rigid pattern, unless otherwise indicated, for steel-pipe dimensions. Include ferrous housing sections, EPDM-rubber gasket, and bolts and nuts.
- 2.4 SPECIALTY VALVES
- A. Listed in UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
 - B. Pressure Rating:
 - 1. Standard-Pressure Piping Specialty Valves: 175-psig minimum.
 - C. Body Material: Cast or ductile iron.
 - D. Size: Same as connected piping.
 - E. End Connections: Flanged or grooved.
 - F. Alarm Valves:
 - 1. Standard: UL 193.
 - 2. Design: For horizontal or vertical installation.
 - 3. Include trim sets for bypass, drain, electrical sprinkler alarm switch, pressure gages, and fill-line attachment with strainer.
 - 4. Drip Cup Assembly: Pipe drain without valves and separate from main drain piping.
 - 5. Drip Cup Assembly: Pipe drain with check valve to main drain piping.
 - 6. 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.
 - G. Automatic (Ball Drip) Drain Valves:
 - 1. Standard: UL 1726.
 - 2. Pressure Rating: 175-psig minimum.
 - 3. Type: Automatic draining, ball check.
 - 4. Size: NPS 3/4.
 - 5. End Connections: Threaded.

2.5 SPRINKLER PIPING SPECIALTIES

- A. Branch Outlet Fittings:
 - 1. Standard: UL 213.
 - 2. Pressure Rating: 175-psig minimum.
 - 3. Body Material: Ductile-iron housing with EPDM seals and bolts and nuts.
 - 4. Type: Mechanical-tee and -cross fittings.
 - 5. Configurations: Snap-on and strapless, ductile-iron housing with branch outlets.
 - 6. Size: Of dimension to fit onto sprinkler main and with outlet connections as required to match connected branch piping.
 - 7. Branch Outlets: Grooved, plain-end pipe, or threaded.
- B. Flow Detection and Test Assemblies:
 - 1. Standard: UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
 - 2. Pressure Rating: 175-psig minimum.
 - 3. Body Material: Cast- or ductile-iron housing with orifice, sight glass, and integral test valve.
 - 4. Size: Same as connected piping.
 - 5. Inlet and Outlet: Threaded or grooved.
- C. Sprinkler Inspector's Test Fittings:
 - 1. Standard: UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
 - 2. Pressure Rating: 175-psig minimum.
 - 3. Body Material: Cast- or ductile-iron housing with sight glass.
 - 4. Size: Same as connected piping.
 - 5. Inlet and Outlet: Threaded.

2.6 SPRINKLERS

- A. Listed in UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
- B. Pressure Rating for Automatic Sprinklers: 175-psig minimum.
- C. Automatic Sprinklers with Heat-Responsive Element:
 - 1. Early-Suppression, Fast-Response Applications: UL 1767.
 - 2. Nonresidential Applications: UL 199.
 - 3. Residential Applications: UL 1626.
 - 4. Characteristics: Nominal 1/2-inch orifice with Discharge Coefficient K of 5.6, and for "Ordinary" temperature classification rating unless otherwise indicated or required by application.
- D. Sprinkler Finish: **[bronze]** .

2.7 ALARM DEVICES

- A. Alarm-device types shall match piping and equipment connections.
- B. Electrically Operated Alarm Bell:
 - 1. Standard: UL 464.
 - 2. Type: Vibrating, metal alarm bell.

3. Size: 6-inch minimum- diameter.
4. Finish: Red-enamel factory finish, suitable for outdoor use.
5. 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. Water-Flow Indicators:

1. Standard: UL 346.
2. Water-Flow Detector: Electrically supervised.
3. Components: Two single-pole, double-throw circuit switches for isolated alarm and auxiliary contacts, 7 A, 125-V ac and 0.25 A, 24-V dc; complete with factory-set, field-adjustable retard element to prevent false signals and tamperproof cover that sends signal if removed.
4. Type: Paddle operated.
5. Pressure Rating: 250 psig.
6. Design Installation: Horizontal or vertical.

D. Valve Supervisory Switches:

1. Standard: UL 346.
2. Type: Electrically supervised.
3. Components: Single-pole, double-throw switch with normally closed contacts.
4. Design: Signals that controlled valve is in other than fully open position.
5. 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.

2.8 PRESSURE GAGES

- A. Standard: UL 393.
- B. Dial Size: 3-1/2- to 4-1/2-inch diameter.
- C. Pressure Gage Range: 0- to 250-psig minimum.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

- A. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated on approved working plans.
 1. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with Architect before deviating from approved working plans.
 2. Coordinate layout and installation of sprinklers with other construction that penetrates ceilings, including light fixtures, HVAC equipment, and partition assemblies.
- B. Piping Standard: Comply with NFPA 13 requirements for installation of sprinkler piping.

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- C. Install seismic restraints on piping. Comply with NFPA 13 requirements for seismic-restraint device materials and installation.
- D. Use listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.
- E. Install unions adjacent to each valve in pipes NPS 2 and smaller.
- F. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.
- G. Install "Inspector's Test Connections" in sprinkler system piping, complete with shutoff valve, and sized and located according to NFPA 13.
- H. Install sprinkler piping with drains for complete system drainage.
- I. Install sprinkler control valves, test assemblies, and drain risers adjacent to standpipes when sprinkler piping is connected to standpipes.
- J. Install automatic (ball drip) drain valve at each check valve for fire-department connection, to drain piping between fire-department connection and check valve. Install drain piping to and spill over floor drain or to outside building.
- K. Install alarm devices in piping systems.
- L. Install hangers and supports for sprinkler system piping according to NFPA 13. Comply with requirements for hanger materials in NFPA 13. In seismic-rated areas, Install seismic restraints.
- M. Install pressure gages on riser or feed main, at each sprinkler test connection, and at top of each standpipe. Include pressure gages with connection not less than NPS 1/4 and with soft-metal seated globe valve, arranged for draining pipe between gage and valve. Install gages to permit removal, and install where they are not subject to freezing.
- N. Fill sprinkler system piping with water.
- O. Install sleeves for piping penetrations of walls, ceilings, and floors.
- P. Install sleeve seals for piping penetrations of concrete walls and slabs.
- Q. Install escutcheons for piping penetrations of walls, ceilings, and floors.

3.2 JOINT CONSTRUCTION

- A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.
- B. Install unions adjacent to each valve in pipes NPS 2 and smaller.
- C. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.

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- D. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- E. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
- F. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with gasket and bolts according to ASME B31.9.
- G. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
- H. Twist-Locked Joints: Insert plain end of steel pipe into plain-end-pipe fitting. Rotate retainer lugs one-quarter turn or tighten retainer pin.
- I. Welded Joints: Construct joints according to AWS D10.12M/D10.12, using qualified processes and welding operators according to "Quality Assurance" Article.
 - 1. Shop weld pipe joints where welded piping is indicated. Do not use welded joints for galvanized-steel pipe.
- J. Steel-Piping, Cut-Grooved Joints: Cut square-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe joints.
- K. Steel-Piping, Roll-Grooved Joints: Roll rounded-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe grooved joints.
- L. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

3.3 VALVE AND SPECIALTIES INSTALLATION

- A. Install listed fire-protection valves, trim and drain valves, specialty valves and trim, controls, and specialties according to NFPA 13 and authorities having jurisdiction.
- B. Install listed fire-protection shutoff valves supervised open, located to control sources of water supply except from fire-department connections. Install permanent identification signs indicating portion of system controlled by each valve.
- C. Install check valve in each water-supply connection. Install backflow preventers instead of check valves in potable-water-supply sources.
- D. Specialty Valves:
 - 1. Install valves in vertical position for proper direction of flow, in main supply to system.

3.4 IDENTIFICATION

- A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13.
- B. Identify system components, wiring, cabling, and terminals.

3.5 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - 3. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.
 - 4. Energize circuits to electrical equipment and devices.
 - 5. Coordinate with fire-alarm tests. Operate as required.
 - 6. Verify that equipment hose threads are same as local fire department equipment.
- B. Sprinkler piping system will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

3.6 CLEANING

- A. Clean dirt and debris from sprinklers.
- B. Only sprinklers with their original factory finish are acceptable. Remove and replace any sprinklers that are painted or have any other finish than their original factory finish.

3.7 PIPING SCHEDULE

- A. Piping between Fire Department Connections and Check Valves: Galvanized, standard-weight steel pipe.
- B. Sprinkler specialty fittings may be used, downstream of control valves, instead of specified fittings.
- C. Standard-pressure, wet-pipe sprinkler system, NPS 6 and smaller with threaded or cut grooved joints, shall be the following:
 - 1. Standard-weight, black-steel.
- D. Standard-pressure, wet-pipe sprinkler system, NPS 8 and larger with threaded or cut grooved joints, shall be one of the following:
 - 1. Standard-weight, black-steel.

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ABP Fire Suppression Improvements

2. Schedule 30, black-steel.
- E. Standard-pressure, wet-pipe sprinkler system, NPS 10 and smaller with welded or roll grooved joints, shall be one of the following:
 1. Standard-weight, black-steel.
 2. Schedule 30, black-steel.
 3. Schedule 10, black-steel.
- F. Standard-pressure, wet-pipe sprinkler system, NPS 12 with welded or roll grooved joints, shall be one of the following:
 1. Standard-weight, black-steel.
 2. Schedule 30, black-steel.

3.8 SPRINKLER SCHEDULE

- A. Use sprinkler types in subparagraphs below for the following applications:
 1. Rooms without Ceilings: Upright sprinklers.

END OF SECTION 21 13 13

SECTION 21 13 16 – PREACTION SPRINKLER SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pipes, fittings, and specialties.
2. Specialty valves.
3. Sprinkler specialty pipe fittings.
4. Sprinklers.
5. Alarm devices.
6. Pressure gages.
7. Nitrogen Generators.
8. Manual control stations.
9. Monitoring and detection devices.
10. Heat detection system.
11. Control panels.

1.2 DEFINITIONS

- A. Standard-Pressure Sprinkler Piping: Sprinkler system piping designed to operate at working pressure of 175-psig maximum.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings

1. Include plans, elevations, sections, and attachment details.
2. Include diagrams for power, signal, and control wiring.
3. Include heat detection system.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer and designer.

B. Design Data:

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ABP Fire Suppression Improvements

1. Approved Sprinkler Piping Drawings: Working plans, prepared according to NFPA 13, that have been approved by authorities having jurisdiction, including hydraulic calculations if applicable.
 - C. Fire-hydrant flow test report.
 - D. Field Test Reports:
 1. Fire-hydrant flow test report.
 2. Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13. Include "Contractor's Material and Test Certificate for Aboveground Piping."
 - E. Field quality-control reports.
- 1.5 CLOSEOUT SUBMITTALS
- A. Operation and Maintenance Data: For sprinkler systems and specialties to include in emergency, operation, and maintenance manuals.
- 1.6 MAINTENANCE MATERIAL SUBMITTALS
- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Sprinkler Cabinets: Finished, wall-mounted, steel cabinet with hinged cover, and with space for minimum of six spare sprinklers plus sprinkler wrench. Include number of sprinklers required by NFPA 13 and sprinkler wrench. Include separate cabinet with sprinklers and wrench for each type of sprinkler used on Project.
- 1.7 QUALITY ASSURANCE
- A. Installer Qualifications:
 1. Installer's responsibilities include designing, fabricating, and installing sprinkler systems and providing professional engineering services needed to assume engineering responsibility. Base calculations on results of fire-hydrant flow test.
- 1.8 FIELD CONDITIONS
- A. Interruption of Existing Sprinkler Service: Do not interrupt sprinkler service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary sprinkler service according to requirements indicated:
 1. Notify Owner no fewer than two days in advance of proposed interruption of sprinkler service.
 2. Do not proceed with interruption of sprinkler service without Owner's written permission.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTIONS

- A. Dry-Pipe Sprinkler System: Automatic sprinklers are attached to piping containing compressed gas. Opening of sprinklers releases compressed gas and permits water pressure to open dry-pipe valve. Water then flows into piping and discharges from opened sprinklers.
- B. Dry sprinkler piping: piping in a dry-pipe or preaction system designed to contain gas instead of water.
- C. Preacton Sprinkler System: A sprinkler system employing automatic sprinklers that are attached to a piping system that contains gas that might or might not be under pressure, with a supplemental detection system installed in the same areas as the sprinklers.
- D. Single-Interlock Preacton Sprinkler System: admits water to sprinkler piping upon operation of detection devices.
- E. Non-Interlock Preacton Sprinkler System: admits water to sprinkler piping upon operation of detection devices or automatic sprinklers.
- F. Double-Interlock Preacton Sprinkler System: admits water to sprinkler piping upon operation of both detection devices and automatic sprinklers.

2.2 PERFORMANCE REQUIREMENTS

- A. Sprinkler system equipment, specialties, accessories, installation, and testing shall comply with the following:
 - 1. NFPA 13.
- B. Standard-Pressure Piping System Component: Listed for 175-psig minimum working pressure.
- C. Design Criteria.
 - 1. Refer to drawings for available flow and pressure.
- D. Sprinkler system design shall be approved by authorities having jurisdiction.
 - 1. Margin of Safety for Available Water Flow and Pressure: 10 percent, including losses through water-service piping, valves, and backflow preventers.
 - 2. Maximum Protection Area per Sprinkler: According to UL listing.
- E. Seismic Performance: Sprinkler piping shall withstand the effects of earthquake motions determined according to NFPA 13 and ASCE/SEI 7.

2.3 STEEL PIPE AND FITTINGS

- A. Standard-Weight, Galvanized-Steel Pipe: ASTM A 53/A 53M. Pipe ends may be factory or field formed to match joining method.
- B. Schedule 30, Galvanized-Steel Pipe: ASTM A 135/A 135M; ASTM A 795/A 795M; or ASME B36.10M wrought steel, with wall thickness not less than Schedule 30 and not more than Schedule 40. Pipe ends may be factory or field formed to match joining method.
- C. Thinwall Galvanized-Steel Pipe: ASTM A 135/A 135M or ASTM A 795/A 795M, threadable, with wall thickness less than Schedule 30 and equal to or greater than Schedule 10. Pipe ends may be factory or field formed to match joining method.
- D. Galvanized-Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M, standard-weight, seamless steel pipe with threaded ends.
- E. Galvanized-Steel Couplings: ASTM A 865/A 865M, threaded.
- F. Galvanized, Gray-Iron Threaded Fittings: ASME B16.4, Class 125, standard pattern.
- G. Grooved-Joint, Steel-Pipe Appurtenances:
 - 1. Pressure Rating: 175-psig minimum.
 - 2. Galvanized, Grooved-End Fittings for Steel Piping: ASTM A 47/A 47M, malleable-iron casting or ASTM A 536, ductile-iron casting, with dimensions matching steel pipe.
 - 3. Grooved-End-Pipe Couplings for Steel Piping: AWWA C606 and UL 213 rigid pattern, unless otherwise indicated, for steel-pipe dimensions. Include ferrous housing sections, EPDM-rubber gasket, and bolts and nuts.

2.4 SPECIALTY VALVES

- A. Listed in UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
- B. Pressure Rating:
 - 1. Standard-Pressure Piping Specialty Valves: 175-psig minimum.
- C. Body Material: Cast or ductile iron.
- D. Size: Same as connected piping.
- E. End Connections: Flanged or grooved.
- F. Automatic water releasing valves:
 - 1. Single Interlock deluge valve shall be a cULus Listed or FM Approved hydraulically operated, differential latching clapper-type valve. Deluge valve for the Single Interlock Preaction System shall be activated by electric actuation trim. Deluge valve trim shall be galvanized. Valve construction shall be of lightweight, ductile-iron construction with "screw in" stainless steel seat and clapper assembly. Seat shall have O-ring seals to resist corrosion and leakage. Clapper facing shall be pressure actuated, providing a limited compression seat for the sealing force between the clapper rubber facing and the valve seat. Valve shall have an external reset knob for resetting the clapper without having to remove the valve face plate. Push-rod chamber design shall consist of a

stainless steel piston/pushrod and spring assembly with diaphragm seal secured to the casting through a pushrod guide constructed of a synthetic engineering plastic to resist corrosion. Valve trim shall consist of galvanized and brass components specifically listed with the deluge valve. Trim components shall include 2" main drain, alarm line test, water pressure gauges, push rod chamber supply connections, manual emergency release valve, and closed drain assembly. Condensate drain valve shall also be included to prevent water columning above the clapper.

2. Releasing device shall be a solenoid valve constructed of a brass body with stainless steel sleeve tube, springs, stop and plunger. Solenoid valve shall have a maximum working pressure of 175 psi (12,1 bar). Power consumption of integrated coil shall be limited to 10 watts and require power from a releasing control panel listed for such service.

G. Automatic (Ball Drip) Drain Valves:

1. Standard: UL 1726.
2. Pressure Rating: 175-psig minimum.
3. Type: Automatic draining, ball check.
4. Size: NPS 3/4.
5. End Connections: Threaded.

2.5 SPRINKLER PIPING SPECIALTIES

A. General Requirements for Dry pipe Fittings: UL listed for dry-pipe service.

B. Branch Outlet Fittings:

1. Standard: UL 213.
2. Pressure Rating: 175-psig minimum.
3. Body Material: Ductile-iron housing with EPDM seals and bolts and nuts.
4. Type: Mechanical-tee and -cross fittings.
5. Configurations: Snap-on and strapless, ductile-iron housing with branch outlets.
6. Size: Of dimension to fit onto sprinkler main and with outlet connections as required to match connected branch piping.
7. Branch Outlets: Grooved, plain-end pipe, or threaded.

C. Flow Detection and Test Assemblies:

1. Standard: UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
2. Pressure Rating: 175-psig minimum.
3. Body Material: Cast- or ductile-iron housing with orifice, sight glass, and integral test valve.
4. Size: Same as connected piping.
5. Inlet and Outlet: Threaded.

D. Branch Line Testers:

1. Standard: UL 199.
2. Pressure Rating: 175-psig minimum.
3. Body Material: Brass.
4. Size: Same as connected piping.
5. Inlet: Threaded.
6. Drain Outlet: Threaded and capped.
7. Branch Outlet: Threaded, for sprinkler.

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- E. Sprinkler Inspector's Test Fittings:
 - 1. Standard: UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
 - 2. Pressure Rating: 175-psig minimum.
 - 3. Body Material: Cast- or ductile-iron housing with sight glass.
 - 4. Size: Same as connected piping.
 - 5. Inlet and Outlet: Threaded.
- F. Adjustable Drop Nipples:
 - 1. Standard: UL 1474.
 - 2. Pressure Rating: 250-psig minimum.
 - 3. Body Material: Steel pipe with EPDM O-ring seals.
 - 4. Size: Same as connected piping.
 - 5. Length: Adjustable.
 - 6. Inlet and Outlet: Threaded.

2.6 SPRINKLERS

- A. Listed in UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
- B. Pressure Rating for Residential Sprinklers: 175-psig maximum.
- C. Pressure Rating for Automatic Sprinklers: 175-psig minimum.
- D. Pressure Rating for High-Pressure Automatic Sprinklers: 250-psig minimum.
- E. Automatic Sprinklers with Heat-Responsive Element:
 - 1. Nonresidential Applications: UL 199.
 - 2. Characteristics: Temperature classification rating by application
- F. Sprinkler Finishes: [**Chrome plated**] [**bronze**] [**and**] [**painted**].

2.7 ALARM DEVICES

- A. Alarm-device types shall match piping and equipment connections.
- B. Electrically Operated Alarm Bell:
 - 1. Standard: UL 464.
 - 2. Type: Vibrating, metal alarm bell.
 - 3. Finish: Red-enamel factory finish, suitable for outdoor use.
 - 4. 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. Pressure Switches:
 - 1. Standard: UL 346.
 - 2. Type: Electrically supervised water-flow switch with retard feature.
 - 3. Components: Single-pole, double-throw switch with normally closed contacts.
 - 4. Design Operation: Rising pressure signals water flow.
- D. Valve Supervisory Switches:

1. Standard: UL 346.
2. Type: Electrically supervised.
3. Components: Single-pole, double-throw switch with normally closed contacts.
4. Design: Signals that controlled valve is in other than fully open position.
5. 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

2.8 PRESSURE GAGES

- A. Standard: UL 393.
- B. Dial Size: 3-1/2- to 4-1/2-inch diameter.
- C. Pressure Gage Range: 0- to 250-psig minimum.

2.9 NITROGEN GENERATORS

- A. The nitrogen generator shall have an air compressor system that is sized appropriately for the application and capable of achieving system supervisory pressure within 30 minutes in accordance with requirements of NFPA 13. The air compressor system may include an external compressor.
- B. The nitrogen generator shall provide a minimum of 98% purity nitrogen to the fire sprinkler system.
- C. The nitrogen generator shall be equipped with a filtration system to remove residual water and all hydrocarbons from the air stream.
- D. The nitrogen generator shall have a nitrogen control panel capable of monitoring compressor runtimes, nitrogen generator pressure, as well as its operational mode.
- E. The nitrogen generator shall have a leak detection system capable of determining sprinkler system leak rates, giving alerts if leaks develop within the sprinkler piping, nitrogen generator system or air compressor.
- F. The nitrogen generator shall be able to indicate trouble alerts.
- G. The nitrogen generator shall have a nitrogen storage tank that conforms to the ASME standard for pressure vessels.
- H. Purge valves: Furnish and install a nitrogen purge valve at the furthest point from the fire sprinkler riser for each fire sprinkler system. The nitrogen purge valve shall be supplied with a restricted orifice with size determined by the total system pressure requirements. The nitrogen purge valve shall have a nitrogen sensor that can shut off the purge valve after 98% nitrogen has been achieved throughout the fire sprinkler system. The nitrogen purge valve shall monitor the nitrogen level in the fire protection system periodically. The nitrogen purge valve shall have a trouble alert relay to indicate trouble if nitrogen purity drops below desired levels. The nitrogen purge valve shall be closed during hydrostatic and air pressure testing of the fire sprinkler system, then placed in the open position for the commissioning, treatment and operation of the system.

- I. Air Maintenance Device: Furnish and install an Air Maintenance Device for each preaction sprinkler system. The Air Maintenance Device shall be equipped with an adjustable pressure regulator that is capable of setting the required pressure for the fire sprinkler system. The Air Maintenance Device shall be listed or approved for fire sprinkler application. The Air Maintenance Device shall be installed per manufacturer's specifications.

2.10 MANUAL CONTROL STATIONS

- A. Hydraulic operation, with union, NPS 1/2 pipe nipple, and bronze ball valve. Include metal enclosure labeled "MANUAL CONTROL STATION," with operating instructions and cover.

2.11 CONTROL PANELS

- A. Description: Single-area, two-area, or single-area cross-zoned type control panel as indicated, including NEMA ICS 6, Type 1 enclosure, detector, alarm, and solenoid-valve circuitry for operation of deluge valves.
 - 1. Listed in UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide" when used with thermal detectors and Class A detector circuit wiring.
 - 2. Electrical characteristics are 120-V ac, 60 Hz, with 24-V dc rechargeable batteries.
 - 3. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application
- B. Panels Components:
 - 1. Power supply.
 - 2. Battery charger.
 - 3. Standby batteries.
 - 4. Field-wiring terminal strip.
 - 5. Electrically supervised solenoid valves and polarized fire-alarm bell.
 - 6. Lamp test facility.
 - 7. Single-pole, double-throw auxiliary alarm contacts.
 - 8. Rectifier.

2.12 LINEAR HEAT DETECTION SYSTEM

- A. Listed for "regular" service and standard environment. Cable includes two steel actuator wires twisted together with spring pressure, wrapped with protective tape, and finished with PVC outer sheath. Each actuator wire is insulated with heat-sensitive material that reacts with heat to allow cable twist pressure to short circuit wires at location of elevated temperature.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

- A. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated on approved working plans.
 - 1. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with Architect before deviating from approved working plans.
 - 2. Coordinate layout and installation of sprinklers with other construction that penetrates ceilings, including light fixtures, HVAC equipment, and partition assemblies.
- B. Piping Standard: Comply with NFPA 13 requirements for installation of sprinkler piping.
- C. Install seismic restraints on piping. Comply with NFPA 13 requirements for seismic-restraint device materials and installation.
- D. Use listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.
- E. Install unions adjacent to each valve in pipes NPS 2 and smaller.
- F. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.
- G. Install "Inspector's Test Connections" in sprinkler system piping, complete with shutoff valve, and sized and located according to NFPA 13.
- H. Install sprinkler piping with drains for complete system drainage.
- I. Install sprinkler control valves, test assemblies, and drain risers adjacent to standpipes when sprinkler piping is connected to standpipes.
- J. Install automatic (ball drip) drain valves to drain piping between fire department connections and check valves. Drain to floor drain or to outside building.
- K. Connect nitrogen supply to dry sprinkler piping.
- L. Connect nitrogen generator to the following piping and wiring:
 - 1. Pressure gages and controls.
 - 2. Electrical power system.
 - 3. Fire-alarm devices, including low-pressure alarm.
- M. Install alarm devices in piping systems.
- N. Install hangers and supports for sprinkler system piping according to NFPA 13. Comply with requirements in NFPA 13.
- O. Install pressure gages on riser or feed main, at each sprinkler test connection, and at top of each standpipe. Include pressure gages with connection not less than NPS 1/4 and with soft-

metal seated globe valve, arranged for draining pipe between gage and valve. Install gages to permit removal, and install where they are not subject to freezing.

- P. Drain sprinkler piping that is not intended to contain water.
- Q. Pressurize and check dry sprinkler piping and air-pressure maintenance devices and nitrogen generators.
- R. Install sleeves for piping penetrations of walls, ceilings, and floors.
- S. Install sleeve seals for piping penetrations of concrete walls and slabs.
- T. Install escutcheons for piping penetrations of walls, ceilings, and floors.

3.2 JOINT CONSTRUCTION

- A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.
- B. Install unions adjacent to each valve in pipes NPS 2 and smaller.
- C. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.
- D. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- E. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
- F. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with gasket and bolts according to ASME B31.9.
- G. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
- H. Twist-Locked Joints: Insert plain end of steel pipe into plain-end-pipe fitting. Rotate retainer lugs one-quarter turn or tighten retainer pin.
- I. Steel-Piping, Cut-Grooved Joints: Cut square-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe joints.
- J. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

3.3 VALVE AND SPECIALTIES INSTALLATION

- A. Install listed fire-protection valves, trim and drain valves, specialty valves and trim, controls, and specialties according to NFPA 13 and authorities having jurisdiction.
- B. Install listed fire-protection shutoff valves supervised open, located to control sources of water supply except from fire-department connections. Install permanent identification signs indicating portion of system controlled by each valve.
- C. Install check valve in each water-supply connection. Install backflow preventers instead of check valves in potable-water-supply sources.
- D. Specialty Valves:
 - 1. Install valves in vertical position for proper direction of flow, in main supply to system.
 - 2. Install automatic water releasing valves with trim sets for air supply, drain, priming level, alarm connections, ball drip valves, pressure gages, priming chamber attachment, and fill-line attachment.
 - a. Install nitrogen generator and supply piping.
 - b. Install air-pressure maintenance device with shutoff valves to permit servicing without shutting down sprinkler system; bypass valve for quick system filling; pressure regulator or switch to maintain system pressure; strainer; pressure ratings with adjustable range; and **175-psig** maximum inlet pressure.

3.4 SPRINKLER INSTALLATION

- A. Install sprinklers with water supply from heated space. Do not install pendent or sidewall sprinklers in areas subject to freezing.

3.5 IDENTIFICATION

- A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13.
- B. Identify system components, wiring, cabling, and terminals.

3.6 DETECTION AND ELECTRICAL CONNECTIONS

- A. Install fire detection for covered areas in accordance with NFPA 72, NFPA 16 and Division 28.
- B. Connect wiring in accordance with Division 26.
- C. Install electrical devices furnished by manufacturer, but not factory mounted, in accordance with NFPA 70.
- D. Install nameplate for each electrical connection, indicating electrical equipment designation and circuit number feeding connection.

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- E. Connect electrical devices to building's fire-alarm system. Comply with requirements in Division 28.
- F. Interface system with building's fire alarm system.
- G. Install all wiring in metal conduit.

3.7 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - 3. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.
 - 4. Energize circuits to electrical equipment and devices.
 - 5. Start and run nitrogen generators.
 - 6. Coordinate with fire-alarm tests. Operate as required.
 - 7. Coordinate with fire-pump tests. Operate as required.
 - 8. Verify that equipment hose threads are same as local fire department equipment.
- B. Sprinkler piping system will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

3.8 CLEANING

- A. Clean dirt and debris from sprinklers.
- B. Only sprinklers with their original factory finish are acceptable. Remove and replace any sprinklers that are painted or have any other finish than their original factory finish.

3.9 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain specialty valves.

3.10 PIPING SCHEDULE

- A. Piping between Fire Department Connections and Check Valves: Galvanized, standard-weight steel pipe.
- B. Sprinkler specialty fittings may be used, downstream of control valves, instead of specified fittings.
- C. Standard-pressure, wet-pipe sprinkler system, NPS 6 and smaller with threaded or cut grooved joints, shall be the following:

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ABP Fire Suppression Improvements

1. Standard-weight, black-steel.
- D. Standard-pressure, wet-pipe sprinkler system, NPS 8 and larger with threaded or cut grooved joints, shall be one of the following:
 1. Standard-weight, black-steel.
 2. Schedule 30, black-steel.
- E. Standard-pressure, wet-pipe sprinkler system, NPS 10 and smaller with welded or roll grooved joints, shall be one of the following:
 1. Standard-weight, black-steel.
 2. Schedule 30, black-steel.
 3. Schedule 10, black-steel.
- F. Standard-pressure, wet-pipe sprinkler system, NPS 12 with welded or roll grooved joints, shall be one of the following:
 1. Standard-weight, black-steel.
 2. Schedule 30, black-steel.

3.11 SPRINKLER SCHEDULE

- A. Use sprinkler types in subparagraphs below for the following applications:
 1. Rooms without Ceilings: Upright sprinklers.

END OF SECTION 21 13 16

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SECTION 21 13 39 – LOW EXPANSION FOAM-WATER SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Concentrate piping and piping specialties.
 - 2. Bladder tanks and proportioning devices.
 - 3. Foam concentrate.
 - 4. Discharge devices.
 - 5. Monitoring and detection devices.
 - 6. Heat detection system.
 - 7. Control panels.

1.2 DEFINITIONS

- A. FFF: Fluorine-free foam. A synthetic foam concentrate based on a mixture of hydrocarbon surface active agents that are fluorine free.
- B. PFAS: per- and polyfluoroalkyl substances.

1.3 SYSTEM DESCRIPTION

- A. Description: Engineered, fixed, deluge, automatically actuated, low-expansion, FFF fire-extinguishing system for flammable-liquid fires. System includes heat detection system and diaphragm proportioning tanks and devices as described in NFPA 16.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include the following:
 - 1. Piping, valves, fittings, and hangers.
 - 2. Seismic restraints for all equipment.
 - 3. Bladder tanks and proportioning devices.
 - 4. Foam concentrate.
 - 5. Discharge devices. Include flow characteristics.
 - 6. Test connections.
 - 7. Monitoring and alarm devices. Include electrical data and supervision method.
 - 8. Heat detection components and devices; include control panel.
- B. Shop Drawings: For foam-water systems, signed and sealed by NICET level 3 certified individual. Prepare in accordance with requirements of NFPA 16, to include, but not be limited to, the following:
 - 1. Include plans, elevations, sections, and attachment details.

2. Include design calculations.
 3. Include details of equipment assemblies. Indicate dimensions, weights, loads, manufacturer-required clearances, method of field assembly, components, and location and size of each field connection.
 4. Include diagrams for power, signal, and control wiring.
 5. Include heat detection system.
 6. Permit-Approved Documents: Working plans and hydraulic calculations approved by authorities having jurisdiction.
- C. Permit-Approved Drawings: Working plans prepared according to NFPA 409 and approved by authorities having jurisdiction. Include hydraulic calculations complying with NFPA 13.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For foam-water fire-extinguishing system to include in emergency, operation, and maintenance manuals.
1. Items to include the following:
 - a. Valves and specialties.
 - b. Bladder tanks and proportioning devices.
 - c. Foam concentrate.
 - d. Discharge devices. Include flow characteristics.
 - e. Monitoring, detection, and alarm devices. Include supervision method.
 - f. Strainers.
 - g. Test connections.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents. Deliver extra materials to Owner.
1. Discharge Devices: As required by NFPA 13.
 2. Foam Concentrate: Not less than 100 percent of amount installed.

1.7 QUALITY ASSURANCE

- A. Pipe and Pressure-Vessel Welding Qualifications: Qualify procedures and operators in accordance with ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.

- B. FM Global Compliance: Provide components that are FM Approved and that are listed in FM Approvals' "Approval Guide."
- C. UL Compliance: Provide equipment listed in UL's "Fire Protection Equipment Directory."
- D. Standard Working Pressure of Piping-System Component: Listed for a minimum of 175 psig (1200 kPa).
- E. Unless authorities having jurisdiction have stricter requirements, minimum design parameters are as follows:
 - 1. Solution: percent foam-water solution as determined by the manufacturer.
- F. Seismic Performance: Fire-suppression piping shall withstand the effects of earthquake motions determined in accordance with NFPA 13.

2.2 CONCENTRATE PIPING MATERIALS

- A. Stainless Steel Pipe: ASTM A312/A312M, Schedule 40, Type 304 or Type 316, with factory-formed threaded or beveled ends; ASTM A376/A376M for seamless pipe; or ASTM A213/A213M, ASTM A249/A249M, and ASTM A269/A269M for seamless and welded tubing.
 - 1. Class 150 Threaded Fittings: ASME B16.3 and MSS SP-114.
 - 2. Butt-Weld Fittings: ASTM A403/A403M.
 - 3. Flanges, Forged Fittings and Flanges, and Socket-Weld Fittings: ASTM A182/A182M.
 - 4. Bar Stock and Compression Fittings: ASTM A276/A276M and ASTM A479/A479M.
- B. Red Brass Pipe: ASTM B43, Schedule 40, with factory- or field-formed threaded ends.
 - 1. Threaded Fittings: ASME B16.11.

2.3 FOAM-WATER PIPING MATERIALS

- A. Carbon Steel Pipe: ASTM 135, 53, or 795, Schedule 40.
 - 1. Class 150 Threaded Fittings: ASME B16.3 and MSS SP 114.
 - 2. Butt-Weld Fittings: ASTM A 403/A 403M.
 - 3. Flanges, Forged Fittings and Flanges, and Socket-Weld Fittings: ASTM A 182/A 182M.
 - 4. Grooved pipe and fittings:
 - a. Pressure Rating: 175-psig (1200-kPa) minimum.
 - b. Uncoated Grooved-End Fittings for Steel Piping: ASTM A 47/A 47M, malleable-iron casting or ASTM A 536, ductile-iron casting, with dimensions matching steel pipe.
 - c. Grooved-End-Pipe with flexible Couplings for Steel Piping: listed couplings or fittings that allows axial displacement, rotation, and at least 1 degree of angular movement of the pipe without inducing harm on the pipe. For pipe diameters of 8 in. and larger, the angular movement shall be permitted to be less than 1 degree but not less than 0.5 degrees.
 - d. Grooved-End-Pipe with rigid Couplings for Steel Piping: listed couplings or fittings that provide rigid joints.

