

General Info

to **disable** Q & A notifications for this solicitation.

Digital ID required

Deadline

09/06/2023 11:00 AM CDT

Advertised

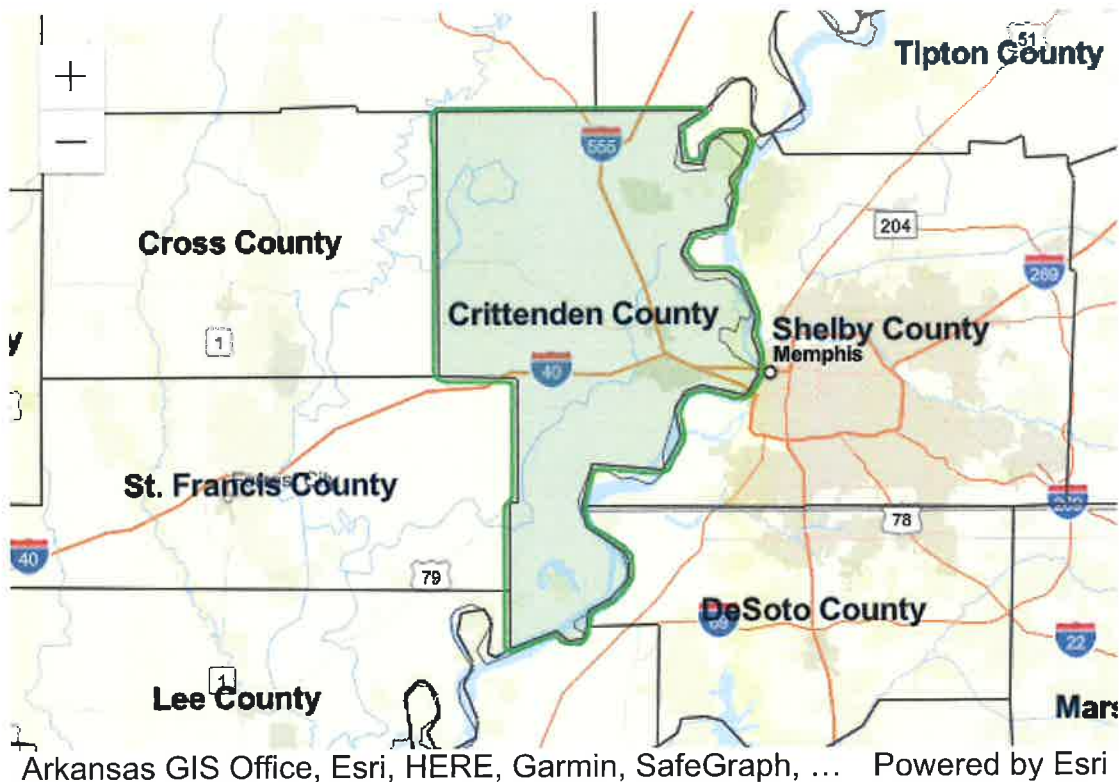
08/16/2023 08:15 AM CDT

Business Name

Arkansas Department of Transportation - Equipment and Procurement

Location(s)

Crittenden, Arkansas



Number

M-24-004H

Description

Construction of Restroom and AHP Substation

Job# 110816

FOB: West Memphis

Allows zero unit prices and labor

Yes

Allows negative unit prices and labor

Yes

Allows multiple bids per solicitation

No

Q & A

Deadline

Same as solicitation deadline.

Remarks

Notes

Notes

ATTACHMENT LIST

CONTRACT AND GRANT DISCLOSURE AND CERTIFICATION FORM.pdf (157 KB)

Download, complete, and upload in the Required ...

Project Manual Job 110816 Articles.pdf (2.91 MB)

Specifications Sect. 1-10 thru 1-33.pdf (2.36 MB)

Specifications Sect. 1-40 thru 1-79.pdf (3.04 MB)

Specifications Sect. 1-80 thru 8-80.pdf (1.93 MB)

Specifications Sect. 9-22 thru 22-13.pdf (1.98 MB)

Specifications Sect. 23-05 thru 31-31.pdf (3.56 MB)

Drawings Job 110816.pdf (2.8 MB)

Building Trade Subcontracts Job 110816.pdf (32.5 KB)
Download, complete, and upload in the Required ...

Standard Bid Conditions Revised 2023.pdf (156 KB)

Certificate For Boycott and Illegal Immigrant Restrictions.pdf (174 KB)
Download, complete, and upload in the Required ...

BID INVITATION

Electronic Sealed bids for furnishing the commodities and/or services described below subject to the Standard Bid Conditions of this Bid Invitation will be publicly opened at the above-noted bid opening date and time at the ARDOT Equipment and Procurement Divison located at 11302 West Baseline Road, Little Rock, AR 72209. Bids must be submitted on this form, with attachments when appropriate, or bids will be rejected.

In compliance with this Bid Invitation end subject to all the Conditions thereof. the undersigned offers and agrees to furnish any and all items upon which prices are quoted, at the price set opposite each item.

Company Name:*

Name:*

Address:*

Title:*

Federal Tax ID or Social Security No:*

Phone:*

Fax:

E-mail:*

Signature:*

Construction of Restroom and AHP Substation

Construction of Restroom and AHP Substation Job# 110816 located at the I-40 Truck Parking Expansion Project, West Memphis, AR.

The AHP Substation (Line Item #2) is an additive bid that may be awarded in addition to the work included in the Base Bid (Line Item #1).

To meet the requirements of the Arkansas Department of Transportation Specifications attached to and made part of this bid.

ARDOT reserves the right to award Bid in whole or in part.

For questions about Bidding requirements contact Danny Keene (501-569-2674).
For questions about job specifications contact Mina Awadalla (501-569-2093).

A non-mandatory pre-bid meeting is scheduled for all potential bidders at the job site located at 5001 West 1-40, West Memphis, AR 72364 at 10:00 A.M. on August 30, 2023.

Bid price shall include all labor, materials, and equipment necessary to perform the work as specified, and shall further include all licenses, fees, permits, royalties, and all taxes.

Bid price shall represent full compensation for completion of work. This provision supercedes Condition 5 on page 1 of Standard Bid Conditions. Payment will be made in accordance with Arkansas Department of Transportation Specification and Applicable Special Provisions.

All bidders should complete and return the Eligible Bidder Certification (Attachment A) and Disclosure Form (see Page 2 of Standard Bid Conditions – Item 18) and Restriction of Boycott of Israel Certification issued with this bid. A current copy of the DFA Illegal Immigrant Contractor Disclosure Certification (see Page 1 of Standard Bid Conditions – Item 17) should also be submitted with bid. These forms are kept on file and remain current for one year from date of submission. Forms do not need to be submitted again, during that time, unless there is a status change.

The successful bidder for this project will be required to obtain Builder's Risk Insurance coverage in a minimum amount equal to the total amount bid for all building facilities included in the contract, and to provide coverage for all existing structures on the job site.

**Current Arkansas Contractor's License Number must be listed or bid will be rejected.
(A.C.A. 17-25-101 et. seq.)**

The successful bidder will be required to begin work within 60 days after notice.

Bid Bond in the amount of 5% of total bid price is required of all bidders at time of bid

Bid Bond in the amount of 5% of total bid price is required of all bidders at time of bid opening or bid will be rejected. **Personal and company checks are not acceptable as Bid Bonds.** See Condition 4 on page 1 of Standard Bid Conditions. Bid bonds that are not submitted electronically must be physically received by Equipment & Procurement located at 11302 West Baseline Road, Little Rock, AR 72209 prior to the designated time of the bid opening. Bid Invitation number should be clearly displayed

1. 1 – Base Bid to consist of the construction of approximately 1460.0 sq. ft. restroom building including all related site work and utilities. All site work, sidewalks, generator, generator pad, and all utilities and related works shall be considered subsidiary to the Base Bid.

FOB: West Memphis, AR

I inubu, your company still may do so. Other Surety Companies will still be

Lump Sum*

\$

checks, or money orders submitted as bid bonds must be physically received by

2. 1 – Additive Bid to consist of the construction of approximately 820.0 sq. ft. AHP substation building.

FOB: West Memphis, AR

Lump Sum*

\$

Proposed number of calendar days for completion of construction project.*

Arkansas Contractor's License Number*

ATTACHMENT A - ELIGIBLE BIDDER CERTIFICATION

The Bidder represents and warrants for itself, its employees and its subcontractors and certifies they:

1. Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;
2. Have not within a three-year period preceding this Bid been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;
3. Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State, or local) with commission of any of the offenses enumerated in paragraph two (2) of this Certification;
4. Have not within a one-year period preceding this application/Bid had one or more public transactions (Federal, State, or local) terminated for cause or default; and

The Bidder represents, warrants and acknowledges the understanding that restrictions placed on the employment of labor or on the scale of pay for the work on a contract will be the requirements of the Fair Labor Standards Act (Federal Wage-Hour Law) of 1938, 28 USC §201 et seq., and other applicable labor laws.

The person executing this Certification further represents, warrants and affirms the truthfulness and accuracy of the contents of the statements submitted on or with this Certification and understands that the provisions of 31 USC §3801 et seq. are applicable thereto.

BIDDER NAME (Company Name):*

BY (Signature):*

TITLE:*

BID BOND

In the amount of 5% of total bid price

Guarantee Method*

Choices...

Paper Bid Bond, Cashier's Check, Certified Check, Money Order, or an Annual Bond on File

Confirmation*
 Choices...

Electronic Bid Bond

Bond ID* **Surety Agency***
 Choices...