2.4 VALVES

- A. General;
 - 1. UL listed or FM Approved for use in fire-protection systems.
 - 2. Compatible with type of foam concentrate used.

2.5 SYSTEM COMPONENTS

- A. Source Limitations: Obtain system components from single source from single manufacturer.
- B. System components to be in accordance with NFPA 16, be compatible with the foam concentrate, and be designed to be drained and cleaned.
- C. Foam-Concentrate Storage Tanks: Buna-N, bladder-type proportioning tank complying with UL 162 and ASME Boiler and Pressure Vessel Code: Section VIII; designed for use with foam-concentrate pumps and for specific type of foam concentrate used. Include bladder, internal piping, fill and drain, glass sight gage, piping, and valves. Contain concentrate in the bladder.
 - 1. Orientation: Horizontal design with saddle support.
- D. Proportioning Controllers: Venturi type complying with UL 162 and of capacity to match design at minimum and maximum flow.
- E. Concentrate Control Valves: Water-operated ball or deluge valve designed to open with flow through the proportioning controller.
- F. Concentrate Strainers: Bronze body and stainless steel mesh strainer with minimum 0.125-inch (3.2-mm) perforations to remove solids that would block system components.
- G. Pressure Gauges: Comply with UL 393; with 3-1/2-inch (90-mm) minimum-diameter dial, 0- to 300-psig (0- to 2070-kPa) dial range, and caption "WATER" or "CONCENTRATE" on dial face.

2.6 FOAM CONCENTRATE

- A. Description: Low expansion FFF liquid concentrate, complying with NFPA 11 and UL 162, for making foam-water fire-extinguishing foam solution.

2.7 DISCHARGE DEVICES

- A. Discharge devices shall be UL listed or FM Approved.
- B. Sprinklers: Open, type; UL listed or FM Approved and listed for use with type of foam concentrate used.

2.8 MONITORING DEVICES

- A. Valve Supervisory Switches: Single pole, double throw, with normally closed contacts complying with UL 753. Switch shall signal an alarm condition at fire-alarm panel or releasing panel when valve is in other than fully open position.

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- B. Pressure Switches: Single pole, double throw, UL listed or FM Approved and complying with UL 753. Switch shall signal an alarm condition at fire-alarm panel or releasing panel when switch is in other than fully open position.
- C. Flow Switches: Single pole, double throw, UL listed or FM Approved and complying with UL 753. Switch shall signal an alarm condition at fire-alarm panel or releasing panel when switch is in other than fully open position.

2.9 DETECTION DEVICES

- A. Spot Heat Detector, Fixed-Temperature Type: Actuated by temperature that exceeds a fixed temperature of 190 degrees F.
 - 1. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to releasing control unit.

2.10 CONTROL PANELS

- A. Description: Single-area release control panel, including NEMA ICS 6, Type 1 enclosure and solenoid-valve circuitry for operation of control valves. Control valves shall utilize a listed and approved release system. Heat detectors shall be compatible with release control panel. System shall include Supervised Releasing Application, Abort Switch, Maintenance Switch, and Walk test Controller.
 - 1. Listed in UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide" when used with thermal detectors.
 - 2. Electrical characteristics are 120-V ac, 60 Hz, with 24-V dc rechargeable batteries.
 - 3. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Manual Control Stations with abort function: Electric operation, metal enclosure, with operating instructions and cover held closed to prevent accidental opening.

PART 3 - EXECUTION

3.1 CONCENTRATE STORAGE TANK INSTALLATION

- A. Install concentrate storage tanks anchored to substrate in accordance with tank manufacturer's written instructions.
- B. Install tanks level and plumb, in accordance with layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.

3.2 PIPING INSTALLATION

- A. Install piping and components level and plumb.

- B. Install pipe and fittings, valves, and discharge devices in accordance with requirements listed in NFPA 16, "Installation of Foam-Water Sprinkler and Foam-Water Spray Systems."
 - 1. Support piping using supports and methods in accordance with NFPA 13.
 - 2. Install seismic restraints for concentrate storage tanks and piping systems.
 - 3. Install monitoring and alarm devices in accordance with NFPA 16 and NFPA 72.
- C. Install flanges, flange adapters, or couplings for grooved-end piping on piping, valves, apparatus, and equipment having **NPS 2-1/2 (DN 65)** and larger end connections.
- D. Ream ends of pipes and tubes and remove burrs.
- E. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
- F. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for foam concentrate. Join flanges with gasket and bolts in accordance with ASME B31.9.
- G. Threaded Joints: Thread pipe with tapered pipe threads in accordance with ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
- H. Steel-Piping, Cut-Grooved Joints: Cut square-edge groove in end of pipe in accordance with AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings in accordance with AWWA C606 for steel-pipe joints.
- I. Steel-Piping, Roll-Grooved Joints: Roll rounded-edge groove in end of pipe in accordance with AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings in accordance with AWWA C606 for steel-pipe grooved joints.
- J. Welded Joints: Construct joints in accordance with AWS D10.12M/D10.12, using qualified processes and welding operators in accordance with "Quality Assurance" Article.
 - 1. Shop weld pipe joints where welded piping is indicated.
- K. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems and with foam concentrate.

3.3 PIPING CONNECTIONS

- A. Comply with requirements for piping specified in Section 211313 "Wet-Pipe Sprinkler Systems"
- B. Provide concentrate control and drain valves with piping to permit maintenance of foam concentrate with continuous sprinkler-system service.
- C. Install proportioning controller in fire-suppression piping to provide coverage to area indicated on Drawings.
- D. Where installing piping adjacent to equipment, allow space for service and maintenance.

3.4 DETECTION AND ELECTRICAL CONNECTIONS

- A. Install fire detection for covered areas in accordance with NFPA 72, NFPA 16 and Division 28.
- B. Connect wiring in accordance with Division 26.
- C. Install electrical devices furnished by manufacturer, but not factory mounted, in accordance with NFPA 70.
- D. Install nameplate for each electrical connection, indicating electrical equipment designation and circuit number feeding connection.
- E. Connect electrical devices to building's fire-alarm system. Comply with requirements in Division 28.
- F. Interface system with building's existing fire alarm system.
- G. Install all wiring in EMT conduit.

3.5 CONNECTIONS

- A. Comply with requirements for piping specified in Section 211313 "Wet-Pipe Sprinkler Systems." Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Provide concentrate control and drain valves with piping to permit maintenance of the foam concentrate with continuous sprinkler-system service.
- C. Install proportioning controller in fire-suppression piping to provide coverage to area indicated on Drawings.
- D. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.

3.6 LABELING

- A. Install labeling on new piping, equipment, and panels. Pipe labels shall be at 20 ft maximum intervals.

3.7 CHARGING SYSTEM

- A. Fill proportioning tanks with foam concentrate after field quality-control testing is complete and satisfactory results have been achieved.

3.8 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- B. Perform tests and inspections with the assistance of a factory-authorized service representative.

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- C. Tests and Inspections: Comply with operating instructions and procedures in NFPA 16, Chapter "Acceptance Tests." Include the following tests and inspections to demonstrate compliance with requirements:
1. Check mechanical items.
 2. Inspect equipment and check mountings for adequate anchoring to substrate.
 3. Check electrical systems.
 4. Flush new piping.
 5. Perform acceptance test.
 6. Perform proportioning system test.
 7. Perform discharge test.
 8. Correct malfunctioning equipment; retest to demonstrate compliance. Replace equipment that cannot be satisfactorily corrected or does not perform as specified and indicated; retest to demonstrate compliance. Repeat procedure until satisfactory results are obtained.
 9. After installing foam-water fire-extinguishing piping system and after electrical circuitry has been energized, test for compliance with NFPA 16.
 10. Operational Test: After electrical circuitry has been energized, start systems to confirm proper unit operation.
 11. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Foam fire-extinguishing piping system will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.

END OF SECTION 211339

SECTION 21 13 39

HIGH EXPANSION FOAM-WATER SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Concentrate piping and piping specialties.
 - 2. Bladder tanks and proportioning devices.
 - 3. Foam concentrate.
 - 4. Discharge devices.
 - 5. Monitoring and detection devices.
 - 6. Heat detection system.
 - 7. Control panels.

1.2 DEFINITIONS

- A. FFF: Fluorine-free foam. A synthetic foam concentrate based on a mixture of hydrocarbon surface active agents that are fluorine free.
- B. HI-EX Foam: High Expansion foam as defined by NFPA 11.

1.3 SYSTEM DESCRIPTION

- A. Description: Engineered, fixed, automatically actuated, low-level high-expansion foam fire-extinguishing system for flammable-liquid fires in compliance with NFPA 409 and NFPA 11.

1.4 PERFORMANCE REQUIREMENTS

- A. Standard Working Pressure of Piping-System Component: Listed for at least 175 psig (1200 kPa).
- B. Unless authorities having jurisdiction have stricter requirements, minimum design parameters are as follows:
 - 1. HI-EX Solution: 2 percent foam-water solution.
 - 2. HI-EX Foam Supply: Minimum 12-minute discharge time.
- C. Seismic Performance: Fire-suppression piping shall withstand the effects of earthquake motions determined according to NFPA 13.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include the following:

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1. Piping, valves, fittings, and hangers.
 2. Seismic restraints for all equipment.
 3. Bladder tanks and proportioning devices.
 4. Foam concentrate.
 5. Discharge devices. Include flow characteristics.
 6. Test connections.
 7. Monitoring and alarm devices. Include electrical data and supervision method.
 8. Heat detection components and devices; include control panel.
- B. Shop Drawings: For each hazard area, drawn to scale, and signed by a NICET level 3 (minimum) technician. Include plans, elevations, sections, details, and attachments to other work.
1. Include plans, elevations, sections, and attachment details. Show the following:
 - a. Foam-solution proportioning tanks and devices, piping, discharge devices, monitoring and alarm devices, and accessories.
 - b. Method of attaching hangers to building structure.
 - c. Heat detection system.
 - d. Fire-alarm releasing panel.
 - e. Equipment and furnishings
 2. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection
 3. Include design calculations.
 4. Include details of equipment assemblies. Indicate dimensions, weights, loads, manufacturer-required clearances, method of field assembly, components, and location and size of each field connection.
 5. Include diagrams for power, signal, and control wiring.
 6. Include heat detection system.
- C. Permit-Approved Drawings: Working plans prepared according to NFPA 409 and approved by authorities having jurisdiction. Include hydraulic calculations complying with NFPA 13.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents. Deliver extra materials to Owner.
1. Foam Concentrate: Not less than 100 percent of amount installed for the largest system. Do not provide extra material for all systems combined.

1.7 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For foam fire extinguishing to include in emergency, operation, and maintenance manuals.
1. Items to include the following:
 - a. Valves and specialties.
 - b. Bladder tanks and proportioning devices.

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- c. Foam concentrate.
- d. Discharge devices. Include flow characteristics.
- e. Monitoring, detection, and alarm devices. Include supervision method.
- f. Strainers.
- g. Test connections.

QUALITY ASSURANCE

- B. Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code: Section IX.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- D. FM Global Compliance: Provide components that are FM Approved and that are listed in FM's "Approval Guide."
- E. UL Compliance: Provide equipment listed in UL's "Fire Protection Equipment Directory."

PART 2 - PRODUCTS

2.1 FOAM CONCENTRATE PIPING MATERIALS

- A. Stainless-Steel Pipe and valves: ASTM A 312/A 312M, Schedule 40, Grade 304 or Grade 316, with factory-formed threaded or beveled ends; ASTM A 376/A 376M for seamless pipe; or ASTM A 213/A 213M, ASTM A 249/A 249M, and ASTM A 269 for seamless and welded tubing.
 - 1. Class 150 Threaded Fittings: ASME B16.3 and MSS SP 114.
 - 2. Butt-Weld Fittings: ASTM A 403/A 403M.
 - 3. Flanges, Forged Fittings and Flanges, and Socket-Weld Fittings: ASTM A 182/A 182M.
 - 4. Grooved pipe and fittings:
 - a. Pressure Rating: 175-psig (1200-kPa) minimum.
 - b. Uncoated Grooved-End Fittings for Steel Piping: ASTM A 47/A 47M, malleable-iron casting or ASTM A 536, ductile-iron casting, with dimensions matching steel pipe.
 - c. Grooved-End-Pipe with flexible Couplings for Steel Piping: listed couplings or fittings that allows axial displacement, rotation, and at least 1 degree of angular movement of the pipe without inducing harm on the pipe. For pipe diameters of 8 in. and larger, the angular movement shall be permitted to be less than 1 degree but not less than 0.5 degrees.
 - d. Grooved-End-Pipe with rigid Couplings for Steel Piping: listed couplings or fittings that provide rigid joints.

2.2 FOAM-WATER PIPING MATERIALS

- A. Carbon Steel Pipe: ASTM 135, 53, or 795, Schedule 40.
 - 1. Class 150 Threaded Fittings: ASME B16.3 and MSS SP 114.
 - 2. Butt-Weld Fittings: ASTM A 403/A 403M.

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3. Flanges, Forged Fittings and Flanges, and Socket-Weld Fittings: ASTM A 182/A 182M.
4. Grooved pipe and fittings:
 - a. Pressure Rating: 175-psig (1200-kPa) minimum.
 - b. Uncoated Grooved-End Fittings for Steel Piping: ASTM A 47/A 47M, malleable-iron casting or ASTM A 536, ductile-iron casting, with dimensions matching steel pipe.
 - c. Grooved-End-Pipe with flexible Couplings for Steel Piping: listed couplings or fittings that allows axial displacement, rotation, and at least 1 degree of angular movement of the pipe without inducing harm on the pipe. For pipe diameters of 8 in. and larger, the angular movement shall be permitted to be less than 1 degree but not less than 0.5 degrees.
 - d. Grooved-End-Pipe with rigid Couplings for Steel Piping: listed couplings or fittings that provide rigid joints.

2.3 VALVES

A. General Valve Requirements:

1. UL listed or FM Approved for use in fire-protection systems.
2. Compatible with type of foam concentrate used.

B. Ball Valves:

1. Description:
 - a. Standard: UL 258.
 - b. For trim and drain functions.
 - c. Valves NPS 1-1/2 (DN 40) and Smaller: Bronze body with threaded ends.
 - d. Valves NPS 2 and NPS 2-1/2 (DN 50 and DN 65): Bronze body with threaded ends or ductile-iron body with grooved ends.
 - e. Valves NPS 3 (DN 80): Ductile-iron body with grooved ends.

C. OS&Y Gate Valves:

1. Description:
 - a. Standard: UL 262.
 - b. Accessories: Pregrooved stem for mounting tamper switch for monitoring by fire-alarm panel.
 - c. Body Material: Cast or ductile iron.
 - d. Ends: Flanged or mechanical.
 - e. Packing: Asbestos free.

D. Indicating-Type Butterfly Valves:

1. Description:
 - a. Standard: UL 1091.
 - b. Pressure Rating: 175 psig (1200 kPa) minimum.
 - c. Valves NPS 2 (DN 50) and Smaller:
 - 1) Body Material: Bronze.
 - 2) End Connections: Threaded.
 - d. Valves NPS 2-1/2 (DN 65) and Larger:

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- 1) Body Material: Cast or ductile iron.
- 2) End Connections: Flanged, grooved, or wafer.
- 3) Ends: Flanged or mechanical.

e. Accessories: Tamper switch for monitoring by fire-alarm panel.

E. Swing Check Valves:

1. Description:

- a. Standard: UL 312.
- b. Pressure Rating: 250 psig (1725 kPa) minimum.
- c. Body Material: Cast iron.
- d. End Connections: Flanged or grooved.

F. Trim and Drain Valves:

1. General Requirements:

- a. Compatible with type of foam concentrate used.
- b. Pressure Rating: 175 psig (1200 kPa) minimum.

2.4 SPECIALTIES

- A. Specialties shall comply with NFPA 11, be compatible with the foam concentrate, and be designed to be drained and cleaned.
- B. Foam-Concentrate Storage Tanks: Buna-N, bladder-type proportioning tank complying with UL 162 and ASME Boiler and Pressure Vessel Code: Section VIII; designed for use with foam-concentrate pumps and for specific type of foam concentrate used. Include bladder, internal piping, fill and drain, glass sight gage, piping, and valves. Contain concentrate in the bladder.
 1. Orientation: Horizontal design with saddle or Vertical design with skirt support as indicated on the drawings.
- C. Proportioning Controllers: Venturi type complying with UL 162 and of capacity to match design at minimum and maximum flow.
- D. Flow Control Valves: Flow control valve with pressure regulating flow control trim, for immediate closure upon deactivation.
- E. Concentrate Control Valves: Halar coated flow control valve with trim and priming line connection package, for immediate closure upon deactivation.
- F. Pressure Gages: Comply with UL 393; with 3-1/2-inch (90-mm) minimum-diameter dial, 0- to 300-psig (0- to 2070-kPa) dial range, and caption "WATER" or "CONCENTRATE" on dial face.

2.5 FOAM CONCENTRATE

- A. Description: HI-EX FFF liquid concentrate, complying with NFPA 11 and UL 162, for making foam-water fire-extinguishing foam solution.

2.6 DISCHARGE DEVICES

- A. Discharge devices shall be UL listed or FM Approved.
- B. Water powered foam generators: For HI-EX foam water; with water motor, fan, stainless steel screen. Tested and approved by manufacturer for use with 100% inside air.

2.7 MONITORING DEVICES

- A. Valve Supervisory Switches: Single pole, double throw, with normally closed contacts complying with UL 753. Switch shall signal fire-alarm panel or releasing panel when valve is in other than fully open position.
- B. Pressure Switches: Single pole, double throw, UL listed or FM Approved and complying with UL 753. Switch shall signal an alarm condition at the fire-alarm panel or releasing panel when switch is in other than fully open position.
- C. Flow Switches: Single pole, double throw, UL listed or FM Approved and complying with UL 753. Switch shall signal an alarm condition at the fire-alarm panel or releasing panel when switch is in other than fully open position.

2.8 CONTROL PANELS AND CONTINUOUS LINEAR HEAT-DETECTOR SYSTEM

- A. Description: Single-area release control panel, including NEMA ICS 6, Type 1 enclosure and solenoid-valve circuitry for operation of control valves. Control valves shall utilize a listed and approved release system. Heat detectors shall be compatible with release control panel. System shall include Supervised Releasing Application, Abort Switch, Maintenance Switch, and Walk test Controller.
 - 1. Listed in UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide" when used with thermal detectors.
 - 2. Electrical characteristics are 120-V ac, 60 Hz, with 24-V dc rechargeable batteries.
 - 3. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Manual Control Stations with abort function: Electric operation, metal enclosure, with operating instructions and cover held closed to prevent accidental opening.
- C. CONTINUOUS LINEAR HEAT-DETECTOR SYSTEM: Listed for "regular" service and standard environment. Cable includes two steel actuator wires twisted together with spring pressure, wrapped with protective tape, and finished with PVC outer sheath. Each actuator wire is insulated with heat-sensitive material that reacts with heat to allow cable twist pressure to short circuit wires at location of elevated temperature.

PART 3 - EXECUTION

3.1 CONCENTRATE STORAGE TANK INSTALLATION

- A. Install concentrate storage tanks anchored to substrate according to tank manufacturer's written instructions.
- B. Install tanks level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.

3.2 PIPING INSTALLATION

- A. Install piping and other components level and plumb.
- B. Install pipe and fittings, valves, and discharge devices according to requirements listed in NFPA 11.
 - 1. Support piping using supports and methods according to NFPA 13.
 - 2. Install seismic restraints for concentrate storage tanks and piping systems.
 - 3. Install monitoring and alarm devices according to NFPA 11 and NFPA 72.
- C. Install flanges, flange adapters, or couplings for grooved-end piping on piping, valves, apparatus, and equipment having NPS 2-1/2 (DN 65) and larger end connections.
- D. Ream ends of pipes and tubes and remove burrs.
- E. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
- F. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for foam concentrate. Join flanges with gasket and bolts according to ASME B31.9.
- G. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
- H. Steel-Piping, Cut-Grooved Joints: Cut square-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe joints.
- I. Steel-Piping, Roll-Grooved Joints: Roll rounded-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe grooved joints.
- J. Welded Joints: Construct joints according to AWS D10.12M/D10.12, using qualified processes and welding operators according to "Quality Assurance" Article.

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1. Shop weld pipe joints where welded piping is indicated.

- K. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems and with foam concentrate.

3.3 DETECTION AND ELECTRICAL CONNECTIONS

- A. Install fire detection for covered areas in accordance with NFPA 72, NFPA 16 and Division 28.
- B. Connect wiring in accordance with Division 26.
- C. Install electrical devices furnished by manufacturer, but not factory mounted, in accordance with NFPA 70.
- D. Install nameplate for each electrical connection, indicating electrical equipment designation and circuit number feeding connection.
- E. Connect electrical devices to building's fire-alarm system. Comply with requirements in Division 28.
- F. Interface system with building's existing fire alarm system.
- G. Install all wiring in EMT conduit.

3.4 CONNECTIONS

- A. Comply with requirements for piping specified in Section 211313 "Wet-Pipe Sprinkler Systems." Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Provide concentrate control and drain valves with piping to permit maintenance of the foam concentrate with continuous sprinkler-system service.
- C. Install proportioning controller in fire-suppression piping to provide coverage to area indicated on Drawings.
- D. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.

3.5 LABELING

- A. Install permanent labeling on piping at maximum 20 foot intervals.

3.6 CHARGING SYSTEM

- A. Fill proportioning tanks with foam concentrate after field quality-control testing is complete and satisfactory results have been achieved.

3.7 FIELD QUALITY CONTROL

- A. Perform preliminary inspections and tests prior to scheduling final test with the engineer. Schedule the final test with the engineer at least 4 weeks in advance. Perform final tests under the observation of the engineer.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations including connections, and to assist in testing
- C. Comply with operating instructions and procedures in NFPA 11, "Acceptance Tests" Chapter. Include the following tests and inspections to demonstrate compliance with requirements:
 - 1. Check mechanical items.
 - 2. Inspect equipment and check mountings for adequate anchoring to substrate.
 - 3. Check electrical systems.
 - 4. Flush supply piping.
 - 5. Perform hydrostatic pressure test.
 - 6. Perform acceptance test.
 - 7. Perform proportioning system test.
 - 8. Perform discharge test.
 - 9. Flush system piping.
 - 10. Correct malfunctioning equipment; retest to demonstrate compliance. Replace equipment that cannot be satisfactorily corrected or does not perform as specified and indicated; retest to demonstrate compliance. Repeat procedure until satisfactory results are obtained.
- D. Perform pan fire tests to verify flame detector function.
 - 1. Utilize aviation fuel for testing.
 - 2. Perform 9 trips throughout the hangar and 4 trips outside the hangar door (12 feet outside the hangar) to verify detector flame coverage and to verify flames outside the hangar do not activate foam system. Pan fire locations will be as determined by the engineer.
 - 3. Flame detectors shall activate foam system within 10 seconds of fire ignition.
 - 4. After flame is extinguished, foam and water flow shall stop within 30 seconds.
 - 5. System test shall be considered fail and contractor shall rectify system if any pan fire test in 1, 2, or 3 above fail.
- E. Foam fire-extinguishing piping system will be considered defective if it does not pass tests and inspections.
- F. Prepare test and inspection reports.

END OF SECTION 21 13 39

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SECTION 21 31 13

ELECTRIC-DRIVE, CENTRIFUGAL FIRE PUMPS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Horizontally mounted, single-stage, split-case fire pumps.
 - 2. Fire-pump accessories and specialties.
 - 3. Fire Pump Controllers.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include rated capacities, operating characteristics, performance curves, electrical characteristics, and furnished specialties and accessories.
- B. Shop Drawings: For fire pumps, motor drivers, and fire-pump accessories and specialties, signed and sealed by a NICET level 3 individual.
 - 1. Include plans, elevations, sections, and mounting and attachment details.
 - 2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 3. Include diagrams for power, signal, and control wiring.

1.3 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For fire pumps to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. NFPA Compliance: Comply with NFPA 20.
- B. Seismic Performance: Fire pumps shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- C. Pump Equipment, Accessory, and Specialty Pressure Rating: 225 psig minimum unless higher pressure rating is indicated.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 GENERAL REQUIREMENTS FOR CENTRIFUGAL FIRE PUMPS

- A. Description: Factory-assembled and -tested fire-pump and driver unit.
- B. Base: Fabricated and attached to fire-pump and driver unit, with reinforcement to resist movement of pump during seismic events when base is anchored to building substrate.
- C. Finish: Red paint applied to factory-assembled and -tested unit before shipping.

2.3 HORIZONTALLY MOUNTED, SINGLE-STAGE, SPLIT-CASE FIRE PUMPS

- A. Pump:
 - 1. Standard: UL 448, for split-case pumps for fire service.
 - 2. Casing: Axially split case, cast iron, with ASME B16.1 pipe-flange connections.
 - 3. Impeller: Double suction, cast bronze, statically and dynamically balanced, and keyed to shaft.
 - 4. Wear Rings: Replaceable bronze.
 - 5. Shaft and Sleeve: Alloy steel shaft with bronze sleeve.
 - a. Shaft Bearings: Grease-lubricated ball bearings in cast-iron housing.
 - b. Seals: Stuffing box with minimum of four rings of graphite-impregnated braided yarn and bronze packing gland.
 - 6. Mounting: Pump and driver shafts are horizontal, with pump and driver on same base.
- B. Coupling: Flexible and capable of absorbing torsional vibration and shaft misalignment. Include metal coupling guard.
- C. Driver:
 - 1. Standard: UL 1004A.
 - 2. Type: Electric motor; NEMA MG 1, polyphase Design B.
- D. Suction Flange: Class 125.
- E. Discharge Flange: Class 250.
- F. Capacities and Characteristics: Refer to drawings.

2.4 FIRE-PUMP ACCESSORIES AND SPECIALTIES

- A. Automatic Air-Release Valves: Comply with NFPA 20 for installation in fire-pump casing.
- B. Circulation Relief Valves: UL 1478, brass, spring loaded; for installation in pump discharge piping.
- C. Relief Valves:
 - 1. Description: UL listed, bronze or cast iron, spring loaded; for installation in fire-suppression water-supply piping.
- D. Inlet Fitting: Eccentric tapered reducer at pump suction inlet.

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- E. Outlet Fitting: Concentric tapered reducer at pump discharge outlet.
- F. Hose Valve Manifold Assembly:
 - 1. Standard: Comply with requirements in NFPA 20.
 - 2. Header Pipe: ASTM A 53/A 53M, Schedule 40, with ends threaded according to ASME B1.20.1.
 - 3. Header Pipe Fittings: ASME B16.4, cast-iron threaded fittings.
 - 4. Automatic Drain Valve: UL 1726.
 - 5. Manifold:
 - a. Test Connections: Comply with UL 405; however, provide outlets without clappers instead of inlets.
 - b. Body: Exposed type, brass, with number of outlets required by NFPA 20.
 - c. Escutcheon Plate: Brass or bronze; round.
 - d. Hose Valves: UL 668, bronze, with outlet threaded according to NFPA 1963 and matching local fire-department threads. Include caps and chains.
 - e. Exposed Parts Finish: Rough brass.
 - f. Escutcheon Plate Marking: Equivalent to "FIRE PUMP TEST."

2.5 GROUT

- A. Standard: ASTM C 1107, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- B. Characteristics: Nonshrink and recommended for interior and exterior applications.
- C. Design Mix: 5000-psi (34-MPa), 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

2.6 SOURCE QUALITY CONTROL

- A. Testing: Test and inspect fire pumps according to UL 448 requirements for "Operation Test" and "Manufacturing and Production Tests."
 - 1. Verification of Performance: Rate fire pumps according to UL 448.
- B. Fire pumps will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports.

2.7 SOFT START FIRE-PUMP CONTROLLER WITH AUTOMATIC TRANSFER SWITCH

- A. General Requirements for Controllers:
 - 1. Comply with NFPA 20 and UL 218.
 - 2. Combined automatic and nonautomatic operation.
 - 3. Factory assembled, wired, and tested; continuous-duty rated.
 - 4. Furnish in NEMA 2 enclosure.
 - 5. Include automatic transfer switch for transfer to emergency power.

- B. Method of Starting:
 - 1. Pressure-switch actuated.
 - a. Water-pressure-actuated switch and pressure transducer with independent high- and low-calibrated adjustments responsive to water pressure in fire-suppression piping.
 - b. Where multiple fire pumps are part of a single system, each pump start shall be delayed to prevent simultaneous pump starts.
 - 2. Controller: soft-start type.
 - 3. Emergency Start: Mechanically operated start handle that closes and retains the motor RUN contactor independent of all electric or pressure actuators.
- C. Method of Stopping: Manual.
- D. Capacity: Rated for fire-pump-driver horsepower and short-circuit-current (withstand) rating equal to or greater than short-circuit current available at controller location.
- E. Method of Isolation and Overcurrent Protection: Interlocked isolating switch and nonthermal MCCB; with a common, externally mounted operating handle, and providing locked-rotor protection.
- F. Door-Mounted Operator Interface and Controls:
 - 1. Monitor, display, and control the devices, alarms, functions, and operations listed in NFPA 20 as required for drivers and controller types used.
 - 2. Local Alarm and Status Indications:
 - a. Controller power on.
 - b. Motor running condition.
 - c. Loss-of-line power.
 - d. Line-power phase reversal.
 - e. Line-power single-phase condition.
 - 3. Audible alarm, with silence push button.
 - 4. Nonautomatic START and STOP push buttons or switches.
 - 5. Set pressure and system pressure.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine equipment bases and anchorage provisions, with Installer present, for compliance with requirements for installation tolerances, and other conditions affecting performance of fire pumps.
- B. Examine roughing-in for fire-suppression piping systems to verify actual locations of piping connections before fire-pump installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Fire-Pump Installation Standard: Comply with NFPA 20 for installation of fire pumps, relief valves, and related components.
- B. Equipment Mounting:
 - 1. Install fire pumps on cast-in-place concrete equipment bases.
- C. Install fire-pump suction and discharge piping equal to or larger than sizes required by NFPA 20.
- D. Support piping and pumps separately, so weight of piping does not rest on pumps.
- E. Install valves that are same size as connecting piping. Comply with requirements for fire-protection valves specified in Section 211313 "Wet-Pipe Sprinkler Systems."
- F. Install pressure gages on fire-pump suction and discharge flange pressure-gage tappings.
- G. Install piping hangers and supports, anchors, valves, gages, and equipment supports according to NFPA 20.
- H. Electrical Wiring: Install electrical devices furnished by equipment manufacturers but not factory mounted. Furnish copies of manufacturers' wiring diagram submittals to electrical Installer.
- I. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.

3.3 ALIGNMENT

- A. Align split-case pump and driver shafts after complete unit has been leveled on concrete base, grout has set, and anchor bolts have been tightened.
- B. After alignment is correct, tighten anchor bolts evenly. Fill baseplate completely with grout, with metal blocks and shims or wedges in place. Tighten anchor bolts after grout has hardened. Check alignment and make required corrections.
- C. Align piping connections.
- D. Align pump and driver shafts for angular and parallel alignment according to HI 1.4 and to tolerances specified by manufacturer.

3.4 CONNECTIONS

- A. Comply with requirements for piping and valves specified in Section 211313 "Wet-Pipe Sprinkler Systems." Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to pumps and equipment to allow service and maintenance.
- C. Connect fire pumps to their controllers.

3.5 IDENTIFICATION

- A. Identify system components. Comply with requirements for fire-pump marking according to NFPA 20.

3.6 FIELD QUALITY CONTROL

- A. Test each fire pump with its controller as a unit.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.
- C. Perform the following tests and inspections with the assistance of a factory-authorized service representative.
 - 1. After installing components, assemblies, and equipment, including controller, test for compliance with requirements.
 - 2. Test according to NFPA 20 for acceptance and performance testing.
 - 3. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - 4. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - 5. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Components, assemblies, and equipment will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports.
- F. Furnish fire hoses in number, size, and length required to reach storm drain or other acceptable location to dispose of fire-pump test water. Hoses are for tests only and do not convey to Owner.

3.7 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
 - 1. Complete installation and startup checks according to manufacturer's written instructions.

3.8 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain fire pumps.

END OF SECTION 21 31 13

SECTION 22 00 00
SUPPLEMENTARY PLUMBING GENERAL CONDITIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section includes supplementary general requirements for the following :
 - 1. Codes and Standards
 - 2. Submittals
 - 3. Product Delivery, Storage, and Handling
 - 4. Product Warranties
 - 5. Delegated Design
 - 6. Emergency, Operation, and Maintenance Manuals
 - 7. General Coordination for Plumbing Work
 - 8. Painting

1.03 DEFINITIONS

- A. "Action Submittals": Written and graphic information and physical samples that require Engineer's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- B. "Approved": When used to convey Engineer's action on Contractor's submittals, applications, and requests, "approved" is limited to Engineer's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Basis-of-Design Product": A product in which a specific manufacturer's product is named on the drawings or is accompanied by the words "basis-of-design product" in the specifications, including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.
- D. "Construction Waste": Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- E. "Cutting": Removal of in-place construction necessary to permit installation or performance of other work.
- F. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- G. "Disposal": Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- H. "File Transfer Protocol (FTP)": Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.
- I. "Furnish": To supply, deliver, unload, and inspect for damage.
- J. "General": Basic Contract definitions are included in the Conditions of the Contract.
- K. "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."
- L. "Informational Submittals": Written and graphic information and physical samples that do not require Engineer's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification

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Sections as "informational submittals."

- M. "Install": To unpack, assemble, erect, apply, place, finish, cure, protect, clean, start up, and make ready for use.
- N. "Patching": Fitting and repair work required to restore construction to original conditions after installation of other work.
- O. "Portable Document Format (PDF)": An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.
- P. "Product": Material, machinery, components, equipment, fixtures, and systems forming the work result. Not materials or equipment used for preparation, fabrication, conveying, or erection and not incorporated into the work result. Product may be new, never before used, or re-used materials or equipment.
- Q. "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.
- R. "Provide": Furnish and install, complete and ready for the intended use.
- S. "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.
- T. "Salvage": Recovery of demolition and construction waste and subsequent sale or reuse in another facility.
- U. "Salvage and Reuse": Recovery of demolition and construction waste and subsequent incorporation into the Work.
- V. "System": An organized collection of parts, equipment, or subsystems united by regular interaction.
- W. "Subsystem": A portion of a system with characteristics similar to a system.

1.04 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 in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

AGA	American Gas Association	(202) 824-7000
	www.aga.org	
AIA	American Institute of Architects (The)	(800) 242-3837
	www.aia.org	(202) 626-7300
ANSI	American National Standards Institute	(202) 293-8020
	www.ansi.org	
ASCE	American Society of Civil Engineers	(800) 548-2723
	www.asce.org	(703) 295-6300
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers	(800) 527-4723
	www.ashrae.org	(404) 636-8400
ASME	ASME International	(800) 843-2763
	(American Society of Mechanical Engineers International)	(973) 882-1170

Bill and Hillary Clinton National Airport
ABP Fire Suppression Improvements

	www.asme.org	
ASTM	ASTM International (American Society for Testing and Materials International) www.astm.org	(610) 832-9500
AWS	American Welding Society www.aws.org	(800) 443-9353 (305) 443-9353
CGA	Compressed Gas Association www.cganet.com	(703) 788-2700
CIMA	Cellulose Insulation Manufacturers Association www.cellulose.org	(888) 881-2462 (937) 222-2462
CSI	Construction Specifications Institute (The) www.csinet.org	(800) 689-2900 (703) 684-0300
EJMA	Expansion Joint Manufacturers Association, Inc. www.ejma.org	(914) 332-0040
HI	Hydronics Institute www.gamanet.org	(908) 464-8200
HI/GAMA	Hydronics Institute/Gas Appliance Manufacturers Association Division of Air-Conditioning, Heating, and Refrigeration Institute (AHRI) www.ahrinet.org	(908) 464-8200
IGMA	Insulating Glass Manufacturers Alliance www.igmaonline.org	(613) 233-1510
ISA	Instrumentation, Systems, and Automation Society, The www.isa.org	(919) 549-8411
ISO	International Organization for Standardization www.iso.ch	41 22 749 01 11
MSS	Manufacturers Standardization Society of The Valve and Fittings Industry Inc. www.mss-hq.com	(703) 281-6613
NEBB	National Environmental Balancing Bureau www.nebb.org	(301) 977-3698
NEMA	National Electrical Manufacturers Association	(703) 841-3200

Bill and Hillary Clinton National Airport
ABP Fire Suppression Improvements

	www.nema.org	
NFPA	NFPA (National Fire Protection Association) www.nfpa.org	(800) 344-3555 (617) 770-3000
STI	Steel Tank Institute www.steeltank.com	(847) 438-8265
TEMA	Tubular Exchanger Manufacturers Association www.tema.org	(914) 332-0040
UL	Underwriters Laboratories Inc. www.ul.com	(877) 854-3577 (847) 272-8800
USGBC	U.S. Green Building Council www.usgbc.org	(800) 795-1747

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

ICC	International Code Council www.iccsafe.org	(888) 422-7233
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- C. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

DOE	Department of Energy www.energy.gov	(202) 586-9220
EPA	Environmental Protection Agency www.epa.gov	(202) 272-0167
FCC	Federal Communications Commission www.fcc.gov	(888) 225-5322
OSHA	Occupational Safety & Health Administration www.osha.gov	(800) 321-6742 (202) 693-1999
PHS	Office of Public Health and Science http://www.hhs.gov/ophs/	(202) 690-7694
USP	U.S. Pharmacopeia www.usp.org	(800) 227-8772
USPS	Postal Service	(202) 268-2000

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

ADAAG	Americans with Disabilities Act (ADA)	(800) 872-2253
CFR	Code of Federal Regulations	(866) 512-1800
	Available from Government Printing Office	(202) 512-1800
	www.gpoaccess.gov/cfr/index.html	

1.05 CODES AND STANDARDS

- A. All materials and workmanship shall comply with all applicable codes, specifications, local ordinances, industry standards and utility company regulations. Where specific code requirements apply, they shall be included in the job, whether or not specifically shown or elsewhere specified.
- B. Applicable codes and standards shall include all state laws, local ordinances, utility company regulations, and the applicable requirements of the following adopted codes and standards.
1. Building Codes for Arkansas
 - a. International Building Code 2006
 - b. Arkansas Fire Prevention Code 2007
 - c. National Electrical Code 2017
 - d. Arkansas Fuel Gas Code 2006 (International Fuel Gas Code 2006)
 - e. Arkansas Energy Code 2011 (based on ANSI/ASHRAE/IESNA Standard 90.1-2007)
 - f. Arkansas State Plumbing Code 2006
 - g. Arkansas Mechanical Code 2010
 - h. Accessibility Code ICC/ANSI A117.1 2003

1.06 CONFLICTING REQUIREMENTS

1.07 SPECIFICATION AND DRAWING CONVENTIONS

1.08 FEES, PERMITS, AND INSPECTIONS

1.09 SUBMITTALS

- A. Submittal Schedule
1. Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Engineer and additional time for handling and reviewing submittals required by those corrections.
 - a. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
 - b. Initial Submittal: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
 - c. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.
 - 1) Submit revised submittal schedule to reflect changes in current status and timing for submittals.
 - d. Format: Arrange the following information in a tabular format:
 - 1) Scheduled date for first submittal.
 - 2) Specification Section number and title.
 - 3) Submittal category: Action; informational.

- 4) Name of subcontractor.
 - 5) Description of the Work covered.
 - 6) Scheduled date for Engineer's final release or approval.
- B. Submittal Administrative Requirements
1. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
 - a. Submit submittals to Engineer through the Architect.
 - b. Engineer, through Architect, will return annotated file.
 2. Digital Data Files:
 - a. Electronic digital data files of the Project drawings may be provided by Engineer for Contractor's use in preparing submittals.
 - b. Electronic digital data files supplied for use in submittal preparation will be subject to terms and conditions of the Engineer's Release Form. A signed release form and any payment required must be returned to the Engineer prior to the transmission of an electronic digital data files.
 - c. Electronic digital data file formats may include AutoCAD drawings, Revit converted to AutoCAD drawings, or Revit model.
 3. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - a. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - b. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 - c. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 - d. 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.
 - 1) Engineer reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
 4. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Engineer'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.
 - a. Initial Review: Allow 14 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Engineer will advise Contractor when a submittal being processed must be delayed for coordination.
 - b. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 - c. Resubmittal Review: Allow 14 days for review of each resubmittal.
 5. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:
 - a. 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.
 - b. Name file with submittal number or other unique identifier, including revision identifier.
 - 1) File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.A).
 - c. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Engineer.

- d. Transmittal Form for Electronic Submittals: Use electronic form containing the following information:
 - 1) Project name.
 - 2) Name and address of Architect.
 - 3) Name and address of Engineer.
 - 4) Name of Contractor.
 - 5) Name of firm or entity that prepared submittal.
 - 6) Names of subcontractor, manufacturer, and supplier.
 - 7) Category and type of submittal.
 - 8) Submittal purpose and description.
 - 9) Specification Section number and title.
 - 10) Specification paragraph number or drawing designation and generic name for each of multiple items.
 - 11) Drawing number and detail references, as appropriate.
 - 12) Location(s) where product is to be installed, as appropriate.
 - 13) Related physical samples submitted directly.
 - 14) Indication of full or partial submittal.
 - 15) Transmittal number.
 - 16) Submittal and transmittal distribution record.
 - 17) Other necessary identification.
 - 18) Remarks.
- e. Metadata: Include the following information as keywords in the electronic submittal file metadata:
 - 1) Project name.
 - 2) Number and title of appropriate Specification Section.
 - 3) Manufacturer name.
 - 4) Product name.
- 6. Options: Identify options requiring selection by Engineer.
- 7. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Engineer on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.
- 8. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
 - a. Note date and content of previous submittal.
 - b. Note date and content of revision in label or title block and clearly indicate extent of revision.
 - c. Resubmit submittals until they are marked with approval notation from Engineer's action stamp.
- 9. 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.
- 10. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Engineer's action stamp.
- 11. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - a. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
 - b. Engineer's Action: If necessary, Engineer will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Engineer will notify Contractor through Architect of approval or rejection of proposed comparable product request within 14 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.

- 1) Use product specified if Engineer does not issue a decision on use of a comparable product request within time allocated.

1.10 CLOSEOUT SUBMITTALS

1.11 QUALITY ASSURANCE

1.12 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 or moisture damage..
 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.

1.13 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.
- C. Submit warranties in accordance with "Closeout Procedures."

1.14 FIELD CONDITIONS

- A. The Contractor shall visit the site of the building before submitting a proposal on this work, and shall thoroughly familiarize himself with the existing conditions and operations. Failure on his part to do this will not be cause of extras after the contract is signed, by reason of unforeseen

conditions.

1.15 WARRANTY

- A. The Contractor shall, after completion of the original test of the installation, and acceptance by the Engineer, provide any service incidental to the proper performance of the plumbing under guarantees outlined above for a period of 1 full year after acceptance by the Engineer and Owner. Regardless of anything to the contrary in warranties by the equipment manufacturer involved, the Contractor's warranty shall run for 1 full year after final acceptance by the Engineer.

PART 2 PRODUCTS

2.01 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. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Engineer.
- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit 2 paper copies of certificate, 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.

2.02 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. Were two or more units of materials or equipment of the same type or class are required, these units shall be products of one manufacturer.
 - 4. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
 - 5. Where products are accompanied by the term "as selected," Architect will make selection.
 - 6. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
 - 7. Products containing asbestos shall not be used.
- B. Product Selection Procedures:
 - 1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 - 2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 - 3. Products:
 - a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience shall be considered.
 - b. Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable

- Products" Article for consideration of an unnamed product.
4. Manufacturers:
 - a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience shall be considered.
 - b. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.
 5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
- C. Visual Selection Procedure: Where Specifications include the phrase "as selected by Architect" or similar phrase, select a product that complies with requirements. Architect will select option from manufacturer's product line that includes both standard and premium items.
- D. Comparable Products
1. Conditions for Consideration: Engineer 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:
 - a. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
 - b. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 - c. Evidence that proposed product provides specified warranty.
 - d. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
 - e. Contractor is responsible for any modification required by products other than the basis of design product at no additional cost to the owner including but not limited to modifications to supports and connections,

2.03 COORDINATION DRAWINGS

2.04 EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

- A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information. Include a section in the directory for each of the following:
 1. List of documents.
 2. List of systems.
 3. List of equipment.
 4. Table of contents.
- B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
- C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
- D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

- 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."
- F. 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.
- G. 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: Enable bookmarking of 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.
- H. Operation Manual
 - 1. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
 - a. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
 - b. Performance and design criteria if Contractor has delegated design responsibility.
 - c. Operating standards.
 - d. Operating procedures.
 - e. Operating logs.
 - f. Wiring diagrams.
 - g. Control diagrams.
 - h. Piped system diagrams.
 - i. Precautions against improper use.
 - j. License requirements including inspection and renewal dates.
 - 2. Descriptions: Include the following:
 - a. Product name and model number. Use designations for products indicated on Contract Documents.
 - b. Manufacturer's name.
 - c. Equipment identification with serial number of each component.
 - d. Equipment function.
 - e. Operating characteristics.
 - f. Limiting conditions.
 - g. Performance curves.
 - h. Engineering data and tests.
 - i. Complete nomenclature and number of replacement parts.
 - 3. Operating Procedures: 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. Instructions on stopping.
 - f. Normal shutdown instructions.
 - g. Seasonal and weekend operating instructions.
 - h. Required sequences for electric or electronic systems.

- i. Special operating instructions and procedures.
- 4. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- I. Maintenance Manuals
 - 1. Content: Organize manual into a separate section for each product, system, subsystem, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
 - 2. Source Information: List each product, system, or subsystem included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
 - 3. Product Information: Include the following, as applicable:
 - a. Product name and model number.
 - b. Manufacturer's name.
 - c. Color, pattern, and texture.
 - d. Material and chemical composition.
 - e. Reordering information for specially manufactured products.
 - f. Standard maintenance instructions and bulletins.
 - g. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 - h. Identification and nomenclature of parts and components.
 - i. List of items recommended to be stocked as spare parts.
 - 4. Maintenance Procedures: Include manufacturer's written recommendations and 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. Schedule for routine cleaning and maintenance.
 - e. Repair instructions.
 - f. Test and inspection instructions.
 - g. Troubleshooting guide.
 - h. Precautions against improper maintenance.
 - i. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - j. Aligning, adjusting, and checking instructions.
 - k. Demonstration and training video recording, if available.
 - 5. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
 - 6. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 - a. Include procedures to follow and required notifications for warranty claims.
 - 7. 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.
 - a. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
 - b. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
 - 8. 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.
 - 9. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

10. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 - a. Include procedures to follow and required notifications for warranty claims.

PART 3 EXECUTION

3.01 CONTRACTOR'S SUBMITTAL REVIEW

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

3.02 ENGINEER'S SUBMITTAL ACTION

- A. Action Submittals: Engineer will review each submittal, make marks to indicate corrections or revisions required, and return it. Engineer will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.
- B. Informational Submittals: Engineer will review each submittal and will not return it, or will return it if it does not comply with requirements. Engineer will forward each submittal to the Architect to forward to the appropriate party.
- C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Engineer.
- D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- E. Submittals not required by the Contract Documents may be returned by the Engineer without action.

3.03 CONSTRUCTION WASTE

3.04 GENERAL COORDINATION FOR PLUMBING WORK

- A. The Contractor shall compare the Plumbing Drawings and Specifications with the drawings and specifications for other trades and shall report any discrepancies between them to the Engineer and obtain written instructions for changes necessary in the Plumbing Work. The Plumbing Work shall be installed in cooperation with other trades installing related work. Before installation, the Contractor shall make proper provision to avoid interferences. All changes required in the work of the Contractor caused by a failure to coordinate the work with other trades shall be made by the Contractor at his own expense.
- B. Anchor bolts, sleeves, inserts and supports that may be required for the Plumbing Work shall be furnished under the same section of the specifications as the respective items to be supported, and they shall be installed, except as otherwise specified, by the trade furnishing and installing the material in which they are to be located. Location of anchor bolts, sleeves, inserts and supports shall be directed by the trade requiring them, which trade shall also insure that they are properly installed. Any expense resulting from the improper location or installation of anchor bolts, sleeves, inserts and supports shall be paid for by the Contractor under the section of the specifications for the trade with the responsibility for directing their proper location.
- C. Slots, chases, openings and recesses through floors, walls, ceilings and roofs as specified will be provided by the various trades in their respective materials, but the trade requiring them shall see that they are properly located, and shall do any cutting and patching caused by the neglect to do so. Slots, chases, openings and recesses in existing structure shall be cut by the trade requiring them and patched and repaired by that trade.
- D. Locations of pipes, equipment, etc. shall be adjusted to accommodate the work and to avoid interferences anticipated and encountered. The Contractor shall determine the exact route and location of each pipe and duct prior to fabrication.

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ABP Fire Suppression Improvements

1. Right-of-Way: Lines which pitch shall have the right of way over those which do not pitch. For example: plumbing drains shall normally have right of way. Lines whose elevations cannot be changed shall have the right of way over lines whose elevations can be changed.
 2. Offsets, transitions and changes in direction in pipes shall be made as required to maintain proper head room and pitch of sloping lines whether or not indicated on the drawings. The Contractor shall furnish and install all traps, air vents, sanitary vents, etc., as required to effect these offsets, transitions and changes in direction.
 3. Installation and Arrangement: The Contractor shall install all Plumbing Work to permit removal (without damage to other parts) of coils, heat exchanger bundles, belt guards, sheaves and drives, and all other parts requiring periodic replacement or maintenance. The Contractor shall arrange pipes and equipment to permit ready access to valves, cocks, control components and to clear the openings of swinging and overhead doors and of access panels.
 4. Access: The Contractor shall provide all necessary access panels in walls, ceilings, equipment, etc., as required for inspection of interiors and for proper maintenance and or installation of equipment valves. Where changes from the plans are made by the Contractor in the installation of his work, he shall provide any and all access panels required as a result of these changes.
- E. Connections Different From Those Shown: Where equipment requiring different arrangement or connections from those shown is approved, it shall be the responsibility of the Contractor to install the equipment to operate properly with the intent of the drawings and specifications. When directed, the Contractor shall submit drawings showing the proposed installation. If the proposed installation is approved, the Contractor shall make all incidental changes in piping, supports, insulation, etc. The Contractor shall provide any additional valves, fittings, and other additional equipment required for the proper operation of the system resulting from the selection of equipment, including all required changes in affected trades. The Contractor shall be responsible for the proper location of roughing in and connections by other trades. All changes shall be made at no increase in the contract amount or additional cost to the other trades.
- F. Connections: All piping connecting to equipment shall be installed without strain at the piping connection
- G. Inaccessible Equipment
1. Where the Engineer or Owner determines that the Contractor has installed equipment not conveniently accessible for operation and maintenance, equipment shall be removed and reinstalled or remedial action (such as providing access panels) performed as directed at no additional cost to the Owner.
 2. The term "conveniently accessible" is defined as capable of being reached without the use of ladders, or without climbing or crawling under or over obstacles such as motors, fans, pumps, belt guards, transformers, high voltage lines, piping, and ductwork.
- H. Electrical Coordination
1. Power: All power and motor wiring shall be performed under Division 26 unless otherwise noted for specific items. Control and interlock wiring shall be done by the Contractor of this Division.
 2. Starters and Drives: All motor starters and drives unless included in other sections of the specifications shall be by Division 26. Furnish auxiliary contacts on magnetic starters to permit interlocking of starting circuits.
 3. Disconnects: All equipment furnished under this Division required to have a means of disconnect shall be supplied with a disconnect or a disconnect shall be furnished and installed by Division 26. The Contractor shall coordinate between this Division and Division 26 to ensure that all disconnects required for the Project are furnished and installed.
 4. The Contractor of this Division shall furnish and install any low voltage relays, pressure switches, and similar items required for the proper operation of the Plumbing equipment.

- I. **Dedicated Electrical Space:** The space equal to the width and depth of the equipment and extending from the floor to a height of 6 feet above the equipment or to the structural ceiling, whichever is lower, shall be dedicated to the electrical installation. No piping, leak protection apparatus, or other equipment foreign to the electrical installation shall be located in this zone. The area above the dedicated space shall be permitted to contain foreign systems, provided protection is installed to avoid damage to the electrical equipment from condensation, leaks or breaks in foreign systems. Every effort shall be made to eliminate foreign systems above equipment to the structural ceiling. If this is not possible, the Contractor shall encase any pipe in a second pipe with a minimum number of joints.

3.05 CUTTING AND PATCHING

- A. **General:** Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 1. Under each section of the specifications, the Contractor shall be responsible for all required cutting, etc., incident to his work under that section, and shall make all satisfactory repairs, but in no case shall the Contractor cut into any major structural element, beam or column.
 2. Each trade shall bear the expense of all cutting, patching, repairing or replacing of the work of other trades because of fault, error or tardiness or because of any damage done by own workmanship.
 3. 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. **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.
- C. **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. Proceed with patching after construction operations requiring cutting are complete.
- D. **Patching:** Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
 1. **Inspection:** Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
 2. **Exposed Finishes:** Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
 - a. Clean piping and similar features before applying paint or other finishing materials.
 - b. Restore damaged pipe covering to its original condition.
 3. **Floors and Walls:** Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

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

3.06 PAINTING

- A. The Contractor shall remove all rust, oil and grease from exposed surfaces and clean all apparatus or materials specified to be painted under this section of the specifications. Contractor shall paint equipment, piping, etc., in accordance with Division 9. Equipment specified to have factory finishes shall be protected until completion of the Contract, with Contractor being responsible for maintaining finishes.
- B. Apply paint to exposed piping according to the following, unless otherwise indicated:
 - 1. Interior, Ferrous Piping: Use semi-gloss, acrylic-enamel finish. Include finish coat over enamel undercoat and primer.
 - 2. Interior, Galvanized-Steel Piping: Use semi-gloss, acrylic-enamel finish. Include 2 finish coats over galvanized metal primer.
 - 3. Interior, Ferrous Supports: Use semi-gloss, acrylic-enamel finish. Include finish coat over enamel undercoat and primer.
 - 4. Do not paint piping specialties with factory-applied finish.
 - 5. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.
 - 6. Galvanized surfaces damaged during installation shall be repaired with a galvanized repair compound complying with Mil Spec DOD-P-21035B. Any equipment scratched, marred or damaged will be repainted to the original condition.

END OF SECTION

SECTION 22 10 05
PLUMBING PIPING

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Pipe, pipe fittings, specialties, and connections for piping systems.
 - 1. Flanges, unions, and couplings.
 - 2. Pipe hangers and supports.
 - 3. Manufactured sleeve-seal systems.
 - 4. Valves.
 - 5. Strainers.

1.02 RELATED REQUIREMENTS

- A. Section 22 05 16 - Expansion Fittings and Loops for Plumbing Piping.
- B. Section 22 05 53 - Identification for Plumbing Piping and Equipment.

1.03 REFERENCE STANDARDS

- A. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; 2016.
- B. ASME B31.1 - Power Piping; 2018.
- C. ASME B31.9 - Building Services Piping; 2017.
- D. ASME BPVC-IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators - Welding Brazing and Fusing Qualifications; 2019.
- E. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings; 1999, with Editorial Revision (2018).
- F. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2018.
- G. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2019.
- H. AWWA C606 - Grooved and Shouldered Joints; 2015.
- I. ICC-ES AC308 - Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements; 2016.
- J. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2018.
- K. MSS SP-67 - Butterfly Valves; 2017.
- L. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.
- C. Welder Certificate: Include welders certification of compliance with ASME BPVC-IX.
- D. Project Record Documents: Record actual locations of valves.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.

1.05 QUALITY ASSURANCE

- A. Perform work in accordance with applicable codes.
- B. Valves: Manufacturer's name and pressure rating marked on valve body.

- C. Welding Materials and Procedures: Comply with ASME BPVC-IX and applicable state labor regulations.
- D. Welder Qualifications: Certified in accordance with ASME BPVC-IX.
- E. Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary protective coating on cast iron and steel valves.
- C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.07 FIELD CONDITIONS

- A. Do not install underground piping when bedding is wet or frozen.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Potable Water Supply Systems: Provide piping, pipe fittings, and solder and flux (if used), that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

2.02 NATURAL GAS PIPING, BURIED BEYOND 5 FEET OF BUILDING

2.03 NATURAL GAS PIPING, ABOVE GRADE

- A. Steel Pipe: ASTM A53/A53M Schedule 40 black.
 - 1. Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M, wrought steel welding type.
 - 2. Joints: Threaded or welded to ASME B31.1.

2.04 FLANGES, UNIONS, AND COUPLINGS

- A. Unions for Pipe Sizes 3 Inches and Under:
 - 1. Ferrous Pipe: Class 150 malleable iron threaded unions.
 - 2. Copper Tube and Pipe: Class 150 bronze unions with soldered joints.
- B. Flanges for Pipe Size Over 1 Inch:
 - 1. Ferrous Pipe: Class 150 malleable iron threaded or forged steel slip-on flanges; preformed neoprene gaskets.
 - 2. Copper Tube and Pipe: Class 150 slip-on bronze flanges; preformed neoprene gaskets.
- C. Mechanical Couplings for Grooved and Shouldered Joints: Two or more curved housing segments with continuous key to engage pipe groove, circular C-profile gasket, and bolts to secure and compress gasket.
 - 1. Dimensions and Testing: In accordance with AWWA C606.
 - 2. Housing Material: Provide ASTM A47/A47M malleable iron or ductile iron, galvanized.
 - 3. Gasket Material: EPDM suitable for operating temperature range from minus 30 degrees F to 230 degrees F.
 - 4. Bolts and Nuts: Hot dipped galvanized or zinc-electroplated steel.
 - 5. When pipe is field grooved, provide coupling manufacturer's grooving tools.
- D. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.05 PIPE HANGERS AND SUPPORTS

- A. Provide hangers and supports that comply with MSS SP-58.
 - 1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
 - 2. Overhead Supports: Individual steel rod hangers attached to structure or to trapeze hangers.

3. Trapeze Hangers: Welded steel channel frames attached to structure.
4. Vertical Pipe Support: Steel riser clamp.
- B. Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:
 1. Concrete Wedge Expansion Anchors: Complying with ICC-ES AC193.
 2. Concrete Screw Type Anchors: Complying with ICC-ES AC193.
 3. Concrete Adhesive Type Anchors: Complying with ICC-ES AC308.

2.06 MANUFACTURED SLEEVE-SEAL SYSTEMS

- A. Modular/Mechanical Seal:
 1. Synthetic rubber interlocking links continuously fill annular space between pipe and wall/casing opening.
 2. Provide watertight seal between pipe and wall/casing opening.
 3. Elastomer element size and material in accordance with manufacturer's recommendations.
 4. Glass reinforced plastic pressure end plates.

2.07 BALL VALVES

- A. Construction, 4 Inches and Smaller: MSS SP-110, Class 150, 400 psi CWP, bronze body, 304 stainless steel or chrome plated brass ball, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handle with balancing stops, threaded or grooved ends with union.

2.08 BUTTERFLY VALVES

- A. Construction 1-1/2 Inches and Larger: MSS SP-67, 200 psi CWP, cast or ductile iron body, nickel-plated ductile iron disc, resilient replaceable EPDM seat, wafer ends, extended neck, 10 position lever handle.
- B. Provide gear operators for valves 8 inches and larger, and chain-wheel operators for valves mounted over 8 feet above floor.

2.09 PIPING SPECIALTIES

- A. Flow Controls:
 1. Construction: Class 125, Brass or bronze body with union on inlet and outlet, temperature and pressure test plug on inlet and outlet, blowdown/backflush drain.
 2. Calibration: Control flow within 5 percent of selected rating, over operating pressure range of 10 times minimum pressure required for control, maximum minimum pressure 3.5 psi.

2.10 STRAINERS

- A. Size 2 Inches and Under:
 1. Threaded brass body for 175 psi CWP, Y pattern with 1/32 inch stainless steel perforated screen.
 2. Class 150, threaded bronze body 300 psi CWP, Y pattern with 1/32 inch stainless steel perforated screen.
- B. Size 1-1/2 inch to 4 inches:
 1. Class 125, flanged iron body, Y pattern with 1/16 inch stainless steel perforated screen.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that excavations are to required grade, dry, and not over-excavated.

3.02 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

- B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- D. Install piping to maintain headroom, conserve space, and not interfere with use of space.
- E. Group piping whenever practical at common elevations.
- F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Refer to Section 22 05 16.
- G. Provide access where valves and fittings are not exposed.
- H. Install vent piping penetrating roofed areas to maintain integrity of roof assembly.
- I. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc-rich primer to welding.
- J. Install bell and spigot pipe with bell end upstream.
- K. Install valves with stems upright or horizontal, not inverted. Refer to Section 22 05 23.
- L. Install water piping to ASME B31.9.
- M. Copper Pipe and Tube: Make soldered joints in accordance with ASTM B828, using specified solder, and flux meeting ASTM B813; in potable water systems use flux also complying with NSF 61 and NSF 372.
- N. Sleeve pipes passing through partitions, walls, and floors.
- O. Inserts:
 - 1. Provide inserts for placement in concrete formwork.
 - 2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
 - 3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
- P. Pipe Hangers and Supports:
 - 1. Install in accordance with ASME B31.9.
 - 2. Support horizontal piping as indicated.
 - 3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
 - 4. Place hangers within 12 inches of each horizontal elbow.
 - 5. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
 - 6. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
 - 7. Provide copper plated hangers and supports for copper piping.
 - 8. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
 - 9. Support cast iron drainage piping at every joint.
- Q. Manufactured Sleeve-Seal Systems:
 - 1. Install manufactured sleeve-seal systems in sleeves located in grade slabs and exterior concrete walls at piping entrances into building.
 - 2. Provide sealing elements of the size, quantity, and type required for the piping and sleeve inner diameter or penetration diameter.
 - 3. Locate piping in center of sleeve or penetration.
 - 4. Install field assembled sleeve-seal system components in annular space between sleeve and piping.
 - 5. Tighten bolting for a watertight seal.
 - 6. Install in accordance with manufacturer's recommendations.
- R. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings.

Ensure flanges, union, and couplings for servicing are consistently provided.

3.04 APPLICATION

- A. Install unions downstream of valves and at equipment or apparatus connections.
- B. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.
- C. Install gate valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- D. Install globe valves for throttling, bypass, or manual flow control services.
- E. Provide flow controls in water recirculating systems where indicated.

3.05 TOLERANCES

- A. Drainage Piping: Establish invert elevations within 1/2 inch vertically of location indicated and slope to drain at minimum of 1/4 inch per foot slope.

3.06 SCHEDULES

- A. Pipe Hanger Spacing:
 - 1. Metal Piping:
 - a. Pipe Size: 1/2 inches to 1-1/4 inches:
 - 1) Maximum Hanger Spacing: 6.5 ft.
 - 2) Hanger Rod Diameter: 3/8 inches.
 - b. Pipe Size: 1-1/2 inches to 2 inches:
 - 1) Maximum Hanger Spacing: 10 ft.
 - 2) Hanger Rod Diameter: 3/8 inch.
 - c. Pipe Size: 2-1/2 inches to 3 inches:
 - 1) Maximum Hanger Spacing: 10 ft.
 - 2) Hanger Rod Diameter: 1/2 inch.

END OF SECTION

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SECTION 26 00 00
SUPPLEMENTARY ELECTRICAL GENERAL CONDITIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section includes supplementary general requirements for the following:
 - 1. Codes and Standards
 - 2. Conflicting Requirements
 - 3. Specifications and Drawing Conventions
 - 4. Fees, Permits, and Inspection
 - 5. Submittals
 - 6. Products
 - 7. Warranties
 - 8. Electrical License Requirement
 - 9. Operation and Maintenance Manuals
 - 10. Demolition, Salvage, and Waste
 - 11. General Coordination for Electrical Work
 - 12. Cutting and Patching
 - 13. Excavation and Trenching
 - 14. Painting
 - 15. Continuity Tests
 - 16. Connection Torque Tests
 - 17. Mechanical Operation Tests
 - 18. Rotational Tests

1.03 CODES, STANDARDS, AND REFERENCES

- A. All materials and workmanship shall comply with all applicable codes, specifications, local ordinances, industry standards and utility company regulations. Where specific code requirements apply, they shall be included in the job, whether or not specifically shown or elsewhere specified.
- B. The **latest applicable edition** of specifications and standards of issues listed below but referred to thereafter by basic designation only, form a part of these specifications:
 - 1. National Electrical Code
 - 2. National Fire Protection Association's Recommended Practices
 - 3. Local, City & State Codes & Ordinances
 - 4. National Electrical Safety Code
 - 5. Underwriter's Laboratories, Inc.
 - 6. Illumination Engineering Society
 - 7. Institute of Electrical & Electronic Engineers
 - 8. Insulated Power Cable Engineers Association
 - 9. National Electrical Manufacturers Association
 - 10. Earthquake Requirement of the International Building Code
 - 11. American Society for Testing Materials
 - 12. Occupational Safety & Health Act
 - 13. Service requirements of serving utility company
 - 14. Americans with Disabilities Act (ADA)
 - 15. ASHRAE / IESNA Standard 90.1
 - 16. Arkansas Energy Code

1.04 CONFLICTING REQUIREMENTS

- A. Conflicting requirements: If compliance with standards, codes, regulations, and specifications 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 Engineer for a decision before proceeding.

1.05 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. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
 - 1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
 - 2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard and scheduled on Drawings.
 - 3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

1.06 FEES, PERMITS, AND INSPECTIONS

- A. This Contractor shall be responsible for all costs incurred by any serving utility, municipal authority, and/or Owner for the relocation, removal, and installation of temporary or new services.
- B. The Contractor shall be responsible for coordinating and providing the exact service equipment and installation methods with the serving utility, municipal authority, and/or Owner prior to bidding. Failure to do so will not constitute sufficient grounds for an authorized change order to the project.

1.07 PROJECT / SITE CONDITIONS:

- A. Install Work in locations shown on Drawings, unless prevented by Project conditions. The Architect / Owner reserves the right to relocate any device a maximum distance of 6' - 0" at the time of installation without an extra cost being incurred.
- B. Prepare drawings showing proposed rearrangement of Work to meet Project conditions, including changes to Work specified in other Sections. Obtain permission of Architect / Engineer before proceeding.

1.08 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
 - 1. The Contractor shall submit five (5) copies to the Architect for approval, a list of all equipment he proposes to furnish, together with descriptive literature, capacities, manufacturer's name, approximately delivery date and any other pertinent facts concerning the various items. The submittal shall consist of a tabulation of all items included, followed by catalog and data sheets, wiring diagrams, etc., all bound in one folder, loose leaf sheets will not be acceptable.
 - 2. The equipment listed herein or on the drawings will be furnished as specified unless scheduled "or equal". If "or equal" is indicated, the product of any reputable manufacturer regularly engaged in the commercial production of the specified equipment will not be excluded on the basis of minor differences, provided all essential requirements of this specification relative to materials, limitations of available space for equipment, capacity,

- and performance are met. The Contractor shall be responsible for any and all additional costs required by modifications to architectural, structural, mechanical or electrical facilities, devices, systems, etc. resulting from the approved substitution.
3. Wherever the substituted equipment actually furnished under these specifications requires the use of larger connections, more connections, or a different connection arrangement than indicated on the drawings or specified under these specifications, the Contractor shall furnish a scaled drawing showing how he proposes to install substituted equipment. Drawings shall show clearances and be coordinated with other mechanical and electrical equipment in the space. Should a substitution require the Architect or Engineer to provide additional services to accommodate it, the Contractor shall be responsible for costs incurred by the Architect or Engineer.
 4. All equipment having motors 1-1/2 horsepower and larger shall include have as part of the submittal package, a written description of the motor, manufacturer, model number and motor efficiency at full load. Failure to include motor data in the equipment submittal shall result in the automatic rejection of the submittal.
 5. The Contractor shall submit shop drawings to the Architect in accordance with the schedule prepared by the General Contractor but not later than 45 calendar days after the date of the agreement. Failure to submit shop drawings within 45 days, shall disqualify the Contractor from substituting specified equipment.
 6. The contractor shall not install any equipment or materials until the shop drawings for the equipment or materials have been approved.
 7. The Contractor shall submit five (5) copies to the Architect for approval, a list of all equipment he proposes to furnish, together with descriptive literature, capacities, manufacturer's name, approximately delivery date and any other pertinent facts concerning the various items. The submittal shall consist of a tabulation of all items included, followed by catalog and data sheets, wiring diagrams, etc., all bound in one folder, loose leaf sheets will not be acceptable.
 8. The equipment listed herein or on the drawings will be furnished as specified unless scheduled "or equal". If "or equal" is indicated, the product of any reputable manufacturer regularly engaged in the commercial production of the specified equipment will not be excluded on the basis of minor differences, provided all essential requirements of this specification relative to materials, limitations of available space for equipment, capacity, and performance are met. The Contractor shall be responsible for any and all additional costs required by modifications to architectural, structural, mechanical or electrical facilities, devices, systems, etc. resulting from the approved substitution.
 9. Wherever the substituted equipment actually furnished under these specifications requires the use of larger connections, more connections, or a different connection arrangement than indicated on the drawings or specified under these specifications, the Contractor shall furnish a scaled drawing showing how he proposes to install substituted equipment. Drawings shall show clearances and be coordinated with other mechanical and electrical equipment in the space. Should a substitution require the Architect or Engineer to provide additional services to accommodate it, the Contractor shall be responsible for costs incurred by the Architect or Engineer.
 10. All equipment having motors 1-1/2 horsepower and larger shall include have as part of the submittal package, a written description of the motor, manufacturer, model number and motor efficiency at full load. Failure to include motor data in the equipment submittal shall result in the automatic rejection of the submittal.
 11. The Contractor shall submit shop drawings to the Architect in accordance with the schedule prepared by the General Contractor but not later than 45 calendar days after the date of the agreement. Failure to submit shop drawings within 45 days, shall disqualify the Contractor from substituting specified equipment.
 12. The contractor shall not install any equipment or materials until the shop drawings for the equipment or materials have been approved.
 13. Engineer will return annotated file.