Surety State* **Principal***

ENVELOPE REQUIRED DOCUMENT LIST

Name	Omission Terms
The information supplied in this component will be available to the owner-agency immediately after the bid deadline, but before the bid is opened.	
Paper Bid Bond, Cashier's Check, Certified Check, Money Order, or an Annual Bond on File Original, wet-ink documents are required at time of bid op...	I have opted to electronically verify my bid bond.

1 Required Document

REQUIRED DOCUMENT LIST

Name	Omission Terms
Contract and Grant Disclosure and Certification Form Failure to complete all of the following information may re...	
Building Trade Subcontracts	

3 Required Documents

Name	Omission Terms
Failure to complete all of the following information may re...	
Certification for Boycott and Illegal Immigrant Restrictions	
Failure to complete all of the following information may re...	
3 Required Documents	

ARDOT - STANDARD BID CONDITIONS

1. **GENERAL:** Any special terms and conditions included in the invitation for bid override these standard terms and conditions. The standard terms and conditions and any special terms and conditions become part of any contract entered into if any or all parts of the bid are accepted by the Arkansas Department of Transportation (ARDOT).
2. **ACCEPTANCE AND REJECTION:** ARDOT reserves the right to reject any or all bids, to accept bids in whole or in part (unless otherwise indicated by bidder), to waive any informalities in bids received, to accept bids on materials or equipment with variations from specifications where efficiency of operation will not be impaired, and to award bids to best serve the interest of the State.
3. **PRICES:** Unless otherwise stated in the Bid Invitation, the following will apply: (1) unit prices shall be bid, (2) prices should be stated in units of quantity specified (feet, each, lbs., etc.), (3) prices must be F.O.B. destination specified in bid, (4) prices must be firm and not subject to escalation, (5) bid must be firm for acceptance for 30 days from bid opening date. In case of errors in extension, unit prices shall govern. Discounts from bid price will not be considered in making awards.
4. **BID BONDS AND PERFORMANCE BONDS:** If required, a **Bid Bond** in the form of a cashier's check, certified check, or surety bond issued by a surety company, in an amount stated in the Bid Invitation, must accompany bid. **Personal and company checks are not acceptable as Bid Bonds.** Surety Bonds may be submitted electronically through the online bidding process. Cashier's checks, Certified checks, or Money orders submitted as bid bonds must be physically received by Equipment & Procurement located at 11302 West Baseline Road, Little Rock, AR 72209 prior to the designated time of the bid opening. Failure to submit a Bid Bond as required will cause a bid to be rejected. The Bid Bond will be forfeited as liquidated damages if the successful bidder fails to provide a required Performance Bond within the period stipulated by ARDOT or fails to honor their bid. When a bidder claims and can show clear and convincing evidence that a material mistake was made in the bid and was not the bid intended, the bidder may be permitted to withdraw their bid prior to award without forfeiture of bid bond. Cashier's checks and certified checks submitted as Bid Bonds will be returned to unsuccessful bidders; surety bonds will be retained. The successful bidder will be required to furnish a **Performance Bond** in an amount stated in the Bid Invitation and in the form of a cashier's check, certified check, or surety bond issued by a surety company, unless otherwise stated in the Bid Invitation, as a guarantee of delivery of goods/services in accordance with the specifications and within the time established in the bid. **Personal and company checks are not acceptable as Performance Bonds.** In some cases, a cashier's check or certified check submitted as a Bid Bond will be held as the Performance Bond of the successful bidder. Cashier's checks or certified checks submitted as Performance Bonds will be refunded shortly after payment has been made to the successful bidder for completion of all terms of the bid; surety bonds will be retained. Surety bonds must be issued by a surety company that is authorized to do business in the State of Arkansas and that is listed on the current United States Department of the Treasury Listing of Approved Sureties. Surety bonds must be executed by a resident or non-resident agent who is licensed by the Arkansas State Insurance Commissioner to represent the surety company executing the bond, and the resident or non-resident agent shall file with the bond the power of attorney of the agent to act on behalf of the bonding company. Certain bids involving labor will require Performance Bonds in the form of surety bonds only (no checks of any kind allowed). These bonds shall not only serve to guarantee the completion of the work, but also to guarantee the excellence of both workmanship and material until the work is finally accepted and the provisions of the Plans, Specifications, and Special Provisions fulfilled. In such cases, the company issuing the surety bond must comply with all stipulations herein and must be named in the U. S. Treasury listing of companies holding Certificates of Authority as acceptable sureties on Federal Bonds and as acceptable reinsuring companies. Any excess between the face amount of the bond and the underwriting limitation of the bonding company shall be protected by reinsurance provided by an acceptable reinsuring company. Annual Bid and Performance Bonds on file with E & P Division must have sufficient unencumbered funds to meet current bonding requirements, or the bid will be rejected, unless the balance is submitted as set forth above, prior to bid opening.
5. **TAXES:** The ARDOT is not exempt from Arkansas State Sales and Use Taxes, or local option city/county sales taxes, when applicable, and bidders are responsible to the State Revenue Department for such taxes. These taxes should not be included in bid prices, but where required by law, will be paid by the ARDOT as an addition thereto, and should be added to the billing to the ARDOT. The ARDOT is exempt from Federal Excise Taxes on all commodities except motor fuels; and excise taxes should not be included in bid prices except for motor fuels. Where applicable, tax exemption certificates will be furnished by the ARDOT.
6. **"ALL OR NONE" BIDS:** Bidders who wish to bid "All or None" on two or more items shall so stipulate on the face of bid sheet; otherwise, bid may be awarded on an individual item basis.
7. **SPECIFICATIONS:** Complete specifications should be attached for any substitution or alternate offered, or where amplification is necessary. Bidder's name must be placed on all attachments to the bid.
8. **EXCEPTIONS TO SPECIFICATIONS:** Any exceptions to the bid specifications must be stated in the bid. Any exceptions to manufacturer's published literature must be stated in the bid, or it will be assumed that bidder is bidding exactly as stated in the literature.
9. **BRAND NAME REFERENCES:** All brand name references in bid specifications refer to that commodity or its equivalent, unless otherwise stated in Bid Invitation. Bidder should state brand or trade name of item being bid, if such name exists.
10. **FREIGHT:** All freight charges should be included in bid price. Any change in common carrier rates authorized by the Interstate Commerce Commission will be adjusted if such change occurs after the bid opening date. Receipted common carrier bills that reflect ICC authorized rate changes must be furnished.