B. Digital Data Files:

1. Electronic digital data files of the Project drawings may be provided by Engineer for Contractor's use in preparing submittals.
 2. Electronic digital data files supplied for use in submittal preparation will be subject to terms and conditions of the Engineer's Release Form. A signed release form and any payment required must be returned to the Engineer prior to the transmission of an electronic digital data files.
 3. Electronic digital data file formats may include AutoCAD drawings, Revit converted to AutoCAD drawings or Revit Model.
- C. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
- D. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Engineer'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 14 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Engineer will advise Contractor when a submittal being processed must be delayed for coordination.
 2. Resubmittal Review: Allow 14 days for review of each resubmittal.
- E. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:
1. Name file with submittal number or other unique identifier, including revision identifier.
 2. Transmittal Form for Electronic Submittals: Use electronic form containing the following information:
 - a. Project name.
 - b. Name and address of Engineer.
 - c. Name of Construction Manager.
 - d. Name of Contractor.
 - e. Name of firm or entity that prepared submittal.
 - f. Names of subcontractor, manufacturer, and supplier.
 - g. Category and type of submittal.
 - h. Specification Section number and title.
 - i. Indication of full or partial submittal.
 - j. Remarks.
- F. Options: Identify options requiring selection by Engineer.
- G. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
1. Note date and content of revision in label or title block and clearly indicate extent of revision.
 2. Resubmit submittals until they are marked with approval notation from Engineer.

1.09 CLOSEOUT SUBMITTALS

- A. Closeout submittals shall include, but not limited to, the following:
1. Operation and Maintenance Materials
 2. Record Drawings
 3. Demonstration and Training Materials

1.10 QUALITY ASSURANCE

- A. Products:
1. 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.
 - a. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
 - b. If a dispute arises between contractors over concurrently selectable but incompatible products, Engineer will determine which products shall be used.

1.11 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 or moisture damage.
 - 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.
 - 7. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.12 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. Submit warranties in accordance with "Closeout Procedures."

1.13 FIELD CONDITIONS

- A. The Contractor shall visit the site of the building before submitting a proposal on this work, and shall thoroughly familiarize himself with the existing conditions and operations. Failure on his part to do this will not be cause of extras after the contract is signed, by reason of unforeseen conditions.

1.14 GUARANTEE/WARRANTY

- A. The work herein specified shall be free from defects in workmanship and material under normal use and service. If, within twelve (12) months from date of substantial completion and Owner acceptance of the work herein described, any of the equipment or materials, or the installation thereof, is found to be defective in workmanship or material, it shall be replaced or repaired free of charge.
- B. The Contractor shall, after completion of the original test of the installation, and acceptance by the Engineer, provide any service incidental to the proper performance of the electrical systems under guarantees outlined above for a period of 1 full year after acceptance by the Engineer

and Owner. Regardless of anything to the contrary in warranties by the equipment manufacturer involved, the Contractor's warranty shall run for 1 full year after final acceptance by the Engineer.

1.15 ELECTRICAL LICENSE REQUIREMENT

- A. No person shall perform electrical work on the contract without possessing a Master's or Journeyman's License from the State Electrical Examiners Board. All electrical work and apprentice electricians shall be supervised by a Master or Journeyman Electrician on a one to one ratio.
- B. All electricians shall have a copy of their license with them and shall be required to show it to an appropriate inspector upon request.

PART 1 PRODUCTS

2.01 SUBMITTAL PROCEDURES

- A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
 - 1. Submit electronic submittals to Engineer.
 - a. Engineer will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
 - 1. Mark each copy of each submittal to show which products and options are applicable.
 - 2. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts.
 - b. Manufacturer's product specifications.
 - c. Standard color charts.
 - d. Statement of compliance with specified referenced standards.
 - e. Testing by recognized testing agency.
 - f. Application of testing agency labels and seals.
 - 3. For equipment, include the following in addition to the above, as applicable:
 - a. Wiring diagrams showing factory-installed wiring.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale and sufficiently large to show all pertinent features of the item, method of connections, and notations clearly legible. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data, unless submittal based on Engineer's digital data drawing files is otherwise permitted.
 - 1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Identification of products.
 - b. Schedules.
 - c. Compliance with specified standards.
 - d. Notation of coordination requirements.

2.02 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.

2.03 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. Where two or more units of materials or equipment of the same type or class are required, these units shall be products of one manufacturer.
 4. Where products are accompanied by the term "as selected," Engineer will make selection.
 5. Products containing asbestos shall not be used.
 6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.
- B. Product Selection Procedures:
1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 3. Products:
 - a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience shall be considered.
 4. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
- C. Visual Selection Specification: Where Specifications include the phrase "as selected by Engineer" or similar phrase, select a product that complies with requirements. Engineer will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.04 COMPARABLE PRODUCTS

- A. Conditions for Consideration: Engineer will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Engineer may return requests without action, except to record noncompliance with these requirements:
1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
 2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 3. Evidence that proposed product provides specified warranty.
 4. Contractor is responsible for any modification required by products other than the basis of design product at no additional cost to the owner including but not limited to modifications to supports and connections.

2.05 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

- A. After approval of materials and equipment for use in this project, a copy of an Operation and Maintenance Manual shall be submitted for approval.
- B. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information. Include a section in the directory for each of the following:
1. List of documents.
 2. List of equipment.

3. Table of contents.
- C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
- D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.
- E. Upon final approval, submit one (1) bound copy of the approved Operation and Maintenance Manual to the Architect and hold two (2) copies for instruction of Owner as hereinafter specified.

2.06 REQUIREMENTS FOR EMERGENCY, 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: Enable bookmarking of 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.

2.07 EQUIPMENT AND MATERIALS:

- A. All materials shall be new and shall bear the manufacturer's name, trade name and the UL label in every case where a standard has been established for the particular material. The equipment to be furnished under each section of the specification shall be essentially the standard product of a manufacturer regularly engaged in the production of the required type of equipment, and shall be the manufacturer's latest approved design.
- B. When 2 or more units of materials or equipment of the same type or class are required, these units shall be products of 1 manufacturer. Equipment and materials of the same general type shall be of the same make throughout the work to provide uniform appearance, operation and maintenance. Manufacturers of equipment assemblies, which use components made by others, assume complete responsibility for the final assembled product.
- C. Nameplate bearing manufacturer's name or identifiable trademark shall be securely affixed in a conspicuous place on equipment, or name or trademark cast integrally with equipment, stamped or otherwise permanently marked on each item of equipment.
- D. Asbestos products or equipment or materials containing asbestos shall not be used.
- E. Equipment and materials shall be delivered to the site and stored in the original containers, suitably sheltered from the elements. Items subject to moisture damage (such as controls) shall be stored in dry, heated spaces.
- F. Equipment shall be tightly covered and protected against dirt, water, and chemical or mechanical injury and theft. At the completion of the work, fixtures, equipment, and materials shall be cleaned and polished thoroughly. Damage or defects developing before acceptance of the work shall be made good at the Contractor's expense.
- G. It shall be the responsibility of the Contractor to insure that items to be furnished fit the space available. The Contractor shall make necessary field measurements to ascertain space requirements, including those for connections, and shall furnish and install such sizes and shapes of equipment that the final installation shall suit the true intent and meaning of the Drawings and Specifications.
- H. Manufacturer's directions shall be followed completely in the delivery, storage, protection, and installation of all equipment and materials. Should the Contractor perform any work that does not comply with the manufacturer's directions, he shall bear all costs arising in correcting the deficiencies.

2.08 EQUIPMENT ACCESSORIES:

- A. The Contractor shall furnish and install all equipment, accessories, connections, and incidental items necessary to fully complete the work, ready for use, occupancy and operation by the Owner, whether or not specifically shown on the plans or herein specified.
- B. Connections: All final connections to equipment shall be installed as required by the manufacturer and/or Vendor.
- C. Connections Different From Those Shown: Where equipment requiring different arrangement or connections from those shown is approved, it shall be the responsibility of the Contractor to install the equipment to operate properly with the intent of the drawings and specifications. When directed, the Contractor shall submit drawings showing the proposed installation. If the proposed installation is approved, the Contractor shall make all incidental changes. The Contractor shall provide any additional equipment required for the proper operation of the system resulting from the selection of equipment, including all required changes in affected trades. The Contractor shall be responsible for the proper location of roughing in and connections by other trades. All changes shall be made at no increase in the contract amount or additional cost to the other trades.

PART 1 - EXECUTION

3.01 CONTRACTOR'S SUBMITTAL REVIEW

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

3.02 ENGINEER'S SUBMITTAL ACTION

- A. Action Submittals: Engineer will review each submittal, make marks to indicate corrections or revisions required, and return it.
- B. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Engineer.
- C. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- D. Submittals not required by the Contract Documents may be returned by the Engineer without action.

3.03 DISPOSAL OF WASTE

- A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
 - 1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 - 3. Disposal: Remove waste materials from Owner's property and legally dispose of them

3.04 RECORD DRAWING RECORDING AND MAINTENANCE

- 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.

3.05 COORDINATION OF WORK

- A. The Contractor shall compare the Electrical Drawings and Specifications with the drawings and specifications for other trades and shall report any discrepancies between them to the Engineer

and obtain written instructions for changes necessary in the Electrical Work. The Electrical Work shall be installed in cooperation with other trades installing related work. Before installation, the Contractor shall make proper provision to avoid interferences. All changes required in the work of the Contractor caused by a failure to coordinate the work with other trades shall be made by the Contractor at his own expense.

- B. Anchor bolts, sleeves, inserts and supports that may be required for the Electrical Work shall be furnished under the same section of the specifications as the respective items to be supported, and they shall be installed, except as otherwise specified, by the trade furnishing and installing the material in which they are to be located. Location of anchor bolts, sleeves, inserts and supports shall be directed by the trade requiring them, which trade shall also insure that they are properly installed. Any expense resulting from the improper location or installation of anchor bolts, sleeves, inserts and supports shall be paid for by the Contractor under the section of the specifications for the trade with the responsibility for directing their proper location.
- C. Slots, chases, openings and recesses through floors, walls, ceilings and roofs as specified will be provided by the various trades in their respective materials, but the trade requiring them shall see that they are properly located, and shall do any cutting and patching caused by the neglect to do so. Slots, chases, openings and recesses in existing structure shall be cut by the trade requiring them and patched and repaired by that trade.
- D. Locations of conduits, equipment, etc. shall be adjusted to accommodate the work and to avoid interferences anticipated and encountered. The Contractor shall determine the exact route and location of each pipe and duct prior to fabrication.
 - 1. Installation and Arrangement: The Contractor shall install all Electrical Work to permit removal (without damage to other parts) of coils, heat exchanger bundles, belt guards, sheaves and drives, and all other parts requiring periodic replacement or maintenance. The Contractor shall arrange pipes and equipment to permit ready access to valves, cocks, control components and to clear the openings of swinging and overhead doors and of access panels.
 - 2. Access: The Contractor shall provide all necessary access panels in walls, ceilings, equipment, etc., as required for inspection of interiors and for proper maintenance and or installation of equipment valves. Where changes from the plans are made by the Contractor in the installation of his work, he shall provide any and all access panels required as a result of these changes.
- E. Connections Different From Those Shown: Where equipment requiring different arrangement or connections from those shown is approved, it shall be the responsibility of the Contractor to install the equipment to operate properly with the intent of the drawings and specifications. When directed, the Contractor shall submit drawings showing the proposed installation. If the proposed installation is approved, the Contractor shall make all incidental changes in conduit, back box, device locations, etc. The Contractor shall provide any additional conduit, fittings, and other additional equipment required for the proper operation of the system resulting from the selection of equipment, including all required changes in affected trades. The Contractor shall be responsible for the proper location of roughing in and connections by other trades. All changes shall be made at no increase in the contract amount or additional cost to the other trades.
- F. Connections: All conduit connecting to equipment shall be installed without strain at the conduit connection
- G. Inaccessible Equipment
 - 1. Where the Engineer or Owner determines that the Contractor has installed equipment not conveniently accessible for operation and maintenance, equipment shall be removed and reinstalled or remedial action (such as providing access panels) performed as directed at no additional cost to the Owner.
 - 2. The term "conveniently accessible" is defined as capable of being reached without the use of ladders, or without climbing or crawling under or over obstacles such as motors, fans, pumps, belt guards, transformers, high voltage lines, piping, and ductwork.
- H. Electrical Coordination

1. Power: All power and motor wiring shall be performed under Division 26 unless otherwise noted for specific items. Control and interlock wiring shall be done by the Contractor of this Division.
 2. Starters and Drives: All motor starters and drives unless included in other sections of the specifications shall be by Division 26. Furnish auxiliary contacts on magnetic starters to permit interlocking of starting circuits.
 3. Disconnects: All equipment furnished under this Division required to have a means of disconnect shall be supplied with a disconnect or a disconnect shall be furnished and installed by Division 26.
- I. Dedicated Electrical Space: The space equal to the width and depth of the equipment and extending from the floor to a height of 6 feet above the equipment or to the structural ceiling, whichever is lower, shall be dedicated to the electrical installation. No piping, leak protection apparatus, or other equipment foreign to the electrical installation shall be located in this zone. The area above the dedicated space shall be permitted to contain foreign systems, provided protection is installed to avoid damage to the electrical equipment from condensation, leaks or breaks in foreign systems. Every effort shall be made to eliminate foreign systems above equipment to the structural ceiling. If this is not possible, the Contractor shall encase any pipe in a second pipe with a minimum number of joints.
- J. Lubrication: The Contractor shall be held responsible for all damage to bearings while the equipment is being operated up to the date of acceptance of the equipment. The Contractor shall be required to protect all bearings during installation and shall thoroughly grease steel shafts to prevent corrosion. All motors and other equipment shall be provided with covers as required for proper protection during construction. Fan shafts, pump shafts, motor shafts, etc. shall be coated to prevent deterioration in moist or wet atmospheres.

3.06 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. Under each section of the specifications, the Contractor shall be responsible for all required cutting, etc., incident to his work under that section, and shall make all satisfactory repairs, but in no case shall the Contractor cut into any major structural element, beam or column.
 2. Each trade shall bear the expense of all cutting, patching, repairing or replacing of the work of other trades because of fault, error or tardiness or because of any damage done by own workmanship.
 3. 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 the "Occupant Coordination" article.
- 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. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other

Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
 - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
 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 re-hang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
- H. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.07 PAINTING

- A. The Contractor shall remove all rust, oil and grease from exposed surfaces and clean all apparatus or materials specified to be painted under this section of the specifications. Equipment specified to have factory finishes shall be protected until completion of the Contract, with Contractor being responsible for maintaining finishes.
- B. Apply paint to exposed piping according to the following, unless otherwise indicated:
 1. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.
 2. Galvanized surfaces damaged during installation shall be repaired with a galvanized repair compound. Any equipment scratched, marred or damaged will be repainted to the original condition.

3.08 CONTINUITY TEST:

- A. The Contractor shall perform a continuity test on the affected portion of the electrical system prior to energizing the system to insure proper cable connections.

3.09 CONNECTION TORQUE TESTS:

- A. All larger conductor bolted connections shall be torque tested using a torque wrench. Torque shall be to National Electrical Testing Association's (NETA) Standards.

3.10 MECHANICAL OPERATION TESTS:

- A. All electrical equipment, such as switches, circuit breakers, etc., shall be tested by operating the device to verify that the mechanical portions of the device are functioning.

3.11 ROTATIONAL TESTS:

- A. The Contractor shall assist all other trades in performing rotational tests on all motors provided under this contract. If rotational tests determine that conductors must be transposed to change direction of rotation, the conductors shall be changed at the make-up box on the motor; or if the change is made elsewhere, then the conductor's color coding shall be changed.

SECTION 26 05 19
LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Single conductor building wire.
- B. Underground feeder and branch-circuit cable.
- C. Service entrance cable.
- D. Metal-clad cable.
- E. Power and control tray cable.
- F. Variable-frequency drive cable.
- G. Wiring connectors.
- H. Electrical tape.
- I. Heat shrink tubing.
- J. Oxide inhibiting compound.
- K. Wire pulling lubricant.
- L. Cable ties.
- M. Firestop sleeves.

1.02 RELATED REQUIREMENTS

- A. Section 07 84 00 - Firestopping.
- B. Section 26 05 26 - Grounding and Bonding for Electrical Systems: Additional requirements for grounding conductors and grounding connectors.

1.03 REFERENCE STANDARDS

- A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire; 2013 (Reapproved 2018).
- B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2011 (Reapproved 2017).
- C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes; 2010, with Editorial Revision (2020).
- D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation; 2004 (Reapproved 2020).
- E. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape; 2017.
- F. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- G. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy; 2009.
- H. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2017.
- I. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- J. UL 44 - Thermoset-Insulated Wires and Cables; Current Edition, Including All Revisions.
- K. UL 83 - Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.
- L. UL 486A-486B - Wire Connectors; Current Edition, Including All Revisions.
- M. UL 486C - Splicing Wire Connectors; Current Edition, Including All Revisions.
- N. UL 486D - Sealed Wire Connector Systems; Current Edition, Including All Revisions.

- O. UL 493 - Thermoplastic-Insulated Underground Feeder and Branch-Circuit Cables; Current Edition, Including All Revisions.
- P. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape; Current Edition, Including All Revisions.
- Q. UL 1277 - Electrical Power and Control Tray Cables with Optional Optical-Fiber Members; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
 - 2. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.
 - 3. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conductors and cables, including detailed information on materials, construction, ratings, listings, and available sizes, configurations, and stranding.
- C. Project Record Documents: Record actual installed circuiting arrangements. Record actual routing for underground circuits.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

1.08 FIELD CONDITIONS

- A. Do not install or otherwise handle thermoplastic-insulated conductors at temperatures lower than 14 degrees F, unless otherwise permitted by manufacturer's instructions. When installation below this temperature is unavoidable, notify Architect and obtain direction before proceeding with work.

PART 2 - PRODUCTS

2.01 CONDUCTOR AND CABLE APPLICATIONS

- A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.
- B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.
 - 1. Exceptions:
 - a. Use power and control tray cable or metal-clad cable for installation in cable tray.
- C. Nonmetallic-sheathed cable is not permitted.
- D. Armored cable is not permitted.
- E. Metal-clad cable is not permitted.

2.02 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

- A. Provide products that comply with requirements of NFPA 70.

- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.
- D. Comply with NEMA WC 70.
- E. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.
- F. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.
- G. Conductors for Grounding and Bonding: Also comply with Section 26 05 26.
- H. Conductors and Cables Installed Where Exposed to Direct Rays of Sun: Listed and labeled as sunlight resistant.
- I. Conductors and Cables Installed Exposed in Spaces Used for Environmental Air (only where specifically permitted): Plenum rated, listed and labeled as suitable for use in return air plenums.
- J. Conductor Material:
 - 1. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.
 - 2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
 - 3. Tinned Copper Conductors: Comply with ASTM B33.
- K. Minimum Conductor Size:
 - 1. Branch Circuits: 12 AWG.
- L. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
- M. Conductor Color Coding:
 - 1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
 - 2. Color Coding Method: Integrally colored insulation.
 - a. Conductors size 4 AWG and larger may have black insulation color coded using vinyl color coding electrical tape.
 - 3. Color Code:
 - a. 480Y/277 V, 3 Phase, 4 Wire System:
 - 1) Phase A: Brown.
 - 2) Phase B: Orange.
 - 3) Phase C: Yellow.
 - 4) Neutral/Grounded: Gray.
 - b. 208Y/120 V, 3 Phase, 4 Wire System:
 - 1) Phase A: Black.
 - 2) Phase B: Red.
 - 3) Phase C: Blue.
 - 4) Neutral/Grounded: White.
 - c. Equipment Ground, All Systems: Green.
 - d. Travelers for 3-Way and 4-Way Switching: Pink.
 - e. For modifications or additions to existing wiring systems, comply with existing color code when existing code complies with NFPA 70 and is approved by the authority having jurisdiction.
 - f. For control circuits, comply with manufacturer's recommended color code.

2.03 SINGLE CONDUCTOR BUILDING WIRE

- A. Manufacturers:
 - 1. Copper Building Wire:
 - a. Encore Wire Corporation

- b. General Cable Technologies Corporation
 - c. Southwire Company
 - d. Advance Wire and Cable, Inc
- B. Description: Single conductor insulated wire.
- C. Conductor Stranding:
 - 1. Feeders and Branch Circuits:
 - a. Size 10 AWG and Smaller: Solid.
 - b. Size 8 AWG and Larger: Stranded.
- D. Insulation Voltage Rating: 600 V.
- E. Insulation:
 - 1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2, except as indicated below.
 - a. Fixture Wiring Within Luminaires: Type TFFN/TFN for luminaires with labeled maximum temperature of 90 degrees C; Approved suitable type for luminaires with labeled maximum temperature greater than 90 degrees C.

2.04 POWER AND CONTROL TRAY CABLE

- A. Manufacturers:
 - 1. Encore Wire Corporation
 - 2. General Cable Technologies Corporation
 - 3. Southwire Company
- B. Description: NFPA 70, Type TC cable listed and labeled as complying with UL 1277.
- C. Conductor Stranding: Stranded.
- D. Insulation Voltage Rating: 600 V.
- E. Insulation: Type XHHW or XHHW-2.
- F. Jacket: PVC or Chlorinated Polyethylene (CPE).

2.05 WIRING CONNECTORS

- A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.
- B. Wiring Connectors for Splices and Taps:
 - 1. Copper Conductors Size 8 AWG and Smaller: Use twist-on insulated spring connectors, mechanical connectors, or compression connectors.
 - 2. Copper Conductors Size 6 AWG and Larger: Use mechanical connectors or compression connectors.
- C. Wiring Connectors for Terminations:
 - 1. Provide terminal lugs for connecting conductors to equipment furnished with terminations designed for terminal lugs.
 - 2. Provide compression adapters for connecting conductors to equipment furnished with mechanical lugs when only compression connectors are specified.
 - 3. Where over-sized conductors are larger than the equipment terminations can accommodate, provide connectors suitable for reducing to appropriate size, but not less than required for the rating of the overcurrent protective device.
 - 4. Provide motor pigtail connectors for connecting motor leads in order to facilitate disconnection.
 - 5. Copper Conductors Size 8 AWG and Larger: Use mechanical connectors or compression connectors where connectors are required.
- D. Do not use insulation-piercing or insulation-displacement connectors designed for use with conductors without stripping insulation.
- E. Do not use push-in wire connectors as a substitute for twist-on insulated spring connectors.

- F. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F for standard applications and 302 degrees F for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.
 - 1. Manufacturers:
 - a. 3M
 - b. Ideal Industries, Inc
 - c. NSI Industries LLC
- G. Mechanical Connectors: Provide bolted type or set-screw type.
 - 1. Manufacturers:
 - a. Burndy LLC
 - b. IlSCO
 - c. Thomas & Betts Corporation
- H. Compression Connectors: Provide circumferential type or hex type crimp configuration.
 - 1. Manufacturers:
 - a. Burndy LLC
 - b. IlSCO
 - c. Thomas & Betts Corporation

2.06 ACCESSORIES

- A. Electrical Tape:
 - 1. Vinyl Color Coding Electrical Tape: Integrally colored to match color code indicated; listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; suitable for continuous temperature environment up to 221 degrees F.
 - 2. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F and suitable for continuous temperature environment up to 221 degrees F.
 - 3. Moisture Sealing Electrical Tape: Insulating mastic compound laminated to flexible, all-weather vinyl backing; minimum thickness of 90 mil.
- B. Heat Shrink Tubing: Heavy-wall, split-resistant, with factory-applied adhesive; rated 600 V; suitable for direct burial applications; listed as complying with UL 486D.
- C. Oxide Inhibiting Compound: Listed; suitable for use with the conductors or cables to be installed.
- D. Wire Pulling Lubricant: Listed; suitable for use with the conductors or cables to be installed and suitable for use at the installation temperature.
 - 1. Manufacturers:
 - a. 3M
 - b. American Polywater Corporation
 - c. Ideal Industries, Inc
- E. Cable Ties: Material and tensile strength rating suitable for application.
- F. Sealing Systems for Roof Penetrations: Premanufactured components and accessories as required to preserve integrity of roofing system and maintain roof warranty; suitable for cables and roofing system to be installed; designed to accommodate existing penetrations where applicable.
- G. Firestop Sleeves: Listed; provide as required to preserve fire resistance rating of building elements.
 - 1. Products:
 - a. HoldRite, a brand of Reliance Worldwide Corporation; HydroFlame Pro Series/HydroFlame Custom Built: www.holdrite.com/#sle.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that interior of building has been protected from weather.

- B. Verify that work likely to damage wire and cable has been completed.
- C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.
- D. Verify that field measurements are as indicated.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

3.03 INSTALLATION

- A. Circuiting Requirements:
 - 1. Unless dimensioned, circuit routing indicated is diagrammatic.
 - 2. When circuit destination is indicated without specific routing, determine exact routing required.
 - 3. Arrange circuiting to minimize splices.
 - 4. Maintain separation of Class 1, Class 2, and Class 3 remote-control, signaling, and power-limited circuits in accordance with NFPA 70.
 - 5. Maintain separation of wiring for emergency systems in accordance with NFPA 70.
 - 6. Circuiting Adjustments: Unless otherwise indicated, when branch circuits are indicated as separate, combining them together in a single raceway is not permitted.
 - a. Provide no more than six current-carrying conductors in a single raceway. Dedicated neutral conductors are considered current-carrying conductors.
 - b. Increase size of conductors as required to account for ampacity derating.
 - c. Size raceways, boxes, etc. to accommodate conductors.
 - 7. Common Neutrals: Unless otherwise indicated, sharing of neutral/grounded conductors among up to three single phase branch circuits of different phases installed in the same raceway is not permitted. Provide dedicated neutral/grounded conductor for each individual branch circuit.
 - 8. Provide oversized neutral/grounded conductors where indicated and as specified below.
 - a. Provide 200 percent rated neutral for feeders fed from K-rated transformers.
 - b. Provide 200 percent rated neutral for feeders serving panelboards with 200 percent rated neutral bus.
- B. Install products in accordance with manufacturer's instructions.
- C. Perform work in accordance with NECA 1 (general workmanship).
- D. Installation in Raceway:
 - 1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
 - 2. Pull all conductors and cables together into raceway at same time.
 - 3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
 - 4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.
- E. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.
- F. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.
 - 1. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conductors and cables to lay on ceiling tiles.

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2. Installation in Vertical Raceways: Provide supports where vertical rise exceeds permissible limits.
- G. Terminate cables using suitable fittings.
 1. Metal-Clad Cable (Type MC):
 - a. Use listed fittings.
 - b. Cut cable armor only using specialized tools to prevent damaging conductors or insulation. Do not use hacksaw or wire cutters to cut armor.
- H. Install conductors with a minimum of 12 inches of slack at each outlet.
- I. Where conductors are installed in enclosures for future termination by others, provide a minimum of 5 feet of slack.
- J. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.
- K. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.
- L. Make wiring connections using specified wiring connectors.
 1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
 2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
 3. Do not remove conductor strands to facilitate insertion into connector.
 4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminants. Do not use wire brush on plated connector surfaces.
 5. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
 6. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- M. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.
- N. Insulate ends of spare conductors using vinyl insulating electrical tape.
- O. Field-Applied Color Coding: Where vinyl color coding electrical tape is used in lieu of integrally colored insulation as permitted in Part 2 under "Color Coding", apply half overlapping turns of tape at each termination and at each location conductors are accessible.
- P. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.
- Q. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

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SECTION 26 05 26
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Grounding and bonding requirements.
- B. Conductors for grounding and bonding.
- C. Connectors for grounding and bonding.
- D. Ground bars.
- E. Ground rod electrodes.
- F. Chemically-enhanced ground electrodes.
- G. Ground plate electrodes.
- H. Ground enhancement material.

1.02 RELATED REQUIREMENTS

- A. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables: Additional requirements for conductors for grounding and bonding, including conductor color coding.
- B. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.
- C. Section 26 56 00 - Exterior Lighting: Additional grounding and bonding requirements for pole-mounted luminaires.

1.03 REFERENCE STANDARDS

- A. IEEE 81 - IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System; 2012.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- C. NEMA GR 1 - Grounding Rod Electrodes and Grounding Rod Electrode Couplings; 2017.
- D. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2017.
- E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. UL 467 - Grounding and Bonding Equipment; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Verify exact locations of underground metal water service pipe entrances to building.
 - 2. Coordinate the work with other trades to provide steel reinforcement complying with specified requirements for concrete-encased electrode.
 - 3. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not install ground rod electrodes until final backfill and compaction is complete.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittals procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for grounding and bonding system components.
- C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- D. Field quality control test reports.

- E. Project Record Documents: Record actual locations of grounding electrode system components and connections.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- D. ANSI/IEEE Compliance: Comply with C114.1 (IEEE Std 142) and IEEE Stds Nos. 241 and 242 pertaining to grounding and ground-fault protection of power systems.
- E. ANSI/UL Compliance: Comply with requirements of ANSI/UL and UL standards pertaining to grounding and ground-fault protection equipment and devices. Provide products which have been UL-listed and labeled.
- F. NEMA Compliance: Comply with NEMA Stds Pub Nos. PB 1.2 and AB 1, pertaining to construction and installation of ground-fault protection devices and molded-case circuit breakers.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.01 GROUNDING AND BONDING REQUIREMENTS

- A. Existing Work: Where existing grounding and bonding system components are indicated to be reused, they may be reused only where they are free from corrosion, integrity and continuity are verified, and where acceptable to the authority having jurisdiction.
- B. Do not use products for applications other than as permitted by NFPA 70 and product listing.
- C. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.
- D. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
- E. Grounding System Resistance:
 - 1. Achieve specified grounding system resistance under normally dry conditions unless otherwise approved by Architect. Precipitation within the previous 48 hours does not constitute normally dry conditions.
 - 2. Grounding Electrode System: Not greater than 5 ohms to ground, when tested according to IEEE 81 using "fall-of-potential" method.
 - 3. Between Grounding Electrode System and Major Electrical Equipment Frames, System Neutral, and Derived Neutral Points: Not greater than 0.5 ohms, when tested using "point-to-point" methods.
- F. Grounding Electrode System:
 - 1. Provide connection to required and supplemental grounding electrodes indicated to form grounding electrode system.
 - a. Provide continuous grounding electrode conductors without splice or joint.
 - b. Install grounding electrode conductors in raceway where exposed to physical damage. Bond grounding electrode conductor to metallic raceways at each end with bonding jumper.
 - 2. Metal Underground Water Pipe(s):
 - a. Provide connection to underground metal domestic and fire protection (where present) water service pipe(s) that are in direct contact with earth for at least 10 feet at an accessible location not more than 5 feet from the point of entrance to the building.

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- b. Provide bonding jumper(s) around insulating joints/pipes as required to make pipe electrically continuous.
 - c. Provide bonding jumper around water meter of sufficient length to permit removal of meter without disconnecting jumper.
 - 3. Metal In-Ground Support Structure:
 - a. Provide connection to metal in-ground support structure that is in direct contact with earth in accordance with NFPA 70.
 - 4. Concrete-Encased Electrode:
 - a. Provide connection to concrete-encased electrode consisting of not less than 20 feet of either steel reinforcing bars or bare copper conductor not smaller than 4 AWG embedded within concrete foundation or footing that is in direct contact with earth in accordance with NFPA 70.
 - 5. Ground Rod Electrode(s):
 - a. Provide three electrodes in an equilateral triangle configuration unless otherwise indicated or required.
 - b. Space electrodes not less than 10 feet from each other and any other ground electrode.
 - c. Where location is not indicated, locate electrode(s) at least 5 feet outside building perimeter foundation as near as possible to electrical service entrance; where possible, locate in softscape (uncovered) area.
 - 6. Provide additional ground electrode(s) as required to achieve specified grounding electrode system resistance.
- G. Service-Supplied System Grounding:
 - 1. For each service disconnect, provide grounding electrode conductor to connect neutral (grounded) service conductor to grounding electrode system. Unless otherwise indicated, make connection at neutral (grounded) bus in service disconnect enclosure.
 - 2. For each service disconnect, provide main bonding jumper to connect neutral (grounded) bus to equipment ground bus where not factory-installed. Do not make any other connections between neutral (grounded) conductors and ground on load side of service disconnect.
- H. Separately Derived System Grounding:
 - 1. Separately derived systems include, but are not limited to:
 - a. Transformers (except autotransformers such as buck-boost transformers).
 - b. Uninterruptible power supplies (UPS), when configured as separately derived systems.
 - c. Generators, when neutral is switched in the transfer switch.
 - 2. Provide grounding electrode conductor to connect derived system grounded conductor to nearest effectively grounded metal building frame. Unless otherwise indicated, make connection at neutral (grounded) bus in source enclosure.
 - 3. Provide bonding jumper to connect derived system grounded conductor to nearest metal building frame and nearest metal water piping in the area served by the derived system, where not already used as a grounding electrode for the derived system. Make connection at same location as grounding electrode conductor connection.
 - 4. Where common grounding electrode conductor ground riser is used for tap connections to multiple separately derived systems, provide bonding jumper to connect the metal building frame and metal water piping in the area served by the derived system to the common grounding electrode conductor.
 - 5. Provide system bonding jumper to connect system grounded conductor to equipment ground bus. Make connection at same location as grounding electrode conductor connection. Do not make any other connections between neutral (grounded) conductors and ground on load side of separately derived system disconnect.
 - 6. Where the source and first disconnecting means are in separate enclosures, provide supply-side bonding jumper between source and first disconnecting means.
- I. Bonding and Equipment Grounding:

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1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.
 2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.
 3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
 4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
 5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
 6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.
 7. Provide bonding for interior metal piping systems in accordance with NFPA 70. This includes, but is not limited to:
 8. Provide bonding for metal building frame.
- J. Communications Systems Grounding and Bonding:
1. Provide intersystem bonding termination at service equipment or metering equipment enclosure and at disconnecting means for any additional buildings or structures in accordance with NFPA 70.
 2. Provide bonding jumper in raceway from intersystem bonding termination to each communications room or backboard and provide ground bar for termination.
 - a. Bonding Jumper Size: 6 AWG, unless otherwise indicated or required.
 - b. Raceway Size: 3/4 inch trade size unless otherwise indicated or required.
 - c. Ground Bar Size: 1/4 by 2 by 12 inches unless otherwise indicated or required.
 - d. Ground Bar Mounting Height: 18 inches above finished floor unless otherwise indicated.
- K. Pole-Mounted Luminaires: Also comply with Section 26 56 00.