11. **SAMPLES, LITERATURE, DEMONSTRATIONS:** Samples and technical literature must be provided free of any charge within 14 days of ARDOT request, and free demonstrations within 30 days, unless ARDOT extends time. Failure to provide as requested within this period may cause bid to be rejected. Samples, literature and demonstrations must be substantially the same as the item(s) being bid, unless otherwise agreed to by ARDOT. Samples that are not destroyed will be returned upon request at bidders expense. Samples from successful bidders may be retained for comparison with items actually furnished.
12. **GUARANTY:** Unless otherwise indicated in Bid Invitation, it is understood and agreed that any item offered or shipped on this bid shall be newly manufactured, latest model and design, and in first class condition; and that all containers shall be new, suitable for storage or shipment and in compliance with all applicable laws relating to construction, packaging, labeling and registration.
13. **BACKORDERS OR DELAY IN DELIVERY:** Backorders or failure to deliver within the time required may constitute default. Vendor must give written notice to the ARDOT, as soon as possible, of the reason for any delay and the expected delivery date. The ARDOT has the right to extend delivery if reasons appear valid. If reason or delivery date is not acceptable, vendor is in default.
14. **DEFAULT:** All commodities furnished will be subject to inspection and acceptance by ARDOT after delivery. Default in promised delivery or failure to meet specifications authorizes the ARDOT to cancel award or any portion of same, to reasonably purchase commodities or services elsewhere and to charge full increase, if any, in cost and handling to defaulting vendor. Applicable bonds may be forfeited.
15. **ETHICS:** *"It shall be a breach of ethical standards for a person to be retained, or to retain a person, to solicit or secure a State contract upon an agreement of understanding for a commission, percentage, brokerage, or contingent fee, except for retention of bona fide employees or bona fide established commercial selling agencies maintained by the contractor for the purpose of securing business."* (Arkansas Code, Annotated, Section 19-11-708).
16. **NOTICE OF NONDISCRIMINATION:** The Arkansas State Highway Commission, through ARDOT, complies with all civil rights provisions of federal statutes and related authorities that prohibit discrimination in programs and activities receiving federal financial assistance. Therefore, ARDOT does not discriminate on the basis of race, sex, color, age, national origin, religion (not applicable as a protected group under the Federal Motor Carrier Safety Administration Title VI Program), disability, Limited English Proficiency (LEP), or low-income status in the admission, access to and treatment in the ARDOT's programs and activities, as well as the ARDOT's hiring or employment practices. Complaints of alleged discrimination and inquiries regarding the ARDOT's nondiscrimination policies may be directed to Joanna P. McFadden Section Head – EEO/DBE (ADA/504/Title VI Coordinator), P. O. Box 2261, Little Rock, AR 72203, (501)569-2298, (Voice/TTY 711), or the following email address: joanna.mcfadden@ardot.gov. Free language assistance for Limited English Proficient individuals is available upon request. This notice is available from the ADA/504/Title VI Coordinator in large print, on audiotape and in Braille.
17. **PROHIBITION OF EMPLOYMENT OF ILLEGAL IMMIGRANTS:** Pursuant to Arkansas Code Annotated 19-11-105, all bidders must certify prior to award of a contract that they **do not** employ or contract with any illegal immigrant(s) in its contract with the state. Bidders shall certify online at <https://www.ark.org/dfa/immigrant/index.php>.
18. **DISCLOSURE:** Failure to make any disclosure required by Governor's Executive Order 98-04, or any violation of any rule, regulation, or policy adopted pursuant to that order, **shall** be a material breach of the terms of this contract. Any contractor, whether an individual or entity, who fails to make the required disclosure or who violates any rule, regulation, or policy **shall** be subject to all legal remedies available to the agency.