2.02 GROUNDING AND BONDING COMPONENTS

- A. General Requirements:
1. Provide products listed, classified, and labeled as suitable for the purpose intended.
 2. Provide products listed and labeled as complying with UL 467 where applicable.
- B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 26 05 26:
1. Use insulated copper conductors unless otherwise indicated.
 - a. Exceptions:
 - 1) Use bare copper conductors where installed underground in direct contact with earth.
 - 2) Use bare copper conductors where directly encased in concrete (not in raceway).
- C. Connectors for Grounding and Bonding:
1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
 2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
 3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.
 4. Manufacturers - Mechanical and Compression Connectors:
 - a. Advanced Lightning Technology (ALT)
 - b. Burndy LLC
 - c. Harger Lightning & Grounding
 - d. Thomas & Betts Corporation

5. Manufacturers - Exothermic Welded Connections:
 - a. Burndy LLC
 - b. Cadweld, a brand of Erico International Corporation
 - c. thermOweld, subsidiary of Continental Industries; division of Burndy LLC
- D. Ground Bars:
 1. Description: Copper rectangular ground bars with mounting brackets and insulators.
 2. Size: As indicated.
 3. Holes for Connections: As indicated or as required for connections to be made.
 4. Manufacturers:
 - a. Advanced Lightning Technology (ALT)
 - b. Erico International Corporation
 - c. Harger Lightning & Grounding
 - d. thermOweld, subsidiary of Continental Industries; division of Burndy LLC
- E. Ground Rod Electrodes:
 1. Comply with NEMA GR 1.
 2. Material: Copper-bonded (copper-clad) steel.
 3. Size: 3/4 inch diameter by 10 feet length, unless otherwise indicated.
 4. Manufacturers:
 - a. Advanced Lightning Technology (ALT)
 - b. Erico International Corporation
 - c. Galvan Industries, Inc
 - d. Harger Lightning & Grounding
- F. Chemically-Enhanced Ground Electrodes:
 1. Description: Copper tube factory-filled with electrolytic salts designed to provide a low-impedance ground in locations with high soil resistivity; straight (for vertical installations) or L-shaped (for horizontal installations) as indicated or as required.
 2. Length: 10 feet.
 3. Integral Pigtail: Factory-attached, sized not less than grounding electrode conductor to be attached.
 4. Backfill Material: Grounding enhancement material recommended by electrode manufacturer.
 5. Manufacturers:
 - a. Advanced Lightning Technology (ALT)
 - b. Erico International Corporation
 - c. Harger Lightning & Grounding
- G. Ground Plate Electrodes:
 1. Material: Copper.
 2. Size: 24 by 24 by 1/4 inches, unless otherwise indicated.
 3. Manufacturers:
 - a. Advanced Lightning Technology (ALT)
 - b. Erico International Corporation
 - c. Harger Lightning & Grounding
 - d. thermOweld, subsidiary of Continental Industries; division of Burndy LLC
- H. Ground Enhancement Material:
 1. Description: Factory-mixed conductive material designed for permanent and maintenance-free improvement of grounding effectiveness by lowering resistivity.
 2. Manufacturers:
 - a. Erico International Corporation
 - b. Harger Lightning & Grounding
 - c. thermOweld, subsidiary of Continental Industries; division of Burndy LLC

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that work likely to damage grounding and bonding system components has been completed.
- B. Verify that field measurements are as indicated.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Ground Rod Electrodes: Unless otherwise indicated, install ground rod electrodes vertically. Where encountered rock prohibits vertical installation, install at 45 degree angle or bury horizontally in trench at least 30 inches (750 mm) deep in accordance with NFPA 70 or provide ground plates.
 - 1. Outdoor Installations: Unless otherwise indicated, install with top of rod 6 inches below finished grade.
- D. Ground Plate Electrodes: Unless otherwise indicated, install ground plate electrodes at a depth of not less than 30 inches.
- E. Make grounding and bonding connections using specified connectors.
 - 1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
 - 2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
 - 3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
 - 4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
 - 5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- F. Identify grounding and bonding system components in accordance with Section 26 05 53.
- G. Neutrals of lighting systems shall be grounded independently and in accordance with the National Electrical Code.
- H. All metal raceway system, including cabinets, conduit and boxes, shall be grounded to a water pipe with UL approved grounding clamp in accordance with the National Electrical Code.
- I. An equipment ground conductor shall be installed in all conduits.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Inspect and test in accordance with NETA ATS except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.13.
- D. Perform ground electrode resistance tests under normally dry conditions. Precipitation within the previous 48 hours does not constitute normally dry conditions.
- E. Investigate and correct deficiencies where measured ground resistances do not comply with specified requirements.
- F. Submit detailed reports indicating inspection and testing results and corrective actions taken.

END OF SECTION

SECTION 26 05 29

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

1.1 SUMMARY

- A. Section Includes:
 - 1. Support systems.
 - 2. Mounting, anchoring, and attachment components.
 - 3. Installation of fabricated metal supports.
 - 4. Installation of concrete bases.
- B. Related Requirements:
 - 1. Section 260010 "Supplemental Requirements for Electrical" specifies additional requirements applicable to coordinating, scheduling, and sequencing of the Work specified in this Section.
 - 2. Section 033000 "Cast-in-Place Concrete" specifies concrete materials, reinforcement, and placement requirements referenced by this Section.
 - 3. Section 260548 "Vibration and Seismic Controls for Electrical Systems" specifies vibration controls, seismic restraints, and wind restraints referenced by this Section.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:
 - a. Slotted support systems, hardware, and accessories.
 - b. Clamps.
 - c. Hangers.
 - d. Sockets.
 - e. Eye nuts.
 - f. Fasteners.
 - g. Anchors.
 - h. Saddles.
 - i. Brackets.
 - 2. Include rated capacities and furnished specialties and accessories.
- B. Shop Drawings: For fabrication and installation details for electrical hangers and support systems.
 - 1. Slotted support systems.
 - 2. Equipment supports.

1.3 REGULATORY AGENCY APPROVALS

- A. Shop drawings requiring approval by authorities having jurisdiction must be signed by qualified structural professional engineer responsible for their preparation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Prepare design calculations in accordance with criteria specified in Section 260010 "Supplemental Requirements for Electrical".
- B. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame Rating: Class 1.
 - 2. Self-extinguishing according to ASTM D635.

2.2 SUPPORT SYSTEMS

- A. Steel Slotted Support Systems:
 - 1. Standard Features: Preformed steel channels and angles with minimum 13/32 inch diameter holes at a maximum of 8 inch on center in at least one surface.
 - a. Referenced Standard: MFMA-4 factory-fabricated components for field assembly.
 - b. Material for Channel, Fittings, and Accessories: Galvanized steel.
 - c. Channel Width: 1-5/8 inch.
 - d. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
 - e. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
 - f. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
 - g. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Conduit and Cable Support Devices:
 - 1. Standard Features: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- C. Support for Conductors in Vertical Conduit:
 - 1. Standard Features: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for nonarmored electrical conductors or cables in riser conduits. Plugs must have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body must be made of malleable iron.
- D. Structural Steel for Fabricated Supports and Restraints:
 - 1. Standard Features: ASTM A36/A36M steel plates, shapes, and bars; black and galvanized.

2.3 MOUNTING, ANCHORING, AND ATTACHMENT COMPONENTS

- A. Mechanical-Expansion Anchors:
 - 1. Standard Features: Insert-wedge-type, stainless steel, for use in hardened portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
- B. Concrete Inserts:
 - 1. Standard Features: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.
- C. Clamps for Attachment to Steel Structural Elements:
 - 1. Standard Features: MSS SP-58 units are suitable for attached structural element.
- D. Through Bolts:
 - 1. Standard Features: Structural type, hex head, and high strength. Comply with ASTM F3125/F3125M, Grade A325.
- E. Toggle Bolts:
 - 1. Standard Features: Stainless steel springhead type.
- F. Hanger Rods:
 - 1. Standard Features: Threaded steel.

PART 3 - EXECUTION

3.1 SELECTION OF HANGERS AND SUPPORTS

- A. Maximum Support Spacing and Minimum Hanger Rod Size for Raceways: Space supports for EMT, IMC, and ERM as required by NFPA 70. Minimum rod size must be 1/4 inch in diameter.
- B. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
 - 1. Secure raceways and cables to these supports with two-bolt conduit clamps.
- C. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2 inch and smaller raceways serving branch circuits and communication systems above suspended ceilings, and for fastening raceways to trapeze supports.

3.2 INSTALLATION OF HANGERS AND SUPPORTS

- A. Comply with manufacturer's published instructions.

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- B. Reference Standards for Installation: Unless more stringent installation requirements are specified in the Contract Documents or manufacturer's published instructions, comply with the following:
1. Electrical Construction: ICC IBC, ICC IFC, NFPA 1, NFPA 70, and NECA NEIS 1.
 2. Hot Work: NFPA 51B.
 3. Work in Confined Spaces: NFPA 350.
 4. Work in Basements and Other Developed Subterranean Spaces: NFPA 520.
 5. Installation of Steel Conduit: NECA NEIS 101.
 6. Installation of Aluminum Conduit: NECA NEIS 102.
 7. Installation of Metal Cable Tray Systems: NECA NEIS 105.
 8. Installation of Nonmetallic Cable Tray Systems: NECA NEIS 111.
 9. Consult Architect for resolution of conflicting requirements.
- C. Special Installation Techniques:
1. Raceway Support Methods: In addition to methods described in NECA NEIS 1, EMT IMC and ERMIC may be supported by openings through structure members, in accordance with NFPA 70.
 2. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination must be weight of supported components plus 200 lb.
 3. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
 - a. To Wood: Fasten with lag screws or through bolts.
 - b. To New Concrete: Bolt to concrete inserts.
 - c. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
 - d. To Existing Concrete: Expansion anchor fasteners.
 - e. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inch thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inch thick.
 - f. To Steel: Beam clamps (MSS SP-58, Type 19, 21, 23, 25, or 27), complying with MSS SP-69.
 - g. To Light Steel: Sheet metal screws.
 - h. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.
 4. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.
- D. Interfaces with Other Work:
1. Provide vibration and seismic controls with hangers and supports.
 2. Touchup Finishes:
 - a. Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

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- 1) Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.
- b. Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.
 - c. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A780.
3. Installation of Fabricated Metal Supports:
 - a. Provide site-fabricated metal supports.
 - b. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
 - c. Field Welding: Comply with AWS D1.1/D1.1M. Submit welding certificates.
4. Installation of Concrete Bases:
 - a. Provide concrete bases of dimensions indicated, but not less than 4 inch larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.
 - b. Use minimum 3000 psi, 28-day compressive-strength concrete.
 - c. Anchor equipment to concrete base as follows:
 - 1) Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 2) Install anchor bolts to elevations required for proper attachment to supported equipment.
 - 3) Install anchor bolts according to anchor-bolt manufacturer's written instructions.

END OF SECTION 26 05 29

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SECTION 26 05 33.13
CONDUIT FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Galvanized steel rigid metal conduit (RMC).
- B. Aluminum rigid metal conduit (RMC).
- C. Intermediate metal conduit (IMC).
- D. PVC-coated galvanized steel rigid metal conduit (RMC).
- E. Flexible metal conduit (FMC).
- F. Liquidtight flexible metal conduit (LFMC).
- G. Electrical metallic tubing (EMT).
- H. Rigid polyvinyl chloride (PVC) conduit.
- I. Liquidtight flexible nonmetallic conduit (LFNC).
- J. Reinforced thermosetting resin conduit (RTRC).
- K. Conduit fittings.
- L. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 07 84 00 - Firestopping.
- B. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
 - 1. Includes additional requirements for fittings for grounding and bonding.
- C. Section 26 05 29 - Hangers and Supports for Electrical Systems.
- D. Section 26 05 33.16 - Boxes for Electrical Systems.
- E. Section 26 05 48 - Vibration and Seismic Controls for Electrical Systems.
- F. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.
- G. Section 26 21 00 - Low-Voltage Electrical Service Entrance: Additional requirements for electrical service conduits.
- H. Section 27 10 00 - Structured Cabling: Additional requirements for communications systems conduits.
- I. Section 33 71 19 - Electrical Underground Ducts, Ductbanks, and Manholes.

1.03 REFERENCE STANDARDS

- A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2015.
- B. ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S); 2015.
- C. ANSI C80.5 - American National Standard for Electrical Rigid Metal Conduit -- Aluminum (ERMC-A); 2015.
- D. ANSI C80.6 - American National Standard for Electrical Intermediate Metal Conduit (EIMC); 2018.
- E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- F. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT); 2013.
- G. NECA 102 - Standard for Installing Aluminum Rigid Metal Conduit; 2004.
- H. NECA 111 - Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC); 2017.
- I. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2014.

- J. NEMA RN 1 - Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit; 2018.
- K. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit; 2013.
- L. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing; 2016.
- M. NEMA TC 14 (SERIES) - Reinforced Thermosetting Resin Conduit and Fittings Series; 2015.
- N. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- O. UL 1 - Flexible Metal Conduit; Current Edition, Including All Revisions.
- P. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.
- Q. UL 6A - Electrical Rigid Metal Conduit-Aluminum, Red Brass, and Stainless Steel; Current Edition, Including All Revisions.
- R. UL 360 - Liquid-Tight Flexible Steel Conduit; Current Edition, Including All Revisions.
- S. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.
- T. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings; Current Edition, Including All Revisions.
- U. UL 797 - Electrical Metallic Tubing-Steel; Current Edition, Including All Revisions.
- V. UL 1203 - Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations; Current Edition, Including All Revisions.
- W. UL 1242 - Electrical Intermediate Metal Conduit-Steel; Current Edition, Including All Revisions.
- X. UL 1660 - Liquid-Tight Flexible Nonmetallic Conduit; Current Edition, Including All Revisions.
- Y. UL 2420 - Belowground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate minimum sizes of conduits with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
 - 2. Coordinate the arrangement of conduits with structural members, ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
 - 3. Verify exact conduit termination locations required for boxes, enclosures, and equipment installed under other sections or by others.
 - 4. Coordinate the work with other trades to provide roof penetrations that preserve the integrity of the roofing system and do not void the roof warranty.
 - 5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not begin installation of conductors and cables until installation of conduit is complete between outlet, junction and splicing points.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittals procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conduits and fittings.
- C. Shop Drawings:
 - 1. Indicate proposed arrangement for conduits to be installed within structural concrete slabs, where permitted.
 - 2. Include proposed locations of roof penetrations and proposed methods for sealing.
- D. Project Record Documents: Record actual routing for conduits installed underground, conduits embedded within concrete slabs, and conduits 2 inch (53 mm) trade size and larger.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store conduit and fittings in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.01 CONDUIT APPLICATIONS

- A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.
- B. Unless otherwise indicated and where not otherwise restricted, use the conduit types indicated for the specified applications. Where more than one listed application applies, comply with the most restrictive requirements. Where conduit type for a particular application is not specified, use galvanized steel rigid metal conduit.
- C. Underground:
 - 1. Under Slab on Grade: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), PVC-coated galvanized steel rigid metal conduit, rigid PVC conduit, or reinforced thermosetting resin conduit (RTRC).
 - 2. Exterior, Direct-Buried: Use galvanized steel rigid metal conduit, intermediate metallic conduit (IMC), PVC-coated galvanized steel rigid metal conduit, rigid PVC conduit, or reinforced thermosetting resin conduit (RTRC).
 - 3. Exterior, Embedded Within Concrete: Use galvanized steel rigid metal conduit, intermediate metallic conduit (IMC), PVC-coated galvanized steel rigid metal conduit, rigid PVC conduit, or reinforced thermosetting resin conduit (RTRC).
 - 4. Where rigid polyvinyl (PVC) conduit is provided, transition to galvanized steel rigid metal conduit where emerging from underground.
 - 5. Where rigid polyvinyl (PVC) conduit larger than 2 inch (53 mm) trade size is provided, use galvanized steel rigid metal conduit elbows for bends.
 - 6. Where steel conduit is installed in direct contact with earth where soil has a resistivity of less than 2000 ohm-centimeters or is characterized as severely corrosive based on soils report or local experience, use corrosion protection tape to provide supplementary corrosion protection or use PVC-coated galvanized steel rigid metal conduit.
 - 7. Where steel conduit emerges from concrete into soil, use corrosion protection tape to provide supplementary corrosion protection for a minimum of 4 inches on either side of where conduit emerges or use PVC-coated galvanized steel rigid metal conduit.
- D. Embedded Within Concrete:
 - 1. Within Slab on Grade (within structural slabs only where approved by Structural Engineer): Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), PVC-coated galvanized steel rigid metal conduit, rigid PVC conduit, or reinforced thermosetting resin conduit (RTRC).
 - 2. Within Slab Above Ground (within structural slabs only where approved by Structural Engineer): Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), PVC-coated galvanized steel rigid metal conduit, rigid PVC conduit, or reinforced thermosetting resin conduit (RTRC).
 - 3. Within Concrete Walls Above Ground: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), PVC-coated galvanized steel rigid metal conduit, rigid PVC conduit, or reinforced thermosetting resin conduit (RTRC).
 - 4. Where rigid polyvinyl (PVC) conduit is provided, transition to galvanized steel rigid metal conduit where emerging from concrete.
- E. Concealed Within Masonry Walls: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or electrical metallic tubing (EMT).

- F. Concealed Within Hollow Stud Walls: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or electrical metallic tubing (EMT).
- G. Concealed Above Accessible Ceilings: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or electrical metallic tubing (EMT).
- H. Interior, Damp or Wet Locations: Use galvanized steel rigid metal conduit.
- I. Exposed, Interior, Not Subject to Physical Damage: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or electrical metallic tubing (EMT).
- J. Exposed, Interior, Subject to Physical Damage: Use galvanized steel rigid metal conduit or intermediate metal conduit (IMC).
 - 1. Locations subject to physical damage include, but are not limited to:
 - a. Where exposed below 8 feet, except within electrical and communication rooms or closets.
 - b. Where exposed below 20 feet in warehouse areas.
- K. Exposed, Exterior: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or PVC-coated galvanized steel rigid metal conduit.
- L. Concealed, Exterior, Not Embedded in Concrete or in Contact With Earth: Use galvanized steel rigid metal conduit or intermediate metal conduit (IMC).
- M. Corrosive Locations Above Ground: Use PVC-coated galvanized steel rigid metal conduit, aluminum rigid metal conduit, or reinforced thermosetting resin conduit (RTRC).
 - 1. Corrosive locations include, but are not limited to:
 - a. Cooling towers.
- N. Hazardous (Classified) Locations: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), aluminum rigid metal conduit, or PVC-coated galvanized steel rigid metal conduit.
- O. Connections to Luminaires Above Accessible Ceilings: Use flexible metal conduit.
 - 1. Maximum Length: 6 feet.
- P. Connections to Vibrating Equipment:
 - 1. Dry Locations: Use flexible metal conduit.
 - 2. Damp, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit.
 - 3. Maximum Length: 6 feet unless otherwise indicated.
 - 4. Vibrating equipment includes, but is not limited to:
 - a. Transformers.
 - b. Motors.

2.02 CONDUIT REQUIREMENTS

- A. Existing Work: Where existing conduits are indicated to be reused, they may be reused only where they comply with specified requirements, are free from corrosion, and integrity is verified by pulling a mandrel through them.
- B. Electrical Service Conduits: Also comply with Section 26 21 00.
- C. Communications Systems Conduits: Also comply with Section 27 10 00.
- D. Fittings for Grounding and Bonding: Also comply with Section 26 05 26.
- E. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.
- F. Provide products listed, classified, and labeled as suitable for the purpose intended.
- G. Minimum Conduit Size, Unless Otherwise Indicated:
 - 1. Branch Circuits: 3/4 inch (21 mm) trade size.
 - 2. Branch Circuit Homeruns: 3/4 inch (21 mm) trade size.
 - 3. Control Circuits: 1/2 inch (16 mm) trade size.
 - 4. Underground, Interior: 3/4 inch (21 mm) trade size.
 - 5. Underground, Exterior: 1 inch (27 mm) trade size.

- H. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

- A. Manufacturers:
1. Allied Tube & Conduit
 2. Republic Conduit
 3. Wheatland Tube, a Division of Zekelman Industries
- B. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.
- C. Fittings:
1. Manufacturers:
 - a. Bridgeport Fittings Inc
 - b. O-Z/Gedney, a brand of Emerson Electric Co
 - c. Thomas & Betts Corporation
 2. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 3. Hazardous (Classified) Locations: Use fittings listed and labeled as complying with UL 1203 for the classification of the installed location.
 4. Material: Use steel or malleable iron.
 - a. Do not use die cast zinc fittings.
 5. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.04 ALUMINUM RIGID METAL CONDUIT (RMC)

- A. Manufacturers:
1. Allied Tube & Conduit
 2. Republic Conduit
 3. Wheatland Tube, a Division of Zekelman Industries
- B. Description: NFPA 70, Type RMC aluminum rigid metal conduit complying with ANSI C80.5 and listed and labeled as complying with UL 6A.
- C. Fittings:
1. Manufacturers:
 - a. Bridgeport Fittings Inc
 - b. O-Z/Gedney, a brand of Emerson Electric Co
 - c. Thomas & Betts Corporation
 2. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 3. Hazardous (Classified) Locations: Use fittings listed and labeled as complying with UL 1203 for the classification of the installed location.
 4. Material: Use aluminum.
 5. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.05 INTERMEDIATE METAL CONDUIT (IMC)

- A. Manufacturers:
1. Allied Tube & Conduit
 2. Republic Conduit
 3. Wheatland Tube, a Division of Zekelman Industries
- B. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.
- C. Fittings:
1. Manufacturers:
 - a. Bridgeport Fittings Inc

- b. O-Z/Gedney, a brand of Emerson Electric Co
 - c. Thomas & Betts Corporation
- 2. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
- 3. Hazardous (Classified) Locations: Use fittings listed and labeled as complying with UL 1203 for the classification of the installed location.
- 4. Material: Use steel or malleable iron.
 - a. Do not use die cast zinc fittings.
- 5. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.06 PVC-COATED GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

- A. Manufacturers:
 - 1. Thomas & Betts Corporation
 - 2. Robroy Industries
- B. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit with external polyvinyl chloride (PVC) coating complying with NEMA RN 1 and listed and labeled as complying with UL 6.
- C. Exterior Coating: Polyvinyl chloride (PVC), nominal thickness of 40 mil.
- D. PVC-Coated Fittings:
 - 1. Manufacturer: Same as manufacturer of PVC-coated conduit to be installed.
 - 2. Non-Hazardous Locations: Use fittings listed and labeled as complying with UL 514B.
 - 3. Hazardous (Classified) Locations: Use fittings listed and labeled as complying with UL 1203 for the classification of the installed location.
 - 4. Material: Use steel or malleable iron.
 - 5. Exterior Coating: Polyvinyl chloride (PVC), minimum thickness of 40 mil.
- E. PVC-Coated Supports: Furnish with exterior coating of polyvinyl chloride (PVC), minimum thickness of 15 mil.

2.07 FLEXIBLE METAL CONDUIT (FMC)

- A. Manufacturers:
 - 1. AFC Cable Systems, Inc
 - 2. Electri-Flex Company
 - 3. International Metal Hose
- B. Description: NFPA 70, Type FMC standard wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems to be used.
- C. Fittings:
 - 1. Manufacturers:
 - a. Bridgeport Fittings Inc
 - b. O-Z/Gedney, a brand of Emerson Electric Co
 - c. Thomas & Betts Corporation
 - 2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 3. Material: Use steel or malleable iron.
 - a. Do not use die cast zinc fittings.

2.08 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

- A. Manufacturers:
 - 1. AFC Cable Systems, Inc
 - 2. Electri-Flex Company
 - 3. International Metal Hose
- B. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.

- C. Fittings:
 - 1. Manufacturers:
 - a. Bridgeport Fittings Inc
 - b. O-Z/Gedney, a brand of Emerson Electric Co
 - c. Thomas & Betts Corporation
 - 2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 3. Material: Use steel or malleable iron.
 - a. Do not use die cast zinc fittings.

2.09 ELECTRICAL METALLIC TUBING (EMT)

- A. Manufacturers:
 - 1. Allied Tube & Conduit
 - 2. Republic Conduit
 - 3. Wheatland Tube, a Division of Zekelman Industries
- B. Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.
- C. Fittings:
 - 1. Manufacturers:
 - a. Bridgeport Fittings Inc
 - b. O-Z/Gedney, a brand of Emerson Electric Co
 - c. Thomas & Betts Corporation
 - 2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 3. Material: Use steel or malleable iron.
 - a. Do not use die cast zinc fittings.
 - 4. Connectors and Couplings: Use compression (gland) type.
 - a. Do not use indenter type connectors and couplings.
 - b. Do not use set-screw type connectors and couplings.
 - 5. Embedded Within Concrete (where permitted): Use fittings listed as concrete-tight. Fittings that require taping to be concrete-tight are acceptable.

2.10 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

- A. Manufacturers:
 - 1. Cantex Inc
 - 2. Carlon, a brand of Thomas & Betts Corporation
 - 3. JM Eagle
- B. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 40 unless otherwise indicated, Schedule 80 where subject to physical damage; rated for use with conductors rated 90 degrees C.
- C. Fittings:
 - 1. Manufacturer: Same as manufacturer of conduit to be connected.
 - 2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.

2.11 LIQUIDTIGHT FLEXIBLE NONMETALLIC CONDUIT (LFNC)

- A. Manufacturers:
 - 1. AFC Cable Systems, Inc
 - 2. Electri-Flex Company
 - 3. International Metal Hose
- B. Description: NFPA 70, Type LFNC liquidtight flexible nonmetallic conduit listed and labeled as complying with UL 1660.
- C. Fittings:

1. Manufacturer: Same as manufacturer of conduit to be connected.
2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B; suitable for the type of conduit to be connected.

2.12 REINFORCED THERMOSETTING RESIN CONDUIT (RTRC)

- A. Manufacturers:
 1. Champion Fiberglass, Inc
 2. FRE Composites
 3. United Fiberglass of America, Inc
- B. Description: NFPA 70, Type RTRC reinforced thermosetting resin conduit complying with NEMA TC 14 (SERIES).
- C. Supports: Per manufacturer's recommendations.
- D. Fittings: Same type and manufacturer as conduit to be connected.
 1. Cement-Tight Joints: Use bonded coupling or bell and spigot.
 2. Cement- and Water-Tight Joints: Use adhesive and manufacturer's standard gaskets.

2.13 ACCESSORIES

- A. Corrosion Protection Tape: PVC-based, minimum thickness of 20 mil.
- B. Conduit Joint Compound: Corrosion-resistant, electrically conductive; suitable for use with the conduit to be installed.
- C. Solvent Cement for PVC Conduit and Fittings: As recommended by manufacturer of conduit and fittings to be installed.
- D. Epoxy Adhesive for RTRC Conduit and Fittings: As recommended by manufacturer of conduit and fittings to be installed.
- E. Pull Strings: Use nylon cord with average breaking strength of not less than 200 pound-force.
- F. Sealing Compound for Sealing Fittings: Listed for use with the particular fittings to be installed.
- G. Modular Seals for Conduit Penetrations: Rated for minimum of 40 psig; Suitable for the conduits to be installed.
- H. Sealing Systems for Roof Penetrations: Premanufactured components and accessories as required to preserve integrity of roofing system and maintain roof warranty; suitable for conduits and roofing system to be installed; designed to accommodate existing penetrations where applicable.
 1. Products:
 - a. Menzies Metal Products; Electrical Roof Stack and Cap
 - b. Menzies Metal Products; Electrical Retro Box
- I. Flashing Panels for Exterior Wall Penetrations: Premanufactured components and accessories as required to preserve integrity of building envelope; suitable for conduits and facade materials to be installed.
 1. Manufacturers:
 - a. Quickflash Weatherproofing Products, Inc
- J. Firestop Sleeves: Listed; provide as required to preserve fire resistance rating of building elements.
 1. Products:
 - a. HoldRite, a brand of Reliance Worldwide Corporation; HydroFlame Pro Series/HydroFlame Custom Built: www.holdrite.com/#sle.
- K. Duct Bank Spacers: Nonmetallic; designed for maintaining conduit/duct spacing for concrete encasement in open trench installation; suitable for the conduit/duct arrangement to be installed.
 1. Products:
 - a. Advance Products & Systems, LLC; Duct Bank Spacers
- L. Bore Spacers: Nonmetallic; designed for maintaining conduit/duct spacing for installation within casing; furnished with roller wheels to facilitate installation, openings to facilitate grout flow, and

holes for stabilization cable; suitable for the casing and conduit/duct arrangement to be installed.

1. Products:
 - a. Advance Products & Systems, LLC; Bore Spacers

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive conduits.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.
- D. Install aluminum rigid metal conduit (RMC) in accordance with NECA 102.
- E. Install intermediate metal conduit (IMC) in accordance with NECA 101.
- F. Install PVC-coated galvanized steel rigid metal conduit (RMC) using only tools approved by the manufacturer.
- G. Install rigid polyvinyl chloride (PVC) conduit in accordance with NECA 111.
- H. Install liquidtight flexible nonmetallic conduit (LFNC) in accordance with NECA 111.
- I. Conduit Routing:
 1. Unless dimensioned, conduit routing indicated is diagrammatic.
 2. When conduit destination is indicated without specific routing, determine exact routing required.
 3. Conceal all conduits unless specifically indicated to be exposed.
 4. Conduits in the following areas may be exposed, unless otherwise indicated:
 - a. Electrical rooms.
 - b. Mechanical equipment rooms.
 - c. Within joists in areas with no ceiling.
 5. Unless otherwise approved, do not route conduits exposed:
 - a. Across floors.
 - b. Across roofs.
 - c. Across top of parapet walls.
 - d. Across building exterior surfaces.
 6. Conduits installed underground or embedded in concrete may be routed in the shortest possible manner unless otherwise indicated. Route all other conduits parallel or perpendicular to building structure and surfaces, following surface contours where practical.
 7. Arrange conduit to maintain adequate headroom, clearances, and access.
 8. Arrange conduit to provide no more than the equivalent of four 90 degree bends between pull points.
 9. Arrange conduit to provide no more than 150 feet between pull points.
 10. Route conduits above water and drain piping where possible.
 11. Arrange conduit to prevent moisture traps. Provide drain fittings at low points and at sealing fittings where moisture may collect.
 12. Maintain minimum clearance of 6 inches between conduits and piping for other systems.
 13. Maintain minimum clearance of 12 inches between conduits and hot surfaces. This includes, but is not limited to:
 - a. Heaters.
 - b. Hot water piping.
 - c. Flues.

14. Group parallel conduits in the same area together on a common rack.
- J. Conduit Support:
1. Secure and support conduits in accordance with NFPA 70 and Section 26 05 29 using suitable supports and methods approved by the authority having jurisdiction.
 2. Provide required vibration isolation and/or seismic controls in accordance with Section 26 05 48.
 3. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
 4. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conduits to lay on ceiling tiles.
 5. Use conduit strap to support single surface-mounted conduit.
 - a. Use clamp back spacer with conduit strap for damp and wet locations to provide space between conduit and mounting surface.
 6. Use metal channel (strut) with accessory conduit clamps to support multiple parallel surface-mounted conduits.
 7. Use conduit clamp to support single conduit from beam clamp or threaded rod.
 8. Use trapeze hangers assembled from threaded rods and metal channel (strut) with accessory conduit clamps to support multiple parallel suspended conduits.
 9. Use non-penetrating rooftop supports to support conduits routed across rooftops (only where approved).
 10. Use of spring steel conduit clips for support of conduits is not permitted.
 11. Where conduit support intervals specified in NFPA 70 and NECA standards differ, comply with the most stringent requirements.
- K. Connections and Terminations:
1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
 2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
 3. Use suitable adapters where required to transition from one type of conduit to another.
 4. Provide drip loops for liquidtight flexible conduit connections to prevent drainage of liquid into connectors.
 5. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
 6. Where spare conduits stub up through concrete floors and are not terminated in a box or enclosure, provide threaded couplings equipped with threaded plugs set flush with finished floor.
 7. Provide insulating bushings or insulated throats at all conduit terminations to protect conductors.
 8. Secure joints and connections to provide maximum mechanical strength and electrical continuity.
- L. Penetrations:
1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
 2. Make penetrations perpendicular to surfaces unless otherwise indicated.
 3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
 4. Conceal bends for conduit risers emerging above ground.
 5. Seal interior of conduits entering the building from underground at first accessible point to prevent entry of moisture and gases.
 6. Provide suitable modular seal where conduits penetrate exterior wall below grade.
 7. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
 8. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are

- necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty. Include proposed locations of penetrations and methods for sealing with submittals.
9. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.
- M. Underground Installation:
1. Minimum Cover, Unless Otherwise Indicated or Required:
 - a. Underground, Exterior: 24 inches.
 - b. Under Slab on Grade: 12 inches to bottom of slab.
 2. Provide underground warning tape in accordance with Section 26 05 53 along entire conduit length for service entrance where not concrete-encased.
- N. Embedment Within Structural Concrete Slabs (only where approved by Structural Engineer):
1. Secure conduits to prevent floating or movement during pouring of concrete.
- O. Hazardous (Classified) Locations: Where conduits cross boundaries of hazardous (classified) locations, provide sealing fittings located as indicated or in accordance with NFPA 70.
- P. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
 2. Where calculated in accordance with NFPA 70 for rigid polyvinyl chloride (PVC) conduit installed above ground to compensate for thermal expansion and contraction.
 3. Where calculated in accordance with NFPA 70 for reinforced thermosetting resin conduit (RTRC) conduit installed above ground to compensate for thermal expansion and contraction.
 4. Where conduits are subject to earth movement by settlement or frost.
- Q. Condensation Prevention: Where conduits cross barriers between areas of potential substantial temperature differential, provide sealing fitting or approved sealing compound at an accessible point near the penetration to prevent condensation. This includes, but is not limited to:
1. Where conduits pass from outdoors into conditioned interior spaces.
 2. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.
 3. Where conduits penetrate coolers or freezers.
- R. Provide pull string in all empty conduits and in conduits where conductors and cables are to be installed by others. Leave minimum slack of 12 inches at each end.
- S. Provide grounding and bonding in accordance with Section 26 05 26.
- T. Identify conduits in accordance with Section 26 05 53.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
- C. Where coating of PVC-coated galvanized steel rigid metal conduit (RMC) contains cuts or abrasions, repair in accordance with manufacturer's instructions.
- D. Correct deficiencies and replace damaged or defective conduits.

3.04 CLEANING

- A. Clean interior of conduits to remove moisture and foreign matter.

3.05 PROTECTION

- A. Immediately after installation of conduit, use suitable manufactured plugs to provide protection from entry of moisture and foreign material and do not remove until ready for installation of conductors.