CONTRACT AND GRANT DISCLOSURE AND CERTIFICATION FORM

Failure to complete all of the following information may result in a delay in obtaining a contract, lease, purchase agreement, or grant award with any Arkansas State Agency.

SUBCONTRACTOR: _____ SUBCONTRACTOR NAME: _____

Yes No

IS THIS FOR:

TAXPAYER ID NAME: _____ Goods? Services? Both?

YOUR LAST NAME: _____ FIRST NAME: _____ M.I.: _____

ADDRESS: _____

CITY: _____ STATE: _____ ZIP CODE: _____ COUNTY: _____

AS A CONDITION OF OBTAINING, EXTENDING, AMENDING, OR RENEWING A CONTRACT, LEASE, PURCHASE AGREEMENT, OR GRANT AWARD WITH ANY ARKANSAS STATE AGENCY, THE FOLLOWING INFORMATION MUST BE DISCLOSED:

FOR INDIVIDUALS*

Indicate below if: you, your spouse or the brother, sister, parent, or child of you or your spouse is a current or former: member of the General Assembly, Constitutional Officer, State Board or Commission Member, or State Employee:

Position Held	Mark (✓)		Name of Position of Job Held <small>(senator, representative, name of board/ commission, data entry, etc.)</small>	For How Long?		What is the person(s) name and how are they related to you? <small>(i.e., Jane Q. Public, spouse, John Q. Public, Jr., child, etc.)</small>	Relation
	Current	Former		From MM/YY	To MM/YY		
General Assembly							
Constitutional Officer							
State Board or Commission Member							
State Employee							

None of the above applies

FOR AN ENTITY (BUSINESS)*

Indicate below if any of the following persons, current or former, hold any position of control or hold any ownership interest of 10% or greater in the entity: member of the General Assembly, Constitutional Officer, State Board or Commission Member, State Employee, or the spouse, brother, sister, parent, or child of a member of the General Assembly, Constitutional Officer, State Board or Commission Member, or State Employee. Position of control means the power to direct the purchasing policies or influence the management of the entity.

Position Held	Mark (✓)		Name of Position of Job Held <small>(senator, representative, name of board/ commission, data entry, etc.)</small>	For How Long?		What is the person(s) name and what is his/her % of ownership interest and/or what is his/her position of control?	Ownership Interest (%)	Position of Control
	Current	Former		From MM/YY	To MM/YY			
General Assembly								
Constitutional Officer								
State Board or Commission Member								
State Employee								

None of the above applies

Contract and Grant Disclosure and Certification Form

Failure to make any disclosure required by Governor's Executive Order 98-04, or any violation of any rule, regulation, or policy adopted pursuant to that Order, shall be a material breach of the terms of this contract. Any contractor, whether an individual or entity, who fails to make the required disclosure or who violates any rule, regulation, or policy shall be subject to all legal remedies available to the agency.

As an additional condition of obtaining, extending, amending, or renewing a contract with a state agency I agree as follows:

1. Prior to entering into any agreement with any subcontractor, prior or subsequent to the contract date, I will require the subcontractor to complete a **CONTRACT AND GRANT DISCLOSURE AND CERTIFICATION FORM**. Subcontractor shall mean any person or entity with whom I enter an agreement whereby I assign or otherwise delegate to the person or entity, for consideration, all, or any part, of the performance required of me under the terms of my contract with the state agency.
2. I will include the following language as a part of any agreement with a subcontractor:

Failure to make any disclosure required by Governor's Executive Order 98-04, or any violation of any rule, regulation, or policy adopted pursuant to that Order, shall be a material breach of the terms of this subcontract. The party who fails to make the required disclosure or who violates any rule, regulation, or policy shall be subject to all legal remedies available to the contractor.
3. No later than ten (10) days after entering into any agreement with a subcontractor, whether prior or subsequent to the contract date, I will mail a copy of the **CONTRACT AND GRANT DISCLOSURE AND CERTIFICATION FORM** completed by the subcontractor and a statement containing the dollar amount of the subcontract to the state agency.