END OF SECTION

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SECTION 26 05 33.16
BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Outlet and device boxes up to 100 cubic inches, including those used as junction and pull boxes.
- B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches.
- C. Boxes and enclosures for integrated power, data, and audio/video.
- D. Boxes for hazardous (classified) locations.
- E. Floor boxes.
- F. Underground boxes/enclosures.
- G. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete.
- B. Section 07 84 00 - Firestopping.
- C. Section 08 31 00 - Access Doors and Panels: Panels for maintaining access to concealed boxes.
- D. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
- E. Section 26 05 29 - Hangers and Supports for Electrical Systems.
- F. Section 26 05 33.13 - Conduit for Electrical Systems:
 - 1. Conduit bodies and other fittings.
 - 2. Additional requirements for locating boxes to limit conduit length and/or number of bends between pulling points.
- G. Section 26 05 48 - Vibration and Seismic Controls for Electrical Systems.
- H. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.
- I. Section 26 27 26 - Wiring Devices:
 - 1. Wall plates.
 - 2. Floor box service fittings.
 - 3. Poke-through assemblies.
 - 4. Access floor boxes.
 - 5. Additional requirements for locating boxes for wiring devices.
- J. Section 27 10 00 - Structured Cabling: Additional requirements for communications systems outlet boxes.
- K. Section 33 71 19 - Electrical Underground Ducts, Ductbanks, and Manholes: Concrete manholes for electrical systems.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- B. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2010.
- C. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2014.
- D. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; 2013.
- E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2018.
- F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

- G. SCTE 77 - Specification for Underground Enclosure Integrity; 2017.
- H. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
- I. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
- J. UL 508A - UL Standard for Safety Industrial Control Panels; 2018.
- K. UL 514A - Metallic Outlet Boxes; Current Edition, Including All Revisions.
- L. UL 1203 - Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
 - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 3. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.
 - 4. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.
 - 5. Coordinate the placement of boxes with millwork, furniture, devices, equipment, etc. installed under other sections or by others.
 - 6. Coordinate the work with other trades to preserve insulation integrity.
 - 7. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted boxes where indicated.
 - 8. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for cabinets and enclosures, boxes for hazardous (classified) locations, floor boxes, and underground boxes/enclosures.
 - 1. Underground Boxes/Enclosures: Include reports for load testing in accordance with SCTE 77 certified by a professional engineer or an independent testing agency upon request.
- C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 - 2. Keys for Lockable Enclosures: Two of each different key.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.01 BOXES

- A. General Requirements:

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1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
 2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
 3. Provide products listed, classified, and labeled as suitable for the purpose intended.
 4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
 5. Provide grounding terminals within boxes where equipment grounding conductors terminate.
- B. Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:
1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
 2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
 3. Use suitable concrete type boxes where flush-mounted in concrete.
 4. Use suitable masonry type boxes where flush-mounted in masonry walls.
 5. Use raised covers suitable for the type of wall construction and device configuration where required.
 6. Use shallow boxes where required by the type of wall construction.
 7. Do not use "through-wall" boxes designed for access from both sides of wall.
 8. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
 9. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
 10. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
 11. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes unless specifically indicated or permitted.
 12. Minimum Box Size, Unless Otherwise Indicated:
 - a. Wiring Devices (Other Than Communications Systems Outlets): 4 inch square by 1-1/2 inch deep (100 by 38 mm) trade size.
 - b. Communications Systems Outlets: Comply with Section 27 10 00.
 - c. Communications Systems Outlets: 4 inch square by 2-1/8 inch (100 by 54 mm) trade size.
 - d. Ceiling Outlets: 4 inch octagonal or square by 1-1/2 inch deep (100 by 38 mm) trade size.
 13. Wall Plates: Comply with Section 26 27 26.
 14. Manufacturers:
 - a. Hubbell Incorporated; Bell Products
 - b. Hubbell Incorporated; RACO Products
 - c. O-Z/Gedney, a brand of Emerson Electric Co
 - d. Thomas & Betts Corporation
- C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches:
1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
 2. NEMA 250 Environment Type, Unless Otherwise Indicated:
 - a. Indoor Clean, Dry Locations: Type 1, painted steel.
 - b. Outdoor Locations: Type 3R, painted steel.
 3. Junction and Pull Boxes Larger Than 100 cubic inches:
 - a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.
 - b. Boxes 6 square feet and Larger: Provide sectionalized screw-cover or hinged-cover enclosures.
 4. Cabinets and Hinged-Cover Enclosures, Other Than Junction and Pull Boxes:

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- a. Provide lockable hinged covers, all locks keyed alike unless otherwise indicated.
 - b. Back Panels: Painted steel, removable.
 - c. Terminal Blocks: Provide voltage/current ratings and terminal quantity suitable for purpose indicated, with 25 percent spare terminal capacity.
5. Finish for Painted Steel Enclosures: Manufacturer's standard grey unless otherwise indicated.
6. Manufacturers:
 - a. Cooper B-Line, a division of Eaton Corporation
 - b. Hoffman, a brand of Pentair Technical Products
 - c. Hubbell Incorporated; Wiegmann Products
- D. Boxes and Enclosures for Integrated Power, Data, and Audio/Video: Size and configuration as indicated or as required with partitions to separate services; field-connected gangable boxes may be used.
 1. Manufacturers:
 - a. Hubbell Incorporated
- E. Boxes for Hazardous (Classified) Locations: Listed and labeled as complying with UL 1203 for the classification of the installed location.
 1. Manufacturers:
 - a. Appleton, a brand of Emerson Electric Co
 - b. Cooper Crouse-Hinds, a division of Eaton Corporation
 - c. Hubbell Incorporated; Killark Products
- F. Floor Boxes:
 1. Description: Floor boxes compatible with floor box service fittings provided in accordance with Section 26 27 26; with partitions to separate multiple services; furnished with all components, adapters, and trims required for complete installation.
 2. Use cast iron floor boxes within slab on grade.
 3. Use sheet-steel or cast iron floor boxes within slab above grade.
 4. Metallic Floor Boxes: Fully adjustable (with integral means for leveling adjustment prior to and after concrete pour).
 5. Manufacturer: Same as manufacturer of floor box service fittings.
- G. Underground Boxes/Enclosures:
 1. Description: In-ground, open bottom boxes furnished with flush, non-skid covers with legend indicating type of service and stainless steel tamper resistant cover bolts.
 2. Size: As indicated on drawings.
 3. Depth: As required to extend below frost line to prevent frost upheaval, but not less than 12 inches.
 4. Provide logo on cover to indicate type of service.
 5. Applications:
 - a. Sidewalks and Landscaped Areas Subject Only to Occasional Nondeliberate Vehicular Traffic: Use polymer concrete enclosures, with minimum SCTE 77 Tier 8 load rating.
 - b. Parking Lots, in Areas Subject Only To Occasional Nondeliberate Vehicular Traffic: Use polymer concrete enclosures, with minimum SCTE 77 Tier 15 load rating.
 - c. Do not use polymer concrete enclosures in areas subject to deliberate vehicular traffic.
 6. Polymer Concrete Underground Boxes/Enclosures: Comply with SCTE 77.
 - a. Manufacturers:
 - 1) Hubbell Incorporated; Quazite Products
 - 2) MacLean Highline
 - 3) Oldcastle Precast, Inc
 - b. Combination fiberglass/polymer concrete boxes/enclosures are acceptable.
 - c. Product(s):
 - 1) MacLean Highline PHA Series: Straight wall, all-polymer concrete splice box/pull box; available Tier 8, Tier 15, and Tier 22 load ratings.

- 2) MacLean Highline CHA Series: Fiberglass/polymer concrete splice box/pull box; available Tier 8 and Tier 15 load ratings.
- 3) MacLean Highline CVA Series: Fiberglass/polymer concrete splice vault; available Tier 8, Tier 15, and Tier 22 load ratings.

2.02 ACCESSORIES

- A. Flashing Panels for Exterior Wall Penetrations: Premanufactured components and accessories as required to preserve integrity of building envelope; suitable for boxes and facade materials to be installed.
 1. Manufacturers:
 - a. Quickflash Weatherproofing Products, Inc: www.quickflashproducts.com/#sle.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive boxes.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install boxes in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Provide separate boxes for emergency power and normal power systems.
- E. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.
- F. Flush-mount boxes in finished areas unless specifically indicated to be surface-mounted.
- G. Unless otherwise indicated, boxes may be surface-mounted where exposed conduits are indicated or permitted.
- H. Box Locations:
 1. Locate boxes to be accessible. Provide access panels in accordance with Section 08 31 00 as required where approved by the Architect.
 2. Unless dimensioned, box locations indicated are approximate.
 3. Locate boxes as required for devices installed under other sections or by others.
 - a. Switches, Receptacles, and Other Wiring Devices: Comply with Section 26 27 26.
 - b. Communications Systems Outlets: Comply with Section 27 10 00.
 4. Locate boxes so that wall plates do not span different building finishes.
 5. Locate boxes so that wall plates do not cross masonry joints.
 6. Unless otherwise indicated, where multiple outlet boxes are installed at the same location at different mounting heights, install along a common vertical center line.
 7. Do not install flush-mounted boxes on opposite sides of walls back-to-back. Provide minimum 6 inches horizontal separation unless otherwise indicated.
 8. Acoustic-Rated Walls: Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches horizontal separation.
 9. Fire Resistance Rated Walls: Install flush-mounted boxes such that the required fire resistance will not be reduced.
 - a. Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches separation where wall is constructed with individual noncommunicating stud cavities or protect both boxes with listed putty pads.
 - b. Do not install flush-mounted boxes with area larger than 16 square inches or such that the total aggregate area of openings exceeds 100 square inches for any 100 square feet of wall area.

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10. Locate junction and pull boxes as indicated, as required to facilitate installation of conductors, and to limit conduit length and/or number of bends between pulling points in accordance with Section 26 05 33.13.
11. Locate junction and pull boxes in the following areas, unless otherwise indicated or approved by the Architect:
 - a. Concealed above accessible suspended ceilings.
 - b. Within joists in areas with no ceiling.
 - c. Electrical rooms.
 - d. Mechanical equipment rooms.
- I. Box Supports:
 1. Secure and support boxes in accordance with NFPA 70 and Section 26 05 29 using suitable supports and methods approved by the authority having jurisdiction.
 2. Provide required seismic controls in accordance with Section 26 05 48.
 3. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.
 4. Installation Above Suspended Ceilings: Do not provide support from ceiling grid or ceiling support system.
- J. Install boxes plumb and level.
- K. Flush-Mounted Boxes:
 1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch or does not project beyond finished surface.
 2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.
 3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch at the edge of the box.
- L. Floor-Mounted Cabinets: Mount on properly sized 3 inch high concrete pad constructed in accordance with Section 03 30 00.
- M. Install boxes as required to preserve insulation integrity.
- N. Metallic Floor Boxes: Install box level at the proper elevation to be flush with finished floor.
- O. Underground Boxes/Enclosures:
 1. Install enclosure on gravel base, minimum 6 inches deep.
 2. Flush-mount enclosures located in concrete or paved areas.
 3. Mount enclosures located in landscaped areas with top at 1 inch above finished grade.
 4. Install additional bracing inside enclosures in accordance with manufacturer's instructions to minimize box sidewall deflections during backfilling. Backfill with cover bolted in place.
- P. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- Q. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.
- R. Close unused box openings.
- S. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.
- T. Provide grounding and bonding in accordance with Section 26 05 26.
- U. Identify boxes in accordance with Section 26 05 53.

3.03 CLEANING

- A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

3.04 PROTECTION

- A. Immediately after installation, protect boxes from entry of moisture and foreign material until ready for installation of conductors.

END OF SECTION

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SECTION 26 05 48

VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Vibration controls.
 - 2. Seismic and wind controls.
- B. Related Requirements:
 - 1. Section 260010 "Supplemental Requirements for Electrical" specifies additional requirements applicable to coordinating, scheduling, and sequencing of the Work specified in this Section.
 - 2. Section 260529 "Hangers and Supports for Electrical Systems" specifies hangers and supports referenced by this Section.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Prepare and submit catalog cuts, brochures and performance data illustrating size, physical appearance, and other characteristics of product.
 - a. Include rated load capacity for each seismic- and wind-restraint device.
 - b. Illustrate and indicate style, material, strength, fastening provision, and finish for each type and size of seismic- and wind-restraint component used.
 - c. Annotate types and sizes of seismic restraints and accessories, complete with listing markings or report numbers and load rating in tension and compression as evaluated by UL product listing and FM Approvals.
 - d. Annotate to indicate application of each product submitted and compliance with requirements.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Prepare design calculations in accordance with criteria specified in Section 260010 "Supplemental Requirements for Electrical"
- B. Seismic and Wind Restraint Device Ratings: Devices must be tested and rated in accordance with applicable code requirements and authorities having jurisdiction. Devices must be listed by a nationally recognized third party that requires periodic follow-up inspections and has a listing directory available to the public. Provide third-party listing by one or more of the following: UL product listing and FM Approvals.

- C. Consequential Damage: Provide additional seismic and wind restraints for suspended components or anchorage of floor-, roof-, or wall-mounted components so that failure of a non-essential or essential component will not cause failure of any other essential building component.
- D. Fire/Smoke Resistance: Seismic- and wind-restraint devices that are not constructed of ferrous metals must have a maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested by qualified testing laboratory in accordance with ASTM E84 or UL 723, and be so labeled.
- E. Component Supports:
 - 1. Load ratings, features, and applications of reinforcement components must be based on testing standards of qualified testing laboratory.

2.2 VIBRATION CONTROLS

- A. Elastomeric Isolation Pads:
 - 1. Standard Features:
 - a. Fabrication: Single or multiple layers of sufficient durometer stiffness for uniform loading over pad area.
 - b. Size: Factory or field cut to match requirements of supported equipment.
 - c. Pad Material: Oil and water resistant with elastomeric properties. Neoprene rubber, silicone rubber, or other elastomeric material.
 - d. Surface Pattern: Smooth, ribbed, or waffle pattern.
 - e. Infused nonwoven cotton or synthetic fibers.
 - f. Load-bearing metal plates adhered to pads.
 - g. Sandwich-Core Material: Resilient and elastomeric.
 - 1) Surface Pattern: Smooth, ribbed, or waffle pattern.
 - 2) Infused nonwoven cotton or synthetic fibers.

2.3 SEISMIC AND WIND CONTROLS

- A. Restraints - Rigid Type:
 - 1. Standard Features: Shop- or field-fabricated bracing assembly made of ANSI/AISI S110-07-S1 slotted steel channels, ANSI/ASTM A53/A53M steel pipe, or other rigid steel brace member. Includes accessories for attachment to braced component at one end and to building structure at the other end and other matching components and with corrosion-resistant coating; rated in tension, compression, and torsion forces.
- B. Restraints - Cable Type:
 - 1. Standard Features:
 - a. Seismic- and Wind-Restraint Cables: ASTM A492 stainless steel cables. End connections made of steel assemblies with thimbles, brackets, swivel, and bolts designed for seismic-restraining cable service; with fittings attached by means of poured socket, swaged socket, or mechanical (Flemish eye) loop.
 - b. Restraint cable assembly and cable fittings must comply with ASCE/SEI 19. Cable fittings and complete cable assembly must maintain the minimum cable breaking force. U-shaped cable clips and wedge-type end fittings do not comply and are unacceptable.

- C. Restraint Accessories:
 - 1. Standard Features:
 - a. Hanger-Rod Stiffener: Reinforcing steel angle clamped to hanger rod. Non-metallic stiffeners are unacceptable.
 - b. Hinged and Swivel Brace Attachments: Multifunctional steel connectors for attaching hangers to rigid channel bracings and restraint cables.
 - c. Bushings for Floor-Mounted Equipment Anchor Bolts: Neoprene bushings designed for rigid equipment mountings, and matched to type and size of anchor bolts and studs.
 - d. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for rigid equipment mountings, and matched to type and size of attachment devices used.
 - e. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.
- D. Mechanical Anchor Bolts:
 - 1. Standard Features:
 - a. Drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength for anchor and as tested according to ASTM E488/E488M.
 - b. Prequalify post-installed anchors in concrete in accordance with ACI 355.2 or other approved qualification testing procedures.
 - c. Prequalify post-installed anchors in masonry in accordance with approved qualification procedures.
- E. Concrete Inserts **<Insert drawing designation>**:
 - 1. Standard Features:
 - a. Provide preset concrete inserts that are seismically prequalified in accordance with ICC-ES AC446 testing.
 - b. Comply with MSS SP-58.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and equipment to receive seismic and wind control devices for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for reinforcement and cast-in-place anchors to verify actual locations before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SELECTION OF VIBRATION AND SEISMIC CONTROLS

- A. Multiple Raceways or Cables: Secure raceways and cables to trapeze member with clamps approved for application by an agency acceptable to authorities having jurisdiction.

- B. Hanger-Rod Stiffeners: Install where indicated or scheduled on the Drawings to receive them and where required to prevent buckling of hanger rods caused by seismic forces.
- C. Strength of Support and Seismic-Restraint Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry static, wind, and seismic loads within specified loading limits.

3.3 INSTALLATION OF SEISMIC AND WIND CONTROLS

- A. Provide seismic and wind control devices for systems and equipment where indicated in Equipment Schedules or Seismic and Wind Controls Schedule, where indicated on the Drawings, where the Specifications indicate they must be installed on specific equipment and systems, and where required by applicable codes.
 - 1. Install equipment and devices to withstand the effects of earthquake motions and high wind events.
- B. Coordinate location of embedded connection hardware with supported equipment attachment and mounting points and with requirements for concrete reinforcement and formwork specified in Section 033000 "Cast-in-Place Concrete."
- C. Installation of seismic and wind restraints must not cause any stresses, misalignment, or change of position of equipment or conduits.
- D. Equipment Restraints:
 - 1. Install resilient bolt isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inch.
 - 2. Install seismic-restraint and wind-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction that provides required submittals for component.
- E. Raceway, Cable, Wireway, Cable Tray, and Busway Support and Hanger Restraints:
 - 1. Install resilient bolt isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inch.
 - 2. Install seismic-restraint and wind-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction that provides required submittals for component.
 - 3. Install resilient, bolt-isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inch.
 - 4. Install seismic-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction providing required submittals for component.
- F. Install cables so they do not bend across edges of adjacent equipment or building structure.
- G. Install bushing assemblies for mounting bolts for wall-mounted equipment, arranged to provide resilient media where equipment or equipment-mounting channels are attached to wall.
- H. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.
- I. Post-Installed Concrete Anchors:

1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify structural engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
 2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
 3. Mechanical-Type Anchor Bolts: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors must be installed with sleeve fully engaged in the structural element to which anchor will be fastened.
 4. Adhesive-Type Anchor Bolts: Clean holes to remove loose material and drilling dust prior to installation of adhesive. Place adhesive in holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.
 5. Set anchors to manufacturer's recommended torque using a torque wrench.
 6. Install zinc-coated steel anchors for interior and stainless steel anchors for exterior applications.
- J. Accommodation of Differential Seismic Motion: Install flexible connections in runs of raceways, cables, wireways, cable trays, and busways where they cross seismic joints, where adjacent sections or branches are supported by different structural elements, and where connection is terminated to equipment that is anchored to a different structural element from the one supporting them as they approach equipment.

3.4 FIELD QUALITY CONTROL

- A. Field tests must be witnessed by Engineer or Resident Project Representative.
- B. Special Structural Tests and Inspections:
1. Provide evidence of recent calibration of test equipment by a testing agency acceptable to authorities having jurisdiction.
 2. Schedule test with Owner, through Architect, before connecting anchorage device to restrained component (unless postconnection testing has been approved), and with at least seven days' advance notice.
 3. Obtain Architect's approval before transmitting test loads to structure. Provide temporary load-spreading members.
 4. Test no fewer than four of each type and size of installed anchors and fasteners.
 5. Test to 90 percent of rated proof load of device.
- C. Nonconforming Work:
1. Seismic controls will be considered defective if they do not pass tests and inspections.
 2. Remove and replace malfunctioning units and retest as specified above.
- D. Field Quality-Control Reports: Collect, assemble, and submit test and inspection reports.

END OF SECTION 26 05 48

SECTION 26 05 53
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Electrical identification requirements.
- B. Identification nameplates and labels.
- C. Wire and cable markers.
- D. Voltage markers.
- E. Underground warning tape.
- F. Floor marking tape.
- G. Warning signs and labels.

1.02 RELATED REQUIREMENTS

- A. Section 09 91 13 - Exterior Painting.
- B. Section 09 91 23 - Interior Painting.
- C. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables: Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.
- D. Section 26 05 73 - Power System Studies: Arc flash hazard warning labels.
- E. Section 26 23 00 - Low-Voltage Switchgear: Factory-installed mimic bus.
- F. Section 26 27 26 - Wiring Devices - Lutron: Device and wallplate finishes; factory pre-marked wallplates.
- G. Section 27 10 00 - Structured Cabling: Identification for communications cabling and devices.

1.03 REFERENCE STANDARDS

- A. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- B. NFPA 70E - Standard for Electrical Safety in the Workplace; 2018.
- C. UL 969 - Marking and Labeling Systems; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Verify final designations for equipment, systems, and components to be identified prior to fabrication of identification products.
- B. Sequencing:
 - 1. Do not conceal items to be identified, in locations such as above suspended ceilings, until identification products have been installed.
 - 2. Do not install identification products until final surface finishes and painting are complete.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittals procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.
- C. Shop Drawings: Provide schedule of items to be identified indicating proposed designations, materials, legends, and formats.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

1.07 FIELD CONDITIONS

- A. Do not install adhesive products when ambient temperature is lower than recommended by manufacturer.

PART 2 - PRODUCTS

2.01 IDENTIFICATION REQUIREMENTS

- A. Identification for Equipment:
 - 1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
 - a. Switchgear:
 - 1) Identify ampere rating.
 - 2) Identify voltage and phase.
 - 3) Identify power source and circuit number. Include location when not within sight of equipment.
 - 4) Use identification nameplate to identify load(s) served for each branch device. Identify spares and spaces.
 - b. Switchboards:
 - 1) Identify ampere rating.
 - 2) Identify voltage and phase.
 - 3) Identify power source and circuit number. Include location when not within sight of equipment.
 - 4) Use identification nameplate to identify load(s) served for each branch device. Identify spares and spaces.
 - c. Panelboards:
 - 1) Identify ampere rating.
 - 2) Identify voltage and phase.
 - 3) Identify power source and circuit number. Include location when not within sight of equipment.
 - 4) Identify main overcurrent protective device. Use identification label for panelboards with a door. For power distribution panelboards without a door, use identification nameplate.
 - 5) Use typewritten circuit directory to identify load(s) served for panelboards with a door. Identify spares and spaces using pencil.
 - 6) For power panelboards without a door, use identification nameplate to identify load(s) served for each branch device. Identify spares and spaces.
 - d. Transformers:
 - 1) Identify kVA rating.
 - 2) Identify voltage and phase for primary and secondary.
 - 3) Identify power source and circuit number. Include location when not within sight of equipment.
 - 4) Identify load(s) served. Include location when not within sight of equipment.
 - e. Enclosed switches, circuit breakers, and motor controllers:
 - 1) Identify voltage and phase.
 - 2) Identify power source and circuit number. Include location when not within sight of equipment.
 - 3) Identify load(s) served. Include location when not within sight of equipment.
 - f. Transfer Switches:
 - 1) Identify voltage and phase.
 - 2) Identify power source and circuit number for both normal power source and standby power source. Include location when not within sight of equipment.
 - 3) Identify load(s) served. Include location when not within sight of equipment.
 - 4) Identify short circuit current rating based on the specific overcurrent protective device type and settings protecting the transfer switch.
 - 2. Service Equipment:
 - a. Use identification nameplate to identify each service disconnecting means.
 - 3. Emergency System Equipment:
 - a. Use identification nameplate or voltage marker to identify emergency system equipment in accordance with NFPA 70.

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- b. Use identification nameplate at each piece of service equipment to identify type and location of on-site emergency power sources.
 - 4. Use identification label to identify overcurrent protective devices for branch circuits serving fire alarm circuits. Identify with text "FIRE ALARM CIRCUIT".
 - 5. Available Fault Current Documentation: Use identification label to identify the available fault current and date calculations were performed at locations requiring documentation by NFPA 70 including but not limited to the following.
 - a. Service equipment.
 - b. Industrial control panels.
 - c. Motor control centers.
 - d. Elevator control panels.
 - e. Industrial machinery.
 - 6. Arc Flash Hazard Warning Labels: Use warning labels to identify arc flash hazards for electrical equipment, such as switchboards, panelboards, industrial control panels, meter socket enclosures, and motor control centers that are likely to require examination, adjustment, servicing, or maintenance while energized.
 - a. Minimum Size: 3.5 by 5 inches.
 - b. Legend: Include orange header that reads "WARNING", followed by the word message "Arc Flash and Shock Hazard; Appropriate PPE Required; Do not operate controls or open covers without appropriate personal protection equipment; Failure to comply may result in injury or death; Refer to NFPA 70E for minimum PPE requirements" or approved equivalent.
 - c. Service Equipment: Include the following information in accordance with NFPA 70.
 - 1) Nominal system voltage.
 - 2) Available fault current.
 - 3) Clearing time of service overcurrent protective device(s).
 - 4) Date label applied.
- B. Identification for Conductors and Cables:
 - 1. Color Coding for Power Conductors 600 V and Less: Comply with Section 26 05 19.
 - 2. Identification for Communications Conductors and Cables: Comply with Section 27 10 00.
 - 3. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.
 - 4. Use wire and cable markers to identify circuit number or other designation indicated for power, control, and instrumentation conductors and cables at the following locations:
 - 5. Use underground warning tape to identify direct buried cables.
- C. Identification for Raceways:
 - 1. Use voltage markers or color-coded bands to identify systems other than normal power system for accessible conduits at maximum intervals of 20 feet.
 - a. Color-Coded Bands: Use field-painting or vinyl color coding electrical tape to mark bands 3 inches wide.
 - 1) Color Code:
 - (a) Emergency Power System: Red.
 - 2) Field-Painting: Comply with Section 09 91 23 and 09 91 13.
 - 3) Vinyl Color Coding Electrical Tape: Comply with Section 26 05 19.
 - 2. Use underground warning tape to identify underground raceways.
- D. Identification for Devices:
 - 1. Identification for Communications Devices: Comply with Section 27 10 00.

2.02 IDENTIFICATION NAMEPLATES AND LABELS

- A. Identification Nameplates:
 - 1. Manufacturers:
 - a. Brimar Industries, Inc
 - b. Kolbi Pipe Marker Co

- c. Seton Identification Products
 - 2. Materials:
 - a. Indoor Clean, Dry Locations: Use plastic nameplates.
 - b. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.
 - 3. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch; engraved text.
 - 4. Stainless Steel Nameplates: Minimum thickness of 1/32 inch; engraved or laser-etched text.
 - 5. Aluminum Nameplates: Anodized; minimum thickness of 1/32 inch; engraved or laser-etched text.
 - 6. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch high; Four, located at corners for larger sizes.
- B. Identification Labels:
- 1. Manufacturers:
 - a. Brady Corporation
 - b. Brother International Corporation
 - c. Panduit Corp
 - 2. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
 - 3. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.
- C. Format for Equipment Identification:
- 1. Minimum Size: 1 inch by 2.5 inches.
 - 2. Legend:
 - a. System designation where applicable:
 - 1) Emergency Power System: Identify with text "EMERGENCY".
 - 2) Fire Alarm System: Identify with text "FIRE ALARM".
 - b. Equipment designation or other approved description.
 - 3. Text: All capitalized unless otherwise indicated.
 - 4. Minimum Text Height:
 - a. System Designation: 1 inch.
 - b. Equipment Designation: 1/2 inch.
 - 5. Color:
 - a. Normal Power System: White text on black background.
 - b. Emergency Power System: White text on red background.
 - c. Fire Alarm System: White text on red background.
- D. Format for General Information and Operating Instructions:
- 1. Minimum Size: 1 inch by 2.5 inches.
 - 2. Legend: Include information or instructions indicated or as required for proper and safe operation and maintenance.
 - 3. Text: All capitalized unless otherwise indicated.
 - 4. Minimum Text Height: 1/4 inch.
 - 5. Color: Black text on white background unless otherwise indicated.

2.03 WIRE AND CABLE MARKERS

- A. Manufacturers:
 - 1. Brady Corporation
 - 2. HellermannTyton
 - 3. Panduit Corp
- B. Markers for Conductors and Cables: Use wrap-around self-adhesive vinyl cloth, wrap-around self-adhesive vinyl self-laminating, heat-shrink sleeve, plastic sleeve, plastic clip-on, or vinyl split sleeve type markers suitable for the conductor or cable to be identified.

- C. Markers for Conductor and Cable Bundles: Use plastic marker tags secured by nylon cable ties.
- D. Legend: Power source and circuit number or other designation indicated.
- E. Text: Use factory pre-printed or machine-printed text, all capitalized unless otherwise indicated.
- F. Minimum Text Height: 1/8 inch.
- G. Color: Black text on white background unless otherwise indicated.

2.04 VOLTAGE MARKERS

- A. Markers for Conduits: Use factory pre-printed self-adhesive vinyl, self-adhesive vinyl cloth, or vinyl snap-around type markers.
- B. Minimum Size:
 - 1. Markers for Conduits: As recommended by manufacturer for conduit size to be identified.
- C. Legend:
 - 1. Markers for System Identification:
 - a. Emergency Power System: Text "EMERGENCY".
- D. Color: Black text on orange background unless otherwise indicated.

2.05 UNDERGROUND WARNING TAPE

- A. Manufacturers:
 - 1. Brady Corporation
 - 2. Brimar Industries, Inc
 - 3. Seton Identification Products
- B. Materials: Use non-detectable type polyethylene tape suitable for direct burial, unless otherwise indicated.
 - 1. Exception: Use foil-backed detectable type tape where required by serving utility or where directed by Owner.
- C. Non-detectable Type Tape: 6 inches wide, with minimum thickness of 4 mil.
- D. Foil-backed Detectable Type Tape: 3 inches wide, with minimum thickness of 5 mil, unless otherwise required for proper detection.
- E. Legend: Type of service, continuously repeated over full length of tape.
- F. Color:

2.06 WARNING SIGNS AND LABELS

- A. Manufacturers:
 - 1. Brimar Industries, Inc
 - 2. Clarion Safety Systems, LLC
 - 3. Seton Identification Products
- B. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.
- C. Warning Signs:
 - 1. Materials:
 - 2. Minimum Size: 7 by 10 inches unless otherwise indicated.
- D. Warning Labels:
 - 1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
 - 2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.
 - 3. Minimum Size: 2 by 4 inches unless otherwise indicated.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Clean surfaces to receive adhesive products according to manufacturer's instructions.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
 - 1. Surface-Mounted Equipment: Enclosure front.
 - 2. Flush-Mounted Equipment: Inside of equipment door.
 - 3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
 - 4. Elevated Equipment: Legible from the floor or working platform.
 - 5. Branch Devices: Adjacent to device.
 - 6. Interior Components: Legible from the point of access.
 - 7. Conduits: Legible from the floor.
 - 8. Conductors and Cables: Legible from the point of access.
 - 9. Devices: Outside face of cover.
- C. Install identification products centered, level, and parallel with lines of item being identified.
- D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.
- E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.
- F. Install underground warning tape above buried lines with one tape per trench at 3 inches below finished grade.
- G. Mark all handwritten text, where permitted, to be neat and legible.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Replace self-adhesive labels and markers that exhibit bubbles, wrinkles, curling or other signs of improper adhesion.

END OF SECTION

SECTION 26 05 83
WIRING CONNECTIONS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Electrical connections to equipment.

1.02 RELATED REQUIREMENTS

- A. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables.
- B. Section 26 05 33.13 - Conduit for Electrical Systems.
- C. Section 26 05 33.16 - Boxes for Electrical Systems.
- D. Section 26 27 26 - Wiring Devices.
- E. Section 26 28 16.16 - Enclosed Switches.
- F. Section 26 29 13 - Enclosed Controllers.

1.03 REFERENCE STANDARDS

- A. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (Reaffirmed 2015).
- B. NEMA WD 6 - Wiring Devices - Dimensional Specifications; 2016.
- C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.
 - 2. Determine connection locations and requirements.
- B. Sequencing:
 - 1. Install rough-in of electrical connections before installation of equipment is required.
 - 2. Make electrical connections before required start-up of equipment.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Products: Listed, classified, and labeled as suitable for the purpose intended.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Cords and Caps: NEMA WD 6; match receptacle configuration at outlet provided for equipment.
 - 1. Colors: Comply with NEMA WD 1.
 - 2. Cord Construction: NFPA 70, Type SO, multiconductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations.
 - 3. Size: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.
- B. Disconnect Switches: As specified in Section 26 28 16.16 and in individual equipment sections.
- C. Wiring Devices: As specified in Section 26 27 26.
- D. Flexible Conduit: As specified in Section 26 05 33.13.
- E. Wire and Cable: As specified in Section 26 05 19.
- F. Boxes: As specified in Section 26 05 33.16.

2.02 EQUIPMENT CONNECTIONS

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that equipment is ready for electrical connection, wiring, and energization.

3.02 ELECTRICAL CONNECTIONS

- A. Make electrical connections in accordance with equipment manufacturer's instructions.
- B. Make conduit connections to equipment using flexible conduit. Use liquidtight flexible conduit with watertight connectors in damp or wet locations.
- C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.
- D. Provide receptacle outlet to accommodate connection with attachment plug.
- E. Provide cord and cap where field-supplied attachment plug is required.
- F. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.
- G. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.
- H. Install terminal block jumpers to complete equipment wiring requirements.
- I. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.
- J. Coolers and Freezers: Cut and seal conduit openings in freezer and cooler walls, floor, and ceilings.

END OF SECTION

SECTION 26 22 00
LOW-VOLTAGE TRANSFORMERS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. General purpose transformers.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Concrete equipment pads.
- B. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
- C. Section 26 05 29 - Hangers and Supports for Electrical Systems.
- D. Section 26 05 33.13 - Conduit for Electrical Systems: Flexible conduit connections.
- E. Section 26 05 48 - Vibration and Seismic Controls for Electrical Systems.
- F. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.
- G. Section 26 09 16 - Electric Controls and Relays: Industrial control transformers.
- H. Section 26 24 16 - Panelboards.

1.03 REFERENCE STANDARDS

- A. 10 CFR 431, Subpart K - Energy Efficiency Program for Certain Commercial and Industrial Equipment - Distribution Transformers; Current Edition.
- B. IEEE C57.94 - IEEE Recommended Practice for Installation, Application, Operation, and Maintenance of Dry-Type Distribution and Power Transformers; 2015.
- C. IEEE C57.96 - IEEE Standard Guide for Loading Dry-Type Distribution and Power Transformers; 2013.
- D. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- E. NECA 409 - Standard for Installing and Maintaining Dry-Type Transformers; 2015.
- F. NEMA ST 20 - Dry-Type Transformers for General Applications; 2014.
- G. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2018.
- H. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2017.
- I. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- J. UL 506 - Standard for Specialty Transformers; Current Edition, Including All Revisions.
- K. UL 1561 - Standard for Dry-Type General Purpose and Power Transformers; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances required by NFPA 70.
 - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 3. Coordinate the work with placement of supports, anchors, etc. required for mounting.
 - 4. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
 - 5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Include voltage, kVA, impedance, tap configurations, insulation system class and rated temperature rise, efficiency, sound level, enclosure ratings, outline and support point dimensions, weight, required clearances, service condition requirements, and installed features.
 - 1. Vibration Isolators: Include attachment method and rated load and deflection.
- C. Shop Drawings: Provide dimensioned plan and elevation views of transformers and adjacent equipment with all required clearances indicated.
- D. Manufacturer's equipment seismic qualification certification.
- E. Source Quality Control Test Reports: Include reports for tests designated in NEMA ST 20 as design and routine tests.
- F. Field Quality Control Test Reports.
- G. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- H. Maintenance Data: Include recommended maintenance procedures and intervals.
- I. Project Record Documents: Record actual locations of transformers.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- B. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to transformer internal components, enclosure, and finish.