Signature _____	Title _____	Date _____
Vendor Contact Person _____	Title _____	Phone No. _____

Agency Use Only			
Agency Number _____	Agency Name _____	Agency Contact Person _____	Contract or Grant No. _____
		Contact Phone No. _____	

BUILDING TRADE SUBCONTRACTS

(Requirements of Arkansas Code 22-9-204)

JOB: 110816 (West Memphis)

The undersigned Prime Contractor intends to use the contractors listed on this page for furnishing and installing bid items appropriate to the respective building trade crafts. If awarded the contract, the Prime Contractor proposes to enter into subcontracts with these contractors.

IMPORTANT: A contractor and license number must be listed for each item (a) thru (d) below. If the contractor is to perform the work with his forces, he must list his company and license number. If an item is not applicable to this contract 'N/A' should be shown. Listed contractors must be licensed by the State Contractors Licensing Board.

<u>BUILDING TRADE</u>	<u>NAME & ADDRESS</u>	<u>LICENSE NO.</u>
(a) Mechanical [indicative of heating, air conditioning and ventilating]	<hr/> <hr/> <hr/>	<hr/> <hr/> <hr/>
(b) Plumbing	<hr/> <hr/> <hr/>	<hr/> <hr/> <hr/>
(c) Electrical [indicative of wiring and illuminating fixtures]	<hr/> <hr/> <hr/>	<hr/> <hr/> <hr/>
(d) Roofing and Sheet Metal Work [indicative of roofing applications]	<hr/> <hr/> <hr/>	<hr/> <hr/> <hr/>

Contractor

Signature

Title



CERTIFICATION FOR BOYCOTT AND ILLEGAL IMMIGRANT RESTRICTIONS

Pursuant to Arkansas law, a vendor must submit the below certifications prior to entering into a contract with a public entity for an amount as designated by the applicable laws.

- 1. **Israel Boycott Restriction:** For contracts valued at \$1,000 or greater.

A public entity shall not enter into a contract with a company unless the contract includes a written certification that the person or company is not currently engaged in a boycott of Israel. If at any time after signing this certification the contractor decides to engage in a boycott of Israel, the contractor must notify the contracting public entity in writing. See Arkansas Code Annotated § 25-1-503.

- 2. **Illegal Immigrant Restriction:** For contracts exceeding \$25,000.

No state agency may enter into or renew a public contract for services with a contractor who employs or contracts with an illegal immigrant. A contractor shall certify that it does not employ, or contract with, illegal immigrants. See Arkansas Code Annotated § 19-11-105.

- 3. **Energy, Fossil Fuel, Firearms, and Ammunition Industries Boycott Restriction:** For contracts valued at, or exceeding, \$75,000.

A public entity shall not enter into a contract with a company unless the contract includes a written certification that the person or company is not currently engaged in, and agrees for the duration of the contract not to engage in, a boycott of an Energy, Fossil Fuel, Firearms, or Ammunition Industry. If a company does boycott any of these industries, see Arkansas Code Annotated § 25-1-1102.

By signing this form, the contractor agrees and certifies that it does not, and shall not for the remaining aggregate term of the contract, participate in the activities checked below:

- Do not boycott Israel.
- Do not employ illegal immigrants.
- Do not boycott Energy, Fossil Fuel, Firearms, or Ammunition Industries.

Contract Number & Description	
Name of Public Entity	Arkansas Department of Transportation
Name of Vendor/Contractor	
AASIS Vendor Number	N/A

Contractor Signature

Date

**ARKANSAS DEPARTMENT OF TRANSPORTATION
JOB NO. 110816
I-40 TRUCK PARKING EXPANSION PROJECT
(Ph. II) (WEST MEMPHIS) (S)
CONSTRUCTION OF RESTROOM AND AHP SUBSTATION
PROJECT MANUAL**

June 14, 2023

**JOB NO. 110816
I-40 TRUCK PARKING EXPANSION PROJECT
(Ph.II) (WEST MEMPHIS) (S)
CONSTRUCTION OF RESTROOM AND AHP SUBSTATION**

ARKANSAS DEPARTMENT OF TRANSPORTATION

10324 Interstate 30 P.O. Box 2261
Little Rock, Arkansas 72203

**ARKANSAS DEPARTMENT OF TRANSPORTATION
JOB NO. 110816
I-40 TRUCK PARKING EXPANSION PROJECT
(Ph. II) (WEST MEMPHIS) (S)
CONSTRUCTION OF RESTROOM AND AHP SUBSTATION
PROJECT MANUAL**

DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS

00 70 00 GENERAL CONDITIONS

DIVISION 01 - GENERAL REQUIREMENTS

01 10 00 SUMMARY
01 21 00 ALLOWANCES
01 12 00 ALTERNATES
01 25 00 SUBSTITUTION PROCEDURES
01 26 00 CONTRACT MODIFICATION PROCEDURES
01 29 00 PAYMENT PROCEDURES
01 31 00 PROJECT MANAGEMENT AND COORDINATION
01 32 00 CONSRUCTION PROGRESS DOCUMENTATION
01 33 00 SUBMITTAL PROCEDURES
01 33 00 A SUBMITTAL TRANSMITTAL FORM
01 40 00 QUALITY REQUIREMENTS
01 42 00 REFERENCES
01 50 00 TEMPORARY FACILITIES AND CONTROLS
01 51 00 IAQ MANAGEMENT PLAN
01 73 00 EXECUTION
01 77 00 CLOSOUT PROCEDURES
01 78 23 OPERATION AND MAINTENANCE DATA
01 78 39 PROJECT RECORD DOCUMENTS
01 79 00 DEMONSTRATION AND TRAINING
01 80 00 WEATHER DELAYS

DIVISION 03 - CONCRETE

03 30 00 CAST IN PLACE CONCRETE

DIVISION 04 - MASONRY

04 20 00 UNIT MASONRY

DIVISION 05 - METALS

05 12 00 STRUCTURAL STEEL FRAMING

DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES

06 10 00 ROUGH CARPENTRY
06 16 00 SHEATHING
06 17 53 SHOP-FABRICATED WOOD TRUSSES
06 41 16 PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

ARKANSAS DEPARTMENT OF TRANSPORTATION
JOB NO. 110816
I-40 TRUCK PARKING EXPANSION PROJECT
(Ph. II) (WEST MEMPHIS) (S)
CONSTRUCTION OF RESTROOM AND AHP SUBSTATION
PROJECT MANUAL

DIVISION 07 - THERMAL AND MOISTURE PROTECTION

07 21 00 THERMAL INSULATION
07 41 13 METAL ROOF PANELS
07 42 13 METAL WALL PANELS
07 62 00 SHEET METAL FLASHING AND TRIM
07 71 00 ROOF SPECIALTIES
07 72 53 SNOW GUARDS
07 92 00 JOINT SEALANTS

DIVISION 08 - OPENINGS

08 11 13 HOLLOW METAL DOORS AND FRAMES
08 14 16 FLUSH WOOD DOORS
08 33 23 OVERHEAD COILING DOORS
08 51 13 ALUMINUM WINDOWS
08 71 00 DOOR HARDWARE
08 80 00 GLAZING

DIVISION 09 - FINISHES

09 22 26 DRYWALL GRID SYSTEM
09 29 00 GYPSUM BOARD
09 51 13 ACOUSTICAL PANEL CEILINGS
09 65 13 RESILIENT BASE AND ACCESSORIES
09 65 19 RESILIENT TILE FLOORING
09 91 13 EXTERIOR PAINTING
09 91 23 INTERIOR PAINTING
10 28 00 TOILET, BATH, AND LAUNDRY ACCESSORIES
10 44 00 FIRE PROTECTION SPECIALTIES

DIVISION 12 - FURNISHINGS

12 21 13 HORIZONTAL LOUVER BLINDS
12 36 23.13 PLASTIC-LAMINATE-CLAD COUNTERTOPS
12 36 61.16 SOLID SURFACING COUNTERTOPS

DIVISION 22 - PLUMBING

22 05 23 GENERAL-DUTY VALVES FOR PLUMBING PIPING
22 05 29 HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT
22 05 48 VIBRATION AND SEISMIC CONTROLS FOR PLUMBING PIPING AND EQUIPMENT
22 05 53 IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT
22 07 00 PLUMBING INSULATION
22 11 16 DOMESTIC WATER PIPING
22 13 16 SANITARY WASTE AND VENT PIPING

**ARKANSAS DEPARTMENT OF TRANSPORTATION
JOB NO. 110816
I-40 TRUCK PARKING EXPANSION PROJECT
(Ph. II) (WEST MEMPHIS) (S)
CONSTRUCTION OF RESTROOM AND AHP SUBSTATION
PROJECT MANUAL**

DIVISION 23 - HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)

- 23 05 17 SLEEVES AND SLEEVE SEALS FOR HVAC PIPING
- 23 05 29 HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT
- 23 05 48 VIBRATION AND SEISMIC CONTROLS FOR HVAC PIPING AND EQUIPMENT
- 23 05 93 TESTING, ADJUSTING, AND BALANCING FOR HVAC
- 23 07 00 HVAC INSULATION
- 23 23 00 REFRIGERANT PIPING
- 23 31 00 HVAC DUCTS AND CASINGS
- 23 37 13 DIFFUSERS, REGISTERS, AND GRILLES

DIVISION 26 - ELECTRICAL

- 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 RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS
- 26 05 44 SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING
- 26 05 48.16 SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS
- 26 24 16 PANELBOARDS
- 26 27 26 WIRING DEVICES
- 26 28 16 ENCLOSED SWITCHES AND CIRCUIT BREAKERS
- 26 32 00 PACKAGED GENERATOR ASSEMBLIES
- 26 36 00 TRANSFER SWITCHES
- 26 43 13 SURGE PROTECTION FOR LOW-VOLTAGE ELECTRICAL POWER CIRCUITS

DIVISION 31 - EARTHWORK

- 31 10 00 SITE CLEARING
- 31 31 16 TERMITE CONTROL

GENERAL CONDITIONS

ARTICLE 1

1.1.1 The Construction Contract shall not be construed to create any contractual relationship of any kind between the Architect/Engineer and the Contractor. Nothing contained in the Construction Contract shall create any contractual relationship between the Owner or the Architect/Engineer and any Subcontractor or Sub-subcontractor, as those terms are defined herein.