1.08 FIELD CONDITIONS

- A. Ambient Temperature: Do not exceed the following maximum temperatures during and after installation of transformers.
 - 1. Greater than 10 kVA: 104 degrees F maximum.
 - 2. Less than 10 kVA: 77 degrees F maximum.

1.09 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Eaton Corporation
- B. Schneider Electric; Square D Products
- C. Siemens Industry, Inc

2.02 TRANSFORMERS - GENERAL REQUIREMENTS

- A. Description: Factory-assembled, dry type transformers for 60 Hz operation designed and manufactured in accordance with NEMA ST 20 and listed, classified, and labeled as suitable for the purpose intended.
- B. Unless noted otherwise, transformer ratings indicated are for continuous loading according to IEEE C57.96 under the following service conditions:
 - 1. Altitude: Less than 3,300 feet.
 - 2. Ambient Temperature:

- a. Greater than 10 kVA: Not exceeding 104 degrees F.
- b. Less than 10 kVA: Not exceeding 77 degrees F.
- C. Core: High grade, non-aging silicon steel with high magnetic permeability and low hysteresis and eddy current losses. Keep magnetic flux densities substantially below saturation point, even at 10 percent primary overvoltage. Tightly clamp core laminations to prevent plate movement and maintain consistent pressure throughout core length.
- D. Impregnate core and coil assembly with non-hydroscopic thermo-setting varnish to effectively seal out moisture and other contaminants.
- E. Basic Impulse Level: 10 kV.
- F. Ground core and coil assembly to enclosure by means of a visible flexible copper grounding strap.
- G. Isolate core and coil from enclosure using vibration-absorbing mounts.
- H. Nameplate: Include transformer connection data, ratings, wiring diagrams, and overload capacity based on rated winding temperature rise.

2.03 GENERAL PURPOSE TRANSFORMERS

- A. Description: Self-cooled, two winding transformers listed and labeled as complying with UL 506 or UL 1561; ratings as indicated on the drawings.
- B. Primary Voltage: 480 volts delta, 3 phase.
- C. Secondary Voltage: 208Y/120 volts, 3 phase.
- D. Insulation System and Allowable Average Winding Temperature Rise:
 - 1. Less than 15 kVA: Class 180 degrees C insulation system with 115 degrees C average winding temperature rise.
 - 2. 15 kVA and Larger: Class 220 degrees C insulation system with 150 degrees C average winding temperature rise.
- E. Coil Conductors: Continuous copper windings with terminations brazed or welded.
- F. Winding Taps:
 - 1. Less than 3 kVA: None.
 - 2. 3 kVA through 15 kVA: Two 5 percent full capacity primary taps below rated voltage.
 - 3. 15 kVA through 300 kVA: Two 2.5 percent full capacity primary taps above and four 2.5 percent full capacity primary taps below rated voltage.
 - 4. 500 kVA and Larger: Two 2.5 percent full capacity primary taps above and two 2.5 percent full capacity primary taps below rated voltage.
- G. Energy Efficiency: Comply with 10 CFR 431, Subpart K.
- H. Sound Levels: Standard sound levels complying with NEMA ST 20
- I. Mounting Provisions:
 - 1. Less than 15 kVA: Suitable for wall mounting.
 - 2. 15 kVA through 75 kVA: Suitable for wall, floor, or trapeze mounting.
 - 3. Larger than 75 kVA: Suitable for floor mounting.
- J. Transformer Enclosure: Comply with NEMA ST 20.
 - 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Indoor clean, dry locations: Type 2.
 - b. Outdoor locations: Type 3R.
 - 2. Construction: Steel.
 - a. Less than 15 kVA: Totally enclosed, non-ventilated.
 - b. 15 kVA and Larger: Ventilated.
 - 3. Finish: Manufacturer's standard grey, suitable for outdoor installations.
 - 4. Provide lifting eyes or brackets.
- K. Accessories:

1. Lug Kits: Sized as required for termination of conductors as indicated on the drawings.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that suitable support frames and anchors are installed where required and that mounting surfaces are ready to receive transformers.
- C. Perform pre-installation tests and inspections on transformers per manufacturer's instructions and as specified in NECA 409. Correct deficiencies prior to installation.
- D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship).
- B. Install products in accordance with manufacturer's instructions.
- C. Install transformers in accordance with NECA 409 and IEEE C57.94.
- D. Use flexible conduit, under the provisions of Section 26 05 33.13, 2 feet minimum length, for connections to transformer case. Make conduit connections to side panel of enclosure.
- E. Arrange equipment to provide minimum clearances as specified on transformer nameplate and in accordance with manufacturer's instructions and NFPA 70.
- F. Install transformers plumb and level.
- G. Transformer Support:
 1. Provide required support and attachment in accordance with Section 26 05 29, where not furnished by transformer manufacturer.
 2. Use integral transformer flanges, accessory brackets furnished by manufacturer, or field-fabricated supports to support wall-mounted transformers.
 3. Unless otherwise indicated, mount floor-mounted transformers on properly sized 3 inch high concrete pad constructed in accordance with Section 03 30 00.
 4. Use trapeze hangers assembled from threaded rods and metal channel (strut) to support suspended transformers. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
- H. Provide grounding and bonding in accordance with Section 26 05 26.
- I. Remove shipping braces and adjust bolts that attach the core and coil mounting bracket to the enclosure according to manufacturer's recommendations in order to reduce audible noise transmission.
- J. Where not factory-installed, install lugs sized as required for termination of conductors as indicated.
- K. Identify transformers in accordance with Section 26 05 53.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Perform inspections and tests listed in NETA ATS Sections 7.2.1.1 and 7.2.1.2. Tests and inspections listed as optional are not required.
 1. 167 kVA single phase, 500 kVA three phase and smaller:
 - a. Perform turns ratio tests at all tap positions.
 2. Larger than 167 kVA single phase and 500 kVA three phase:
 - a. Verify that control and alarm settings on temperature indicators are as specified.
 - b. Perform excitation-current tests on each phase.
 - c. Measure the resistance of each winding at each tap connection.
 - d. Perform an applied voltage test on all high- and low-voltage windings-to-ground.

3.04 ADJUSTING

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- A. Measure primary and secondary voltages and make appropriate tap adjustments.
- B. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

3.05 CLEANING

- A. Clean dirt and debris from transformer components according to manufacturer's instructions.
- B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION

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SECTION 26 24 16
PANELBOARDS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Power distribution panelboards.
- B. Lighting and appliance panelboards.
- C. Overcurrent protective devices for panelboards.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Concrete equipment pads.
- B. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
- C. Section 26 05 29 - Hangers and Supports for Electrical Systems.
- D. Section 26 05 48 - Vibration and Seismic Controls for Electrical Systems.
- E. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.
- F. Section 26 05 73 - Power System Studies: Additional criteria for the selection and adjustment of equipment and associated protective devices specified in this section.
- G. Section 26 43 00 - Surge Protective Devices.

1.03 REFERENCE STANDARDS

- A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service; 2013e, with Amendments (2022).
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- C. NECA 407 - Standard for Installing and Maintaining Panelboards; 2015.
- D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2018.
- E. NEMA PB 1 - Panelboards; 2011.
- F. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 1000 Volts or Less; 2023.
- G. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2017.
- H. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
- J. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
- K. UL 67 - Panelboards; Current Edition, Including All Revisions.
- L. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures; Current Edition, Including All Revisions.
- M. UL 869A - Reference Standard for Service Equipment; Current Edition, Including All Revisions.
- N. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.
- O. UL 1053 - Ground-Fault Sensing and Relaying Equipment; Current Edition, Including All Revisions.
- P. UL 1699 - Arc-Fault Circuit-Interrupters; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:

1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
3. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted panelboards where indicated.
4. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for panelboards, enclosures, overcurrent protective devices, and other installed components and accessories.
- C. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, overcurrent protective device arrangement and sizes, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.
 1. Include dimensioned plan and elevation views of panelboards and adjacent equipment with all required clearances indicated.
- D. Manufacturer's equipment seismic qualification certification.
- E. Project Record Documents: Record actual installed locations of panelboards and actual installed circuiting arrangements.
- F. Maintenance Data: Include information on replacement parts and recommended maintenance procedures and intervals.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 2. Panelboard Keys: Two of each different key.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store panelboards in accordance with manufacturer's instructions and NECA 407.
- B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- C. Handle carefully in accordance with manufacturer's written instructions to avoid damage to panelboard internal components, enclosure, and finish.

1.08 FIELD CONDITIONS

- A. Maintain ambient temperature within the following limits during and after installation of panelboards:
 1. Panelboards Containing Circuit Breakers: Between 23 degrees F and 104 degrees F.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Eaton Corporation
- B. Schneider Electric; Square D Products

C. Siemens Industry, Inc

2.02 PANELBOARDS - GENERAL REQUIREMENTS

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.
- B. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
 - 1. Altitude: Less than 6,600 feet.
 - 2. Ambient Temperature:
 - a. Panelboards Containing Circuit Breakers: Between 23 degrees F and 104 degrees F.
- C. Short Circuit Current Rating:
 - 1. Provide panelboards with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.
- D. Panelboards Used for Service Entrance: Listed and labeled as suitable for use as service equipment according to UL 869A.
- E. Mains: Configure for top or bottom incoming feed as indicated or as required for the installation.
- F. Branch Overcurrent Protective Devices: Replaceable without disturbing adjacent devices.
- G. Bussing: Sized in accordance with UL 67 temperature rise requirements.
 - 1. Provide fully rated neutral bus unless otherwise indicated, with a suitable lug for each feeder or branch circuit requiring a neutral connection.
 - 2. Provide solidly bonded equipment ground bus in each panelboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.
- H. Conductor Terminations: Suitable for use with the conductors to be installed.
- I. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
 - 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Indoor Clean, Dry Locations: Type 1.
 - b. Outdoor Locations: Type 3R.
 - 2. Boxes: Galvanized steel unless otherwise indicated.
 - a. Provide wiring gutters sized to accommodate the conductors to be installed.
 - b. Increase gutter space as required where sub-feed lugs, feed-through lugs, gutter taps, or oversized lugs are provided.
 - c. Provide removable end walls for NEMA Type 1 enclosures.
 - d. Provide painted steel boxes for surface-mounted panelboards where indicated, finish to match fronts.
 - 3. Fronts:
 - a. Fronts for Surface-Mounted Enclosures: Same dimensions as boxes.
 - b. Fronts for Flush-Mounted Enclosures: Overlap boxes on all sides to conceal rough opening.
 - c. Finish for Painted Steel Fronts: Manufacturer's standard grey unless otherwise indicated.
 - 4. Lockable Doors: All locks keyed alike unless otherwise indicated.
- J. Future Provisions: Prepare all unused spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.
- K. Surge Protective Devices: Where factory-installed, internally mounted surge protective devices are provided in accordance with Section 26 43 00, list and label panelboards as a complete assembly including surge protective device.
- L. Ground Fault Protection: Where ground-fault protection is indicated, provide system listed and labeled as complying with UL 1053.

- M. Multi-Section Panelboards: Provide enclosures of the same height, with feed-through lugs or sub-feed lugs and feeders as indicated or as required to interconnect sections.
- N. Load centers are not acceptable.
- O. Provide the following features and accessories where indicated or where required to complete installation:
 - 1. Feed-through lugs.
 - 2. Sub-feed lugs.

2.03 POWER DISTRIBUTION PANELBOARDS

- A. Description: Panelboards complying with NEMA PB 1, power and feeder distribution type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.
- B. Conductor Terminations:
 - 1. Main and Neutral Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
 - 2. Main and Neutral Lug Type: Mechanical.
- C. Bussing:
 - 1. Phase and Neutral Bus Material: Copper.
 - 2. Ground Bus Material: Copper.
- D. Circuit Breakers:
 - 1. Provide bolt-on type or plug-in type secured with locking mechanical restraints.
- E. Enclosures:
 - 1. Provide surface-mounted enclosures unless otherwise indicated.

2.04 LIGHTING AND APPLIANCE PANELBOARDS

- A. Description: Panelboards complying with NEMA PB 1, lighting and appliance branch circuit type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.
- B. Conductor Terminations:
 - 1. Main and Neutral Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
 - 2. Main and Neutral Lug Type: Mechanical.
- C. Bussing:
 - 1. Phase Bus Connections: Arranged for sequential phasing of overcurrent protective devices.
 - 2. Phase and Neutral Bus Material: Copper.
 - 3. Ground Bus Material: Copper.
- D. Circuit Breakers: Thermal magnetic bolt-on type unless otherwise indicated.
- E. Enclosures:
 - 1. Provide surface-mounted or flush-mounted enclosures as indicated.
 - 2. Provide clear plastic circuit directory holder mounted on inside of door.

2.05 OVERCURRENT PROTECTIVE DEVICES

- A. Molded Case Circuit Breakers:
 - 1. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
 - 2. Interrupting Capacity:
 - a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than:
 - b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
 - 3. Conductor Terminations:

- a. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
4. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
5. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.
6. Provide the following circuit breaker types where indicated:
 - a. Ground Fault Circuit Interrupter (GFCI) Circuit Breakers: Listed as complying with UL 943, class A for protection of personnel.
 - b. Ground Fault Equipment Protection Circuit Breakers: Designed to trip at 30 mA for protection of equipment.
 - c. Arc-Fault Circuit Interrupter (AFCI) Circuit Breakers: Combination type listed as complying with UL 1699.
 - d. 100 Percent Rated Circuit Breakers: Listed for application within the panelboard where installed at 100 percent of the continuous current rating.
 - e. Current Limiting Circuit Breakers: Without using fusible elements, designed to limit the let-through energy to a value less than the energy of a one-half cycle wave of the symmetrical prospective current when operating within its current limiting range.
7. Do not use tandem circuit breakers.
8. Do not use handle ties in lieu of multi-pole circuit breakers.
9. Provide the following features and accessories where indicated or where required to complete installation:
 - a. Shunt Trip: Provide coil voltage as required for connection to indicated trip actuator.
 - b. Handle Pad-Lock Provision: For locking circuit breaker handle in OFF position.

2.06 SOURCE QUALITY CONTROL

- A. Factory test panelboards according to NEMA PB 1.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that the ratings and configurations of the panelboards and associated components are consistent with the indicated requirements.
- C. Verify that mounting surfaces are ready to receive panelboards.
- D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship).
- B. Install products in accordance with manufacturer's instructions.
- C. Install panelboards in accordance with NECA 407 and NEMA PB 1.1.
- D. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- E. Provide required support and attachment in accordance with Section 26 05 29.
- F. Install panelboards plumb.
- G. Install flush-mounted panelboards so that trims fit completely flush to wall with no gaps and rough opening completely covered.
- H. Mount panelboards such that the highest position of any operating handle for circuit breakers or switches does not exceed 79 inches above the floor or working platform.
- I. Mount floor-mounted power distribution panelboards on properly sized 3 inch high concrete pad constructed in accordance with Section 03 30 00.
- J. Provide minimum of six spare 1 inch trade size conduits out of each flush-mounted panelboard stubbed into accessible space above ceiling and below floor.
- K. Provide grounding and bonding in accordance with Section 26 05 26.

- L. Install all field-installed branch devices, components, and accessories.
- M. Set field-adjustable circuit breaker tripping function settings as determined by overcurrent protective device coordination study performed according to Section 26 05 73.
- N. Set field-adjustable ground fault protection pickup and time delay settings as indicated.
- O. Provide filler plates to cover unused spaces in panelboards.
- P. Provide circuit breaker lock-on devices to prevent unauthorized personnel from de-energizing essential loads where indicated. Also provide for the following:
 - 1. Fire detection and alarm circuits.
- Q. Identify panelboards in accordance with Section 26 05 53.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Molded Case Circuit Breakers: Perform inspections and tests listed in NETA ATS, Section 7.6.1.1 for all main circuit breakers. Tests listed as optional are not required.
- D. Ground Fault Protection Systems: Test in accordance with manufacturer's instructions as required by NFPA 70.
- E. Test GFCI circuit breakers to verify proper operation.
- F. Test AFCI circuit breakers to verify proper operation.
- G. Test shunt trips to verify proper operation.
- H. Correct deficiencies and replace damaged or defective panelboards or associated components.

3.04 ADJUSTING

- A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.
- B. Adjust alignment of panelboard fronts.

3.05 CLEANING

- A. Clean dirt and debris from panelboard enclosures and components according to manufacturer's instructions.
- B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION

SECTION 26 27 26
WIRING DEVICES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Wall switches.
- B. Wall dimmers.
- C. Fan speed controllers.
- D. Receptacles.
- E. Wall plates.
- F. Floor box service fittings.
- G. Poke-through assemblies.
- H. Access floor boxes.

1.02 RELATED REQUIREMENTS

- A. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables: Manufactured wiring systems for use with access floor boxes with compatible pre-wired connectors.
- B. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
- C. Section 26 05 33.16 - Boxes for Electrical Systems.
- D. Section 26 05 33.23 - Surface Raceways for Electrical Systems: Surface raceway systems, including multioutlet assemblies.
- E. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.
- F. Section 26 05 83 - Wiring Connections: Cords and plugs for equipment.
- G. Section 26 09 23 - Lighting Control Devices: Devices for automatic control of lighting, including occupancy sensors, in-wall time switches, and in-wall interval timers.

1.03 REFERENCE STANDARDS

- A. FS W-C-596 - Connector, Electrical, Power, General Specification for; 2014h, with Amendments (2017).
- B. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush Mounted (General Specification); 2014g, with Amendment (2017).
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- D. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2010.
- E. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (Reaffirmed 2015).
- F. NEMA WD 6 - Wiring Devices - Dimensional Specifications; 2016.
- G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. UL 20 - General-Use Snap Switches; Current Edition, Including All Revisions.
- I. UL 498 - Attachment Plugs and Receptacles; Current Edition, Including All Revisions.
- J. UL 514D - Cover Plates for Flush-Mounted Wiring Devices; Current Edition, Including All Revisions.
- K. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.
- L. UL 1472 - Solid-State Dimming Controls; Current Edition, Including All Revisions.
- M. UL 1917 - Solid-State Fan Speed Controls; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:

1. Coordinate the placement of outlet boxes with millwork, furniture, equipment, etc. installed under other sections or by others.
2. Coordinate wiring device ratings and configurations with the electrical requirements of actual equipment to be installed.
3. Coordinate the placement of outlet boxes for wall switches with actual installed door swings.
4. Coordinate the installation and preparation of uneven surfaces, such as split face block, to provide suitable surface for installation of wiring devices.
5. Coordinate the core drilling of holes for poke-through assemblies with the work covered under other sections.
6. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.
 1. Wall Dimmers: Include derating information for ganged multiple devices.
- C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- D. Operation and Maintenance Data:
 1. Wall Dimmers: Include information on operation and setting of presets.
 2. GFCI Receptacles: Include information on status indicators.
- E. Project Record Documents: Record actual installed locations of wiring devices.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 2. Screwdrivers for Tamper-Resistant Screws: Two for each type of screw.
 3. Extra Keys for Locking Switches: Two of each type.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Products: Listed, classified, and labeled as suitable for the purpose intended.

1.07 DELIVERY, STORAGE, AND PROTECTION

- A. Store in a clean, dry space in original manufacturer's packaging until ready for installation.

PART 2 - PRODUCTS

2.01 WIRING DEVICE APPLICATIONS

- A. Provide wiring devices suitable for intended use and with ratings adequate for load served.
- B. For single receptacles installed on an individual branch circuit, provide receptacle with ampere rating not less than that of the branch circuit.
- C. Provide weather resistant GFCI receptacles with specified weatherproof covers for receptacles installed outdoors or in damp or wet locations.
- D. Provide tamper resistant receptacles for receptacles installed in dwelling units.
- E. Provide GFCI protection for receptacles installed within 6 feet of sinks.
- F. Provide GFCI protection for receptacles installed in kitchens.
- G. Provide GFCI protection for receptacles serving electric drinking fountains.
- H. For flush floor service fittings, use tile rings for installations in tile floors.

- I. For flush floor service fittings, use carpet flanges for installations in carpeted floors.

2.02 WIRING DEVICE FINISHES

- A. Provide wiring device finishes as described below unless otherwise indicated.
- B. Wiring Devices, Unless Otherwise Indicated: Color to be selected by Architect from Manufacturer's list of standard colors.
- C. Wiring Devices Installed in Wet or Damp Locations: Color to be selected by Architect from Manufacturer's list of standard colors. with weatherproof cover.
- D. Wiring Devices Connected to Emergency Power: Red with red nylon wall plate.
- E. Flush Floor Box Service Fittings: Color as selected by Architect from Manufacturer's standard list of colors wiring devices with aluminum cover and ring/flange.
- F. Flush Poke-Through Service Fittings: Color as selected by Architect from Manufacturer's standard list of colors wiring devices with aluminum cover and aluminum flange.
- G. Access Floor Boxes: Gray wiring devices with gray steel cover with insert to match floor covering.

2.03 WALL SWITCHES

- A. Manufacturers:
 - 1. Hubbell Incorporated
 - 2. Leviton Manufacturing Company, Inc
 - 3. Pass & Seymour, a brand of Legrand North America, Inc
- B. Wall Switches - General Requirements: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20 and where applicable, FS W-S-896; types as indicated on the drawings.
 - 1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.
- C. Standard Wall Switches: Commercial specification grade, 20 A, 120/277 V with standard toggle type switch actuator and maintained contacts; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.
- D. Pilot Light Wall Switches: Commercial specification grade, 20 A, 120/277 V with red illuminated standard toggle type switch actuator and maintained contacts; illuminated with load on; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.

2.04 WALL DIMMERS

- A. Manufacturers:
 - 1. Leviton Manufacturing Company, Inc
 - 2. Lutron Electronics Company, Inc; Maestro Series
 - 3. Pass & Seymour, a brand of Legrand North America, Inc
- B. Wall Dimmers - General Requirements: Solid-state with continuous full-range even control following square law dimming curve, integral radio frequency interference filtering, power failure preset memory, air gap switch accessible without removing wall plate, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 1472; types and ratings suitable for load controlled as indicated on the drawings.
- C. Control: Slide control type with separate on/off switch.
- D. Power Rating, Unless Otherwise Indicated or Required to Control the Load Indicated on the Drawings.

2.05 FAN SPEED CONTROLLERS

- A. Manufacturers:
 - 1. Leviton Manufacturing Company, Inc
 - 2. Lutron Electronics Company, Inc; Maestro Series
 - 3. Pass & Seymour, a brand of Legrand North America, Inc

- B. Description: 120 V AC, solid-state, full-range variable speed, slide control type with separate on/off switch, with integral radio frequency interference filtering, fan noise elimination circuitry, power failure preset memory, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 1917.
 - 1. Current Rating: 1.5 A unless otherwise indicated or required to control the load indicated on the drawings.

2.06 RECEPTACLES

- A. Manufacturers:
 - 1. Hubbell Incorporated
 - 2. Leviton Manufacturing Company, Inc
 - 3. Pass & Seymour, a brand of Legrand North America, Inc
- B. Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498, and where applicable, FS W-C-596; types as indicated on the drawings.
 - 1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.
 - 2. NEMA configurations specified are according to NEMA WD 6.
- C. Convenience Receptacles:
 - 1. Standard Convenience Receptacles: Commercial specification grade, 20A, 125V, NEMA 5-20R; single or duplex as indicated on the drawings.
 - 2. Weather Resistant Convenience Receptacles: Commercial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations; single or duplex as indicated on the drawings.
 - 3. Tamper Resistant Convenience Receptacles: Commercial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as tamper resistant type; single or duplex as indicated on the drawings.
 - 4. Tamper Resistant and Weather Resistant Convenience Receptacles: Commercial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as tamper resistant type and as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations; single or duplex as indicated on the drawings.
- D. GFCI Receptacles:
 - 1. GFCI Receptacles - General Requirements: Self-testing, with feed-through protection and light to indicate ground fault tripped condition and loss of protection; listed as complying with UL 943, class A.
 - a. Provide test and reset buttons of same color as device.
 - 2. Standard GFCI Receptacles: Commercial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style.
 - 3. Weather Resistant GFCI Receptacles: Commercial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations.
 - 4. Tamper Resistant GFCI Receptacles: Commercial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as tamper resistant type.
 - 5. Tamper Resistant and Weather Resistant GFCI Receptacles: Commercial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as tamper resistant type and as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations.
- E. Locking Receptacles: Industrial specification grade, configuration as indicated on the drawings.

2.07 WALL PLATES

- A. Manufacturers:
 - 1. Hubbell Incorporated
 - 2. Leviton Manufacturing Company, Inc

3. Lutron Electronics Company, Inc
4. Pass & Seymour, a brand of Legrand North America, Inc
- B. Wall Plates: Comply with UL 514D.
 1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
 2. Size: Standard.
 3. Screws: Metal with slotted heads finished to match wall plate finish.
- C. Nylon Wall Plates: Smooth finish, high-impact thermoplastic.
- D. Stainless Steel Wall Plates: Brushed satin finish, Type 302 stainless steel.
- E. Weatherproof Covers for Damp Locations: Gasketed, cast aluminum, with self-closing hinged cover and corrosion-resistant screws; listed as suitable for use in wet locations with cover closed.
- F. Weatherproof Covers for Wet Locations: Gasketed, cast aluminum, with hinged lockable cover and corrosion-resistant screws; listed as suitable for use in wet locations while in use with attachment plugs connected and identified as extra-duty type.

2.08 FLOOR BOX SERVICE FITTINGS

- A. Manufacturers:
 1. Hubbell Incorporated
 2. Thomas & Betts Corporation
 3. Wiremold, a brand of Legrand North America, Inc
- B. Description: Service fittings compatible with floor boxes provided under Section 26 05 33.16 with components, adapters, and trims required for complete installation.

2.09 POKE-THROUGH ASSEMBLIES

- A. Manufacturers:
 1. Hubbell Incorporated
 2. Thomas & Betts Corporation
 3. Wiremold, a brand of Legrand North America, Inc
- B. Description: Assembly comprising floor service fitting, poke-through component, fire stops and smoke barriers, and junction box for conduit termination; fire rating listed to match fire rating of floor and suitable for floor thickness where installed.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.
- C. Verify that wall openings are neatly cut and will be completely covered by wall plates.
- D. Verify that final surface finishes are complete, including painting.
- E. Verify that floor boxes are adjusted properly.
- F. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.
- G. Verify that core drilled holes for poke-through assemblies are in proper locations.
- H. Verify that openings in access floor are in proper locations.
- I. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.
- B. Coordinate locations of outlet boxes provided under Section 26 05 33.16 as required for installation of wiring devices provided under this section.
 - 1. Mounting Heights: Unless otherwise indicated, as follows:
 - a. Wall Switches: 48 inches above finished floor.
 - b. Wall Dimmers: 48 inches above finished floor.
 - c. Fan Speed Controllers: 48 inches above finished floor.
 - d. Receptacles: 18 inches above finished floor or 6 inches above counter.
 - 2. Orient outlet boxes for vertical installation of wiring devices unless otherwise indicated.
 - 3. Where multiple receptacles, wall switches, or wall dimmers are installed at the same location and at the same mounting height, gang devices together under a common wall plate.
 - 4. Locate wall switches on strike side of door with edge of wall plate 3 inches from edge of door frame. Where locations are indicated otherwise, notify Architect to obtain direction prior to proceeding with work.
 - 5. Locate receptacles for electric drinking fountains concealed behind drinking fountain according to manufacturer's instructions.
- C. Install wiring devices in accordance with manufacturer's instructions.
- D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- E. Where required, connect wiring devices using pigtails not less than 6 inches long. Do not connect more than one conductor to wiring device terminals.
- F. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.
- G. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
- H. Provide GFCI receptacles with integral GFCI protection at each location indicated. Do not use feed-through wiring to protect downstream devices.
- I. Install wiring devices plumb and level with mounting yoke held rigidly in place.
- J. Install wall switches with OFF position down.
- K. Install wall dimmers to achieve full rating specified and indicated after derating for ganging as instructed by manufacturer.
- L. Do not share neutral conductor on branch circuits utilizing wall dimmers.
- M. Install vertically mounted receptacles with grounding pole on top and horizontally mounted receptacles with grounding pole on left.
- N. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.
- O. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.
- P. Install poke-through closure plugs in each unused core holes to maintain fire rating of floor.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Inspect each wiring device for damage and defects.
- C. Operate each wall switch, wall dimmer, and fan speed controller with circuit energized to verify proper operation.

- D. Test each receptacle to verify operation and proper polarity.
- E. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.
- F. Correct wiring deficiencies and replace damaged or defective wiring devices.

3.05 ADJUSTING

- A. Adjust devices and wall plates to be flush and level.
- B. Adjust presets for wall dimmers according to manufacturer's instructions as directed by Architect.

3.06 CLEANING

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

END OF SECTION

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SECTION 26 28 16.16
ENCLOSED SWITCHES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Enclosed safety switches.

1.02 RELATED REQUIREMENTS

- A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
- B. Section 26 05 29 - Hangers and Supports for Electrical Systems.
- C. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.
- D. Section 26 28 13 - Fuses.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2018.
- C. NEMA KS 1 - Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum); 2013.
- D. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2017.
- E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
- G. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
- H. UL 98 - Enclosed and Dead-Front Switches; Current Edition, Including All Revisions.
- I. UL 869A - Reference Standard for Service Equipment; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other trades. Avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and within working clearances for electrical equipment required by NFPA 70.
 - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 3. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
 - 4. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for enclosed switches and other installed components and accessories.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- B. Handle carefully in accordance with manufacturer's written instructions to avoid damage to enclosed switch internal components, enclosure, and finish.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Eaton Corporation
- B. Schneider Electric; Square D Products
- C. Siemens Industry, Inc
- D. Source Limitations: Furnish enclosed switches and associated components produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

2.02 ENCLOSED SAFETY SWITCHES

- A. Description: Quick-make, quick-break enclosed safety switches listed and labeled as complying with UL 98; heavy duty; ratings, configurations, and features as indicated on the drawings.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
 - 1. Altitude: Less than 6,600 feet.
 - 2. Ambient Temperature: Between -22 degrees F and 104 degrees F.
- D. Horsepower Rating: Suitable for connected load.
- E. Voltage Rating: Suitable for circuit voltage.
- F. Short Circuit Current Rating:
 - 1. Provide enclosed safety switches, when protected by the fuses or supply side overcurrent protective devices to be installed, with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.
 - 2. Minimum Ratings:
 - a. Heavy Duty Single Throw Switches Protected by Class R, Class J, Class L, or Class T Fuses: 200,000 rms symmetrical amperes.
 - b. Double Throw Switches Protected by Class R, Class J, or Class T Fuses: 100,000 rms symmetrical amperes.
- G. Enclosed Safety Switches Used for Service Entrance: Listed and labeled as suitable for use as service equipment according to UL 869A.
- H. Provide with switch blade contact position that is visible when the cover is open.
- I. Fuse Clips for Fusible Switches: As required to accept fuses indicated.
- J. Conductor Terminations: Suitable for use with the conductors to be installed.
- K. Provide insulated, groundable fully rated solid neutral assembly where a neutral connection is required, with a suitable lug for terminating each neutral conductor.
- L. Provide solidly bonded equipment ground bus in each enclosed safety switch, with a suitable lug for terminating each equipment grounding conductor.
- M. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
 - 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Indoor Clean, Dry Locations: Type 1.
 - b. Outdoor Locations: Type 3R.
 - 2. Finish for Painted Steel Enclosures: Manufacturer's standard, factory applied grey unless otherwise indicated.

- N. Provide safety interlock to prevent opening the cover with the switch in the ON position with capability of overriding interlock for testing purposes.
- O. Heavy Duty Switches:
 - 1. Comply with NEMA KS 1.
 - 2. Conductor Terminations:
 - a. Provide mechanical lugs unless otherwise indicated.
 - b. Lug Material: Copper, suitable for terminating copper conductors only.
 - 3. Provide externally operable handle with means for locking in the OFF position, capable of accepting three padlocks.
 - a. Provide means for locking handle in the ON position where indicated.
- P. Provide the following features and accessories where indicated or where required to complete installation:
 - 1. Hubs: As required for environment type; sized to accept conduits to be installed.
 - 2. Integral fuse pullers.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that the ratings of the enclosed switches are consistent with the indicated requirements.
- C. Verify that mounting surfaces are ready to receive enclosed safety switches.
- D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Provide required support and attachment in accordance with Section 26 05 29.
- E. Install enclosed switches plumb.
- F. Except where indicated to be mounted adjacent to the equipment they supply, mount enclosed switches such that the highest position of the operating handle does not exceed 79 inches above the floor or working platform.
- G. Provide grounding and bonding in accordance with Section 26 05 26.
- H. Provide fuses complying with Section 26 28 13 for fusible switches as indicated or as required by equipment manufacturer's recommendations.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.5.1.1.
- D. Correct deficiencies and replace damaged or defective enclosed safety switches or associated components.

3.04 ADJUSTING

- A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

3.05 CLEANING

- A. Clean dirt and debris from switch enclosures and components according to manufacturer's instructions.
- B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION

SECTION 26 32 13
ENGINE GENERATORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Packaged engine generator system and associated components and accessories:
 - 1. Engine and engine accessory equipment.
 - 2. Alternator (generator).
 - 3. Generator set control system.
 - 4. Generator set enclosure.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Concrete equipment pads.
- B. Section 23 11 23 - Facility Natural-Gas Piping.
- C. Section 23 11 26 - Facility Liquefied-Petroleum Gas Piping.
- D. Section 23 51 00 - Breechings, Chimneys, and Stacks: Engine exhaust piping.
- E. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
- F. Section 26 05 29 - Hangers and Supports for Electrical Systems.
- G. Section 26 05 48 - Vibration and Seismic Controls for Electrical Systems.
- H. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.
- I. Section 26 36 00 - Transfer Switches.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- B. NECA/EGSA 404 - Standard for Installing Generator Sets; 2014.
- C. NEMA MG 1 - Motors and Generators; 2018.
- D. NFPA 30 - Flammable and Combustible Liquids Code; 2018.
- E. NFPA 37 - Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines; 2018.
- F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. NFPA 99 - Health Care Facilities Code; 2018.
- H. NFPA 110 - Standard for Emergency and Standby Power Systems; 2019.
- I. UL 1236 - Battery Chargers for Charging Engine-Starter Batteries; Current Edition, Including All Revisions.
- J. UL 2200 - Stationary Engine Generator Assemblies; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate compatibility of generator sets to be installed with work provided under other sections or by others.
 - a. Transfer Switches: See Section 26 36 00.
 - 2. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment or other potential obstructions within the spaces dedicated for engine generator system.
 - 3. Coordinate arrangement of equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 4. Coordinate the work to provide electrical circuits suitable for the power requirements of the actual auxiliary equipment and accessories to be installed.

5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product, including ratings, configurations, dimensions, finishes, weights, service condition requirements, and installed features. Include alternator starting capabilities, engine fuel consumption rates, and cooling, combustion air, and exhaust requirements.
 1. Include generator set sound level test data.
 2. Include characteristic trip curves for overcurrent protective devices upon request.
 3. Include alternator thermal damage curve upon request.
- C. Shop Drawings: Include dimensioned plan views and sections indicating locations of system components, required clearances, and field connection locations. Include system interconnection schematic diagrams showing all factory and field connections.
 1. Identify mounting conditions required for equipment seismic qualification.
- D. Manufacturer's equipment seismic qualification certification.
- E. Fuel Storage Tank Calculations: Indicate maximum running time for generator set configuration provided.
- F. Manufacturer's factory emissions certification.
- G. Source quality control test reports.
- H. Maintenance contracts.
- I. Project Record Documents: Record actual locations of system components, installed circuiting arrangements and routing, and final equipment settings.
- J. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 2. Extra Fuses: One of each type and size.
 3. Extra Filter Elements: One of each type, including fuel, oil and air.

1.06 QUALITY ASSURANCE

- A. Comply with the following:
 1. NFPA 70 (National Electrical Code).
 2. NFPA 37 (Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines).
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
 1. Authorized service facilities located within 200 miles of project site.
- C. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience with engine generator systems of similar size, type, and complexity; manufacturer's authorized installer.
- D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store generator sets in accordance with manufacturer's instructions and NECA/EGSA 404.
- B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- C. Handle carefully in accordance with manufacturer's instructions to avoid damage to generator set components, enclosure, and finish.

1.08 FIELD CONDITIONS

- A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.09 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Provide minimum one year manufacturer warranty covering repair or replacement due to defective materials or workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Packaged Engine Generator Set - Basis of Design: MTU.

2.02 PACKAGED ENGINE GENERATOR SYSTEM

- A. Provide new engine generator system consisting of all required equipment, sensors, conduit, boxes, wiring, piping, supports, accessories, system programming, etc. as necessary for a complete operating system that provides the functional intent indicated.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. System Description:
 - 1. Application: Emergency/standby.
 - 2. Configuration: Single packaged engine generator set operated independently (not in parallel).
- D. Packaged Engine Generator Set:
 - 1. Type: As indicated on drawings.
 - 2. Power Rating: As indicated on drawings.
 - 3. Voltage: As indicated on drawings.
 - 4. Main Line Circuit Breaker:
 - a. Type: Thermal magnetic.
 - b. Trip Rating: Select according to generator set rating.
- E. Generator Set General Requirements:
 - 1. Prototype tested in accordance with NFPA 110 for Level 1 systems.
 - 2. Factory-assembled, with components mounted on suitable base.
 - 3. List and label engine generator assembly as complying with UL 2200.
 - 4. Power Factor: Unless otherwise indicated, specified power ratings are at 0.8 power factor for three phase voltages and 1.0 power factor for single phase voltages.
 - 5. Provide suitable guards to protect personnel from accidental contact with rotating parts, hot piping, and other potential sources of injury.
 - 6. Main Line Circuit Breakers: Provide factory-installed line side connections with suitable lugs for load side connections.
- F. Service Conditions: Provide engine generator system and associated components suitable for operation under the service conditions at the installed location.
- G. Starting and Load Acceptance Requirements:
 - 1. Cranking Method: Cycle cranking complying with NFPA 110 (15 second crank period, followed by 15 second rest period, with cranking limiter time-out after 3 cycles), unless otherwise required.
 - 2. Cranking Limiter Time-Out: If generator set fails to start after specified cranking period, indicate overcrank alarm condition and lock-out generator set from further cranking until manually reset.
 - 3. Start Time: Capable of starting and achieving conditions necessary for load acceptance within 10 seconds (NFPA 110, Type 10).
 - 4. Maximum Load Step: Supports 100 percent of rated load in one step.
- H. Exhaust Emissions Requirements:
 - 1. Comply with federal (EPA), state, and local regulations applicable at the time of commissioning; include factory emissions certification with submittals.

2. Do not make modifications affecting generator set factory emissions certification without approval of manufacturer and Engineer. Where such modifications are made, provide field emissions testing as necessary for certification.
- I. Sound Level Requirements:
 1. Do not exceed 60 dBA when measured at 23 feet from generator set in free field (no sound barriers) while operating at full load; include manufacturer's sound data with submittals.

2.03 ENGINE AND ENGINE ACCESSORY EQUIPMENT

- A. Provide engine with adequate horsepower to achieve specified power output at rated speed, accounting for alternator efficiency and parasitic loads.
- B. Engine Fuel System - Gaseous (Spark Ignition):
 1. Fuel Source: Natural gas.
 2. Engine Fuel Connections: Provide suitable, approved flexible fuel lines for coupling engine to fuel source.
 3. Provide components/features indicated and as necessary for operation and/or required by applicable codes, including but not limited to:
 - a. Carburetor.
 - b. Gas pressure regulators.
 - c. Fuel shutoff control valves.
 - d. Low gas pressure switches.
- C. Engine Starting System:
 1. System Type: Electric, with DC solenoid-activated starting motor(s).
 2. Battery(s):
 - a. Battery Type: Lead-acid.
 - b. Battery Capacity: Size according to manufacturer's recommendations for achieving starting and load acceptance requirements under worst case ambient temperature; capable of providing cranking through two complete periods of cranking limiter time-outs without recharging.
 - c. Provide battery rack, cables, and connectors suitable for the supplied battery(s); size battery cables according to manufacturer's recommendations for cable length to be installed.
 3. Battery-Charging Alternator: Engine-driven, with integral solid-state voltage regulation.
 4. Battery Charger:
 - a. Provide dual rate battery charger with automatic float and equalize charging modes and minimum rating of 10 amps; suitable for maintaining the supplied battery(s) at full charge without manual intervention.
 - b. Capable of returning supplied battery(s) from fully discharged to fully charged condition within 24 hours, as required by NFPA 110 for Level 1 applications while carrying normal loads.
 - c. Recognized as complying with UL 1236.
 - d. Furnished with integral overcurrent protection; current limited to protect charger during engine cranking; reverse polarity protection.
 - e. Provide integral DC output ammeter and voltmeter with five percent accuracy.
 - f. Provide alarm output contacts as necessary for alarm indications.
 5. Battery Heater: Provide thermostatically controlled battery heater to improve starting under cold ambient conditions.
- D. Engine Speed Control System (Governor):
 1. Single Engine Generator Sets (Not Operated in Parallel): Provide electronic isochronous governor for controlling engine speed/alternator frequency.
 2. Frequency Regulation, Electronic Isochronous Governors: No change in frequency from no load to full load; plus/minus 0.25 percent at steady state.
- E. Engine Lubrication System:

1. System Type: Full pressure, with engine-driven, positive displacement lubrication oil pump, replaceable full-flow oil filter(s), and dip-stick for oil level indication. Provide oil cooler where recommended by manufacturer.
- F. Engine Cooling System:
 1. System Type: Closed-loop, liquid-cooled, with unit-mounted radiator/fan and engine-driven coolant pump; suitable for providing adequate cooling while operating at full load under worst case ambient temperature.
 2. Fan Guard: Provide suitable guard to protect personnel from accidental contact with fan.
- G. Engine Air Intake and Exhaust System:
 1. Air Intake Filtration: Provide engine-mounted, replaceable, dry element filter.
 2. Engine Exhaust Connection: Provide suitable, approved flexible connector for coupling engine to exhaust system.

2.04 ALTERNATOR (GENERATOR)

- A. Alternator: 4-pole, 1800 rpm (60 Hz output) revolving field, synchronous generator complying with NEMA MG 1; connected to engine with flexible coupling; voltage output configuration as indicated, with reconnectable leads for 3 phase alternators.
- B. Exciter:
 1. Exciter Type: Brushless; provide permanent magnet generator (PMG) excitation system; self-excited (shunt) systems are not permitted.
 2. PMG Excitation Short-Circuit Current Support: Capable of sustaining 300 percent of rated output current for 10 seconds.
 3. Voltage Regulation (with PMG excitation): Plus/minus 0.5 percent for any constant load from no load to full load.
- C. Temperature Rise: Comply with UL 2200.
- D. Insulation System: NEMA MG 1, Class H; suitable for alternator temperature rise.
- E. Enclosure: NEMA MG 1, drip-proof.
- F. Total Harmonic Distortion: Not greater than five percent.

2.05 GENERATOR SET CONTROL SYSTEM

- A. Provide microprocessor-based control system for automatic control, monitoring, and protection of generator set. Include sensors, wiring, and connections necessary for functions/indications specified.
- B. Control Panel:
 1. Control Panel Mounting: Unit-mounted unless otherwise indicated; vibration isolated.
 2. Generator Set Control Functions:
 - a. Automatic Mode: Initiates generator set start/shutdown upon receiving corresponding signal from remote device (e.g. automatic transfer switch).
 - b. Manual Mode: Initiates generator set start/shutdown upon direction from operator.
 - c. Reset Mode: Clears all faults, allowing generator set restart after a shutdown.
 - d. Emergency Stop: Immediately shuts down generator set (without time delay) and prevents automatic restarting until manually reset.
 - e. Cycle Cranking: Programmable crank time, rest time, and number of cycles.
 - f. Time Delay: Programmable for shutdown (engine cooldown) and start (engine warmup).
 - g. Voltage Adjustment: Adjustable through range of plus/minus 5 percent.
 3. Generator Set Status Indications:
 - a. Voltage (Volts AC): Line-to-line, line-to-neutral for each phase.
 - b. Current (Amps): For each phase.
 - c. Frequency (Hz).
 - d. Real power (W/kW).
 - e. Reactive power (VAR/kVAR).
 - f. Apparent power (VA/kVA).

- g. Power factor.
- h. Duty Level: Actual load as percentage of rated power.
- i. Engine speed (RPM).
- j. Battery voltage (Volts DC).
- k. Engine oil pressure.
- l. Engine coolant temperature.
- m. Engine run time.
- n. Generator powering load (position signal from transfer switch).
- 4. Generator Set Protection and Warning/Shutdown Indications:
 - a. Comply with NFPA 110; configurable for NFPA 110 Level 1 or Level 2, or NFPA 99 systems including but not limited to the following protections/indications:
 - 1) Overcrank (shutdown).
 - 2) Low coolant temperature (warning).
 - 3) High coolant temperature (warning).
 - 4) High coolant temperature (shutdown).
 - 5) Low oil pressure (shutdown).
 - 6) Overspeed (shutdown).
 - 7) Low fuel level (warning).
 - 8) Low coolant level (warning/shutdown).
 - 9) Generator control not in automatic mode (warning).
 - 10) High battery voltage (warning).
 - 11) Low cranking voltage (warning).
 - 12) Low battery voltage (warning).
 - 13) Battery charger failure (warning).
 - b. In addition to NFPA 110 requirements, provide the following protections/indications:
 - 1) High AC voltage (shutdown).
 - 2) Low AC voltage (shutdown).
 - 3) High frequency (shutdown).
 - 4) Low frequency (shutdown).
 - 5) Overcurrent (shutdown).
 - c. Provide contacts for local and remote common alarm.
 - d. Provide lamp test function that illuminates all indicator lamps.
- 5. Other Control Panel Features:
 - a. Event log.
- C. Remote Annunciator:
 - 1. Remote Annunciator Mounting: Wall-mounted; Provide flush-mounted annunciator for finished areas and surface-mounted annunciator for non-finished areas unless otherwise indicated.
 - 2. Generator Set Status Indications:
 - a. Generator powering load (via position signal from transfer switch).
 - b. Communication functional.
 - 3. Generator Set Warning/Shutdown Indications:
 - a. Comply with NFPA 110; configurable for NFPA 110 Level 1 or Level 2, or NFPA 99 systems including but not limited to the following indications:
 - 1) Overcrank (shutdown).
 - 2) Low coolant temperature (warning).
 - 3) High coolant temperature (warning).
 - 4) High coolant temperature (shutdown).
 - 5) Low oil pressure (shutdown).
 - 6) Overspeed (shutdown).
 - 7) Low fuel level (warning).
 - 8) Low coolant level (warning/shutdown).
 - 9) Generator control not in automatic mode (warning).
 - 10) High battery voltage (warning).

- 11) Low cranking voltage (warning).
- 12) Low battery voltage (warning).
- 13) Battery charger failure (warning).
- b. Provide audible alarm with silence function.
- c. Provide lamp test function that illuminates all indicator lamps.
- D. Remote Emergency Stop: Provide approved red, mushroom style remote emergency stop button where indicated or required by authorities having jurisdiction.

2.06 GENERATOR SET ENCLOSURE

- A. Enclosure Type: Sound attenuating, weather protective.
- B. Enclosure Material: Steel or aluminum.
- C. Hardware Material: Stainless steel.
- D. Color: Manufacturer's standard.
- E. Access Doors: Lockable, with all locks keyed alike.
- F. Openings: Designed to prevent bird/rodent entry.
- G. External Drains: Extend oil and coolant drain lines to exterior of enclosure for maintenance service.
- H. Sound Attenuating Enclosures: Line enclosure with non-hydroscopic, self-extinguishing sound-attenuating material.

2.07 SOURCE QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Perform production tests on generator sets at factory to verify operation and performance characteristics prior to shipment. Include certified test report with submittals.
- C. Generator Set production testing to include, at a minimum:
 - 1. Operation at rated load and rated power factor.
 - 2. Single step load pick-up.
 - 3. Transient and steady state voltage and frequency performance.
 - 4. Operation of safety shutdowns.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that the ratings and configurations of generator sets and auxiliary equipment are consistent with the indicated requirements.
- C. Verify that rough-ins for field connections are in the proper locations.
- D. Verify that mounting surfaces are ready to receive equipment.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship).
- B. Install products in accordance with manufacturer's instructions.
- C. Install generator sets and associated accessories in accordance with NECA/EGSA 404.
- D. Arrange equipment to provide minimum clearances and required maintenance access.
- E. Unless otherwise indicated, mount generator set on properly sized, minimum 6 inch high concrete pad constructed in accordance with Section 03 30 00.
- F. Provide required support and attachment in accordance with Section 26 05 29.
- G. Use manufacturer's recommended oil and coolant, suitable for the worst case ambient temperatures.

- H. Provide engine exhaust piping in accordance with Section 23 51 00, where not factory installed.
 - 1. Include piping expansion joints, piping insulation, thimble, condensation trap/drain, rain cap, hangers/supports, etc. as indicated or as required.
 - 2. Do not exceed manufacturer's maximum back pressure requirements.
- I. Provide grounding and bonding in accordance with Section 26 05 26.
- J. Identify system wiring and components in accordance with Section 26 05 53.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Notify Owner and Architect at least two weeks prior to scheduled inspections and tests.
- C. Notify authorities having jurisdiction and comply with their requirements for scheduling inspections and tests and for observation by their personnel.
- D. Provide all equipment, tools, and supplies required to accomplish inspection and testing, including load bank and fuel.
- E. Preliminary inspection and testing to include, at a minimum:
 - 1. Inspect each system component for damage and defects.
 - 2. Verify tightness of mechanical and electrical connections are according to manufacturer's recommended torque settings.
 - 3. Check for proper oil and coolant levels.
- F. Prepare and start system in accordance with manufacturer's instructions.
- G. Inspection and testing to include, at a minimum:
 - 1. Verify compliance with starting and load acceptance requirements.
 - 2. Verify voltage and frequency; make required adjustments as necessary.
 - 3. Verify phase sequence.
 - 4. Verify control system operation, including safety shutdowns.
 - 5. Verify operation of auxiliary equipment and accessories (e.g. battery charger, heaters, etc.).
 - 6. Perform load tests in accordance with NFPA 110 (1.5 hour building load test followed by 2 hour full load test).
- H. Provide field emissions testing where necessary for certification.
- I. Sound Level Tests: Measure sound levels for compliance with specified requirements. Identify and report ambient noise conditions.
- J. Correct defective work, adjust for proper operation, and retest until entire system complies with Contract Documents.

3.04 CLEANING

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.05 CLOSEOUT ACTIVITIES

- A. Demonstration: Demonstrate proper operation of system to Owner, and correct deficiencies or make adjustments as directed.
- B. Training: Train Owner's personnel on operation, adjustment, and maintenance of system.
 - 1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
 - 2. Provide minimum of four hours of training.
- C. After successful acceptance test and just prior to Substantial Completion, replace air, oil, and fuel filters and fill fuel storage tank.

3.06 PROTECTION

- A. Protect installed engine generator system from subsequent construction operations.

3.07 MAINTENANCE

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ABP Fire Suppression Improvements

- A. Provide to Owner a proposal as an alternate to the base bid, a separate maintenance contract for the service and maintenance of engine generator system for two years from date of Substantial Completion; Include a complete description of preventive maintenance, systematic examination, adjustment, inspection, and testing, with a detailed schedule.

END OF SECTION

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SECTION 26 36 00
TRANSFER SWITCHES

PART 2 - PRODUCTS

1.01 MANUFACTURERS

- A. Transfer Switches - Basis of Design: ASCO
- B. Source Limitations: Furnish transfer switches and accessories produced by a single manufacturer and obtained from a single supplier.

1.02 TRANSFER SWITCHES

- A. Provide complete power transfer system consisting of all required equipment, conduit, boxes, wiring, supports, accessories, system programming, etc. as necessary for a complete operating system that provides the functional intent indicated.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Construction Type: Either "contactor type" (open contact) or "breaker type" (enclosed contact) transfer switches complying with specified requirements are acceptable.
- D. Comply with NEMA ICS 10 Part 1, and list and label as complying with UL 1008 for the classification of the intended application (e.g. emergency, optional standby).
- E. Do not use double throw safety switches or other equipment not specifically designed for power transfer applications and listed as transfer switch equipment.
- F. Load Classification: Classified for total system load (any combination of motor, electric discharge lamp, resistive, and tungsten lamp loads with tungsten lamp loads not exceeding 30 percent of the continuous current rating) unless otherwise indicated or required.
- G. Switching Methods:
 - 1. Obtain control power for transfer operation from line side of source to which the load is to be transferred.
- H. Service Conditions: Provide transfer switches suitable for continuous operation at indicated ratings under the service conditions at the installed location.
- I. Enclosures:
 - 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Indoor Clean, Dry Locations: Type 1 or Type 12.
 - b. Outdoor Locations: Type 3R or Type 4.
 - 2. Provide lockable door(s) for outdoor locations.
 - 3. Finish: Manufacturer's standard unless otherwise indicated.
- J. Short Circuit Current Rating:
 - 1. Withstand and Closing Rating: Provide transfer switches, when protected by the supply side overcurrent protective devices to be installed, with listed withstand and closing rating not less than the available fault current at the installed location as indicated on the drawings.
- K. Automatic Transfer Switches:
 - 1. Description: Transfer switches with automatically initiated transfer between sources; electrically operated and mechanically held.
 - 2. Control Functions:
 - a. Automatic mode.
 - b. Test Mode: Simulates failure of primary/normal source.
 - c. Voltage and Frequency Sensing:
 - 1) Undervoltage sensing for each phase of primary/normal source; adjustable dropout/pickup settings.
 - 2) Undervoltage sensing for alternate/emergency source; adjustable dropout/pickup settings.

- 3) Underfrequency sensing for alternate/emergency source; adjustable dropout/pickup settings.
 - d. Outputs:
 - 1) Contacts for engine start/shutdown (except where direct generator communication interface is provided).
 - 2) Auxiliary contacts; one set(s) for each switch position.
 - e. Adjustable Time Delays:
 - 1) Engine generator start time delay; delays engine start signal to override momentary primary/normal source failures.
 - 2) Transfer to alternate/emergency source time delay.
 - 3) Retransfer to primary/normal source time delay.
 - 4) Engine generator cooldown time delay; delays engine shutdown following retransfer to primary/normal source to permit generator to run unloaded for cooldown period.
 - f. Engine Exerciser: Provides programmable scheduled exercising of engine generator selectable with or without transfer to load; provides memory retention during power outage.
- 3. Status Indications:
 - a. Connected to alternate/emergency source.
 - b. Connected to primary/normal source.
 - c. Alternate/emergency source available.
- 4. Alarm Indications for Closed Transition Transfer Switches:
 - a. Failure to synchronize.
 - b. Extended source interconnection/transfer switch locked out.
- 5. Other Features:
 - a. Event log.
- 6. Automatic Sequence of Operations:
 - a. Upon failure of primary/normal source for a programmable time period (engine generator start time delay), initiate starting of engine generator where applicable.
 - b. When alternate/emergency source is available, transfer load to alternate/emergency source after programmable time delay.
 - c. When primary/normal source has been restored, retransfer to primary/normal source after a programmable time delay. Bypass time delay if alternate/emergency source fails and primary/normal source is available.
 - d. Where applicable, initiate shutdown of engine generator after programmable engine cooldown time delay.
- L. Remote Annunciators:
 - 1. Remote Annunciator Mounting: Wall-mounted; Provide flush-mounted annunciator for finished areas and surface-mounted annunciator for non-finished areas unless otherwise indicated.
 - 2. Transfer Switch Status Indications:
 - a. Connected to alternate/emergency source.
 - b. Connected to primary/normal source.
 - c. Alternate/emergency source available.
- M. Interface with Other Work:
 - 1. Interface with engine generators as specified in Section 26 32 13.

1.03 SOURCE QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Perform production tests on transfer switches at factory to verify operation and performance characteristics prior to shipment. Include certified test report with submittals.

PART 3 - EXECUTION

2.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that the ratings and configurations of transfer switches are consistent with the indicated requirements.
- C. Verify that rough-ins for field connections are in the proper locations.
- D. Verify that mounting surfaces are ready to receive transfer switches.
- E. Verify that conditions are satisfactory for installation prior to starting work.

2.02 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship).
- B. Install products in accordance with manufacturer's instructions.
- C. Arrange equipment to provide minimum clearances and required maintenance access.
- D. Provide required support and attachment in accordance with Section 26 05 29.
- E. Install transfer switches plumb and level.
- F. Unless otherwise indicated, mount floor-mounted transfer switches on properly sized 3 inch high concrete pad constructed in accordance with Section 03 30 00.
- G. Provide grounding and bonding in accordance with Section 26 05 26.
- H. Identify transfer switches and associated system wiring in accordance with Section 26 05 53.

2.03 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Prepare and start system in accordance with manufacturer's instructions.
- C. Automatic Transfer Switches:
 - 1. Inspect and test in accordance with NETA ATS, except Section 4.
 - 2. Perform inspections and tests listed in NETA ATS, Section 7.22.3. The insulation-resistance tests listed as optional are not required.
 - a. Disconnect surge protective devices (SPDs) prior to performing any high potential testing. Replace SPDs damaged by performing high potential testing with SPDs connected.
- D. Correct defective work, adjust for proper operation, and retest until entire system complies with Contract Documents.

2.04 CLEANING

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

2.05 CLOSEOUT ACTIVITIES

- A. See Section 01 78 00 - Closeout Submittals, for closeout submittals.

2.06 PROTECTION

- A. Protect installed transfer switches from subsequent construction operations.

2.07 MAINTENANCE

- A. See Section 01 70 00 - Execution and Closeout Requirements, for additional requirements relating to maintenance service.

END OF SECTION

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SECTION 28 46 21.11 - ADDRESSABLE FIRE-ALARM SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Existing fire-alarm system to be modified.
 - 2. System smoke detectors.
- B. Related Requirements:
 - 1. Section 260519 "Low-Voltage Electrical Power Conductors and Cables.

1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. FACU: Fire-alarm control unit.
- C. Mode: The terms "Active Mode," "Off Mode," and "Standby Mode" are used as defined in the 2007 Energy Independence and Security Act (EISA).
- D. NICET: National Institute for Certification in Engineering Technologies.
- E. PC: Personal computer.
- F. Voltage Class: For specified circuits and equipment, voltage classes are defined as follows:
 - 1. Control Voltage: Listed and labeled for use in remote-control, signaling, and power-limited circuits supplied by a Class 2 or Class 3 power supply having rated output not greater than 150 V and 5 A, allowing use of alternate wiring methods complying with NFPA 70, Article 725.
 - 2. Low Voltage: Listed and labeled for use in circuits supplied by a Class 1 or other power supply having rated output not greater than 1000 V, requiring use of wiring methods complying with NFPA 70, Article 300, Part I.

1.4 SEQUENCING AND SCHEDULING

- A. Existing Fire-Alarm Equipment: Maintain existing equipment fully operational until new equipment has been tested and accepted. When new equipment is installed, label it "NOT IN

SERVICE" until it is accepted. Remove labels from new equipment when put into service, and label existing fire-alarm equipment "NOT IN SERVICE" until removed from building.

- B. Equipment Removal: After acceptance of new fire-alarm system, remove existing disconnected fire-alarm equipment and wiring.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product, including furnished options and accessories.
 - 1. Include construction details, material descriptions, dimensions, profiles, and finishes.
 - 2. Include rated capacities, operating characteristics, and electrical characteristics.
- B. Shop Drawings: For fire-alarm system.
 - 1. Comply with recommendations and requirements in "Documentation" section of "Fundamentals" chapter in NFPA 72.
 - 2. Include plans, elevations, sections, and details, including details of attachments to other Work.
 - 3. Include voltage drop calculations for notification-appliance circuits.
 - 4. Include battery-size calculations.
 - 5. Include input/output matrix.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For fire-alarm systems and components to include in emergency, operation, and maintenance manuals.
 - a. Comply with "Records" section of "Inspection, Testing and Maintenance" chapter in NFPA 72.
 - b. Provide "Fire-Alarm and Emergency Communications System Record of Completion Documents" in accordance with "Completion Documents" Article in "Documentation" section of "Fundamentals" chapter in NFPA 72.
 - c. Complete wiring diagrams showing connections between devices and equipment. Each conductor must be numbered at every junction point with indication of origination and termination points.
 - d. Riser diagram.
 - e. Device addresses.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. Personnel must be trained and certified by manufacturer for installation of units required for this Project.
 - 2. Licensed or certified by authorities having jurisdiction.

1.8 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace fire-alarm system equipment and components that fail because of defects in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 EXISTING FIRE-ALARM SYSTEM TO BE MODIFIED

- A. Source Limitations for Fire-Alarm System and Components: Components must be compatible with, and operate as extension of, existing system. Provide system manufacturer's certification that components provided have been tested as, and will operate as, a system.

2.2 SYSTEM SMOKE DETECTORS

- A. Photoelectric Smoke Detectors:

1. Performance Criteria:

- a. Regulatory Requirements:

- 1) NFPA 72.
- 2) UL 268.

- b. General Characteristics:

- 1) Detectors must be **[four] [two]**-wire type.
- 2) Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to FACU.
- 3) Base Mounting: Detector and associated electronic components must be mounted in twist-lock module that connects to fixed base. Provide terminals in fixed base for connection to building wiring.
- 4) Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
- 5) Integral Visual-Indicating Light: LED type, indicating detector has operated.
- 6) Detector address must be accessible from FACU and must be able to identify detector's location within system and its sensitivity setting.
- 7) Operator at FACU, having designated access level, must be able to manually access the following for each detector:
 - a) Primary status.
 - b) Device type.
 - c) Present average value.
 - d) Present sensitivity selected.
 - e) Sensor range (normal, dirty, etc.).
- 8) Detector must have functional humidity range within 10 to 90 percent relative humidity.

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- 9) Rate-of-rise temperature characteristic of combination smoke- and heat-detection units must be selectable at FACU for 15 or 20 deg F per minute.
- 10) Fixed-temperature sensing characteristic of combination smoke- and heat-detection units must be independent of rate-of-rise sensing and must be settable at FACU to operate at 135 or 155 deg F.

B. Ionization Smoke Detectors:

1. Performance Criteria:

a. Regulatory Requirements:

- 1) NFPA 72.
- 2) UL 268.

b. General Characteristics:

- 1) Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to FACU.
- 2) Base Mounting: Detector and associated electronic components must be mounted in twist-lock module that connects to fixed base. Provide terminals in fixed base for connection to building wiring.
- 3) Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
- 4) Integral Visual-Indicating Light: LED type, indicating detector has operated.
- 5) Detector address must be accessible from FACU and must be able to identify detector's location within system and its sensitivity setting.
- 6) Operator at FACU, having designated access level, must be able to manually access the following for each detector:
 - a) Primary status.
 - b) Device type.
 - c) Present average value.
 - d) Present sensitivity selected.
 - e) Sensor range (normal, dirty, etc.).
- 7) Detector must have functional humidity range within 10 to 90 percent relative humidity.
- 8) Color: Match Existing
- 9) Rate-of-rise temperature characteristic of combination smoke- and heat-detection units must be selectable at FACU for 15 or 20 deg F per minute.
- 10) Fixed-temperature sensing characteristic of combination smoke- and heat-detection units must be independent of rate-of-rise sensing and must be settable at FACU to operate at 135 or 155 deg F.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions for compliance with requirements for ventilation, temperature, humidity, and other conditions affecting performance of the Work.

1. Verify that manufacturer's written instructions for environmental conditions have been permanently established in spaces where equipment and wiring are installed, before installation begins.
- B. Examine roughing-in for electrical connections to verify actual locations of connections before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Preinstallation Testing: Perform verification of functionality of installed components of existing system prior to starting work. Document equipment or components not functioning as designed.
- B. Interruption of Existing Fire-Alarm Service: Do not interrupt fire-alarm service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary guard service in accordance with requirements indicated:
 1. Notify Owner no fewer than seven days in advance of proposed interruption of fire-alarm service.
 2. Do not proceed with interruption of fire-alarm service without Owner's written permission.
- C. Protection of In-Place Conditions: Protect devices during construction unless devices are placed in service to protect facility during construction.

3.3 INSTALLATION OF EQUIPMENT

- A. Comply with NECA 305, NFPA 72, NFPA 101, and requirements of authorities having jurisdiction for installation and testing of fire-alarm equipment. Install electrical wiring to comply with requirements in NFPA 70 including, but not limited to, Article 760, "Fire Alarm Systems."
 1. Devices placed in service before other trades have completed cleanup must be replaced.
 2. Devices installed, but not yet placed, in service must be protected from construction dust, debris, dirt, moisture, and damage in accordance with manufacturer's written storage instructions.
- B. Connecting to Existing Equipment: Verify that existing fire-alarm system is operational before making changes or connections.
 1. Connect new equipment to existing control panel in existing part of building.
 2. Connect new equipment to existing monitoring equipment at supervising station.
 3. Expand, modify, and supplement existing control and monitoring equipment as necessary to extend existing control and monitoring functions to new points. New components must be capable of merging with existing configuration without degrading performance of either system.
- C. Smoke- and Heat-Detector Spacing:
 1. Comply with "Smoke-Sensing Fire Detectors" section in "Initiating Devices" chapter in NFPA 72, for smoke-detector spacing.

2. Comply with "Heat-Sensing Fire Detectors" section in "Initiating Devices" chapter in NFPA 72, for heat-detector spacing.
 3. Spacing of detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas must be determined in accordance with Annex A in NFPA 72.
 4. Lighting Fixtures: Locate detectors not closer than 12 inch from lighting fixture and not directly above pendant mounted or indirect lighting.
- D. Install cover on each smoke detector that is not placed in service during construction. Cover must remain in place except during system testing. Remove cover prior to system turnover.

3.4 ELECTRICAL CONNECTIONS

- A. Connect wiring in accordance with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
- B. Ground equipment in accordance with Section 260526 "Grounding and Bonding for Electrical Systems."
- C. Install electrical devices furnished by manufacturer, but not factory mounted, in accordance with NFPA 70 and NECA 1.
- D. Install nameplate for each electrical connection, indicating electrical equipment designation and circuit number feeding connection.
 1. Nameplate must be laminated acrylic or melamine plastic signs, as specified in Section 260553 "Identification for Electrical Systems."
 2. Nameplate must be laminated acrylic or melamine plastic signs with black background and engraved white letters at least 1/2 inch high.

3.5 PATHWAYS

- A. Pathways above recessed ceilings and in inaccessible locations may be routed exposed.
 1. Exposed pathways located less than 96 inch above floor must be installed in EMT.
- B. Pathways must be installed in EMT.
- C. Exposed EMT must be painted red enamel.

3.6 CONNECTIONS

- A. Make addressable connections with supervised interface device to the following devices and systems. Install interface device less than 36 inch from device controlled. Make addressable confirmation connection when such feedback is available at device or system being controlled.
 1. Alarm-initiating connection to activate suppression release panel.
 2. Supervisory connections at suppression release panel.
 3. Supervisory connections at fire-pump engine control panel.
- B. Install framed instructions in location visible from FACU.

3.7 GROUNDING

- A. Ground FACU and associated circuits in accordance with Section 260526 "Grounding and Bonding for Electrical Systems."
- B. Ground shielded cables at control panel location only. Insulate shield at device location.

3.8 FIELD QUALITY CONTROL

- A. Field tests must be witnessed by authorities having jurisdiction.
- B. Administrant for Tests and Inspections:
 - 1. Engage factory-authorized service representative to administer and perform tests and inspections on components, assemblies, and equipment installations, including connections.
- C. Tests and Inspections:
 - 1. Visual Inspection: Conduct visual inspection prior to testing.
 - a. Inspection must be based on completed record Drawings and system documentation that is required by "Completion Documents, Preparation" table in "Documentation" section of "Fundamentals" chapter in NFPA 72.
 - b. Comply with "Visual Inspection Frequencies" table in "Inspection" section of "Inspection, Testing and Maintenance" chapter in NFPA 72; retain "Initial/Reacceptance" column and list only installed components.
 - 2. System Testing: Comply with "Test Methods" table in "Testing" section of "Inspection, Testing and Maintenance" chapter in NFPA 72.
 - 3. Factory-authorized service representative must prepare "Fire Alarm System Record of Completion" in "Documentation" section of "Fundamentals" chapter in NFPA 72 and "Inspection and Testing Form" in "Records" section of "Inspection, Testing and Maintenance" chapter in NFPA 72.
- D. Reacceptance Testing: Perform reacceptance testing to verify proper operation of added or replaced devices and appliances.
- E. Fire-alarm system will be considered defective if it does not pass tests and inspections.
- F. Prepare test and inspection reports.
- G. Maintenance Test and Inspection: Perform tests and inspections listed for weekly, monthly, quarterly, and semiannual periods. Use forms developed for initial tests and inspections.
- H. Annual Test and Inspection: One year after date of Substantial Completion, test fire-alarm system complying with visual and testing inspection requirements in NFPA 72. Use forms developed for initial tests and inspections.

END OF SECTION 28 46 21.11

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