1.1.2 THE WORK

The "Work" or "Construction Work" comprises the completed construction required by the Construction Contract and any and all documents incorporated therein (the "Contract Documents") and includes all labor necessary to produce such construction, and all materials and equipment incorporated or to be incorporated in such construction.

1.1.3 THE PROJECT

The "Project" is the total construction of which the Work performed under the Contract Documents may be the whole or part.

1.2 EXECUTION, CORRELATION, AND INTENT

1.2.2 By executing the Construction Contract, the Contractor represents that he has visited the site, familiarized himself with the local conditions under which the Work is to be performed, and correlated his observations with the requirements of the Construction Contract.

1.2.3 The intent of the Construction Contract is to include all items necessary for the proper execution and completion of the Work. Work not covered in the Construction Contract shall be required if it is consistent therewith and is reasonably inferable therefrom as being necessary to produce the intended results. Words and abbreviations which have well-known technical or trade meanings are used in the Construction Contract in accordance with such recognized meanings.

1.2.4 The interrelation of the Specifications, the Drawings and the schedules, excluding the progress schedule, is as follows: the Specifications determine the nature and setting of the materials; the Drawings establish the quantities, dimensions and details of the materials and Work; and the schedules give the locations. Should the drawings disagree with another requirement, or with one another, or with the Specifications, the better quality or greater quantity of work or materials shall be performed or furnished. Figures given on the Drawings govern small scale drawings.

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

1.2.6 Where any section of General Conditions is modified or deleted, or any paragraph, subparagraph or clause thereof is modified or deleted, unaltered provisions of that section, paragraph, subparagraph or clause remain in full force and effect.

1.3 OWNERSHIP AND USE OF DOCUMENTS

1.3.1 The Drawings, the Specifications, and copies thereof furnished by the Architect/Engineer are and shall remain the property of the Owner. They are to be used by the Architect/Engineer and the Contractor only with respect to the Project and not to be used on any other project. With the exception of one contract set for each party to the Construction Contract, such documents are to be returned or suitably accounted for to the Owner on request at the completion of the Work. Submission or distribution to meet official regulatory requirements or for other

purposes in connection with the Project is not to be construed as publication in derogation of the Architect/Engineer's common law copyright or other reserved rights or the rights of the Owner.

- 1.3.2 The Contractor will be furnished five (5) sets of the Drawings and Specifications free of charge. Additional complete sets of the Drawings and Specifications, if requested, will be furnished at reproduction cost.

ARTICLE 2

ARCHITECT/ENGINEER

2.1 DEFINITION

The Architect/Engineer (or "A/E") is a person registered as an architect, or a person defined as an engineer. The term Architect/Engineer, as used in these General Conditions, shall include Architects, Engineers, or person having both skills. The term is used for ease of reference and does not imply skills which may not apply to the professional utilized in this Project. The definition of Architect/Engineer shall also include those consultants registered as a landscape architect, registered as a professional engineer, and other firms employed to provide professional architectural or engineering services and having overall responsibility for the design of a project or a significant portion thereof. The Architect/Engineer is referred to throughout the Contract Documents as if singular in number and masculine in gender.

2.2 ADMINISTRATION OF THE CONTRACT

- 2.2.1 The Architect/Engineer's administration of the Construction Phase shall commence with the award of the Construction Contract, and shall terminate upon receipt of all closeout documentation and deliverables and certification of final payment of the Construction Contract by ARDOT. The contracting plan will be based on a single general contractor (the "Contractor").
- 2.2.2 The Architect/Engineer will administer the Construction Contract as hereinafter described. The Architect/Engineer will be the Owner's representative during the Project on matters related to the intent and interpretation of the Construction Contract Documents. The Architect/Engineer will advise and consult with the Owner. The Architect/Engineer will have authority to act on behalf of the Owner only to the extent provided in the Construction Contract.
- 2.2.3 The Architect/Engineer shall pay all fees associated with the Plan Review and site development permit to ensure that the Building Permit, as defined herein, is ready for Contractor at the beginning of the Project.
- 2.2.4 The Architect/Engineer will visit the site at intervals appropriate to the stage of construction to familiarize himself with the progress and quality of the Work and to determine if the Work is proceeding in accordance with the Contract Documents. However, the Architect/Engineer will not be required to make continuous on-site inspections to check the quality or quantity of the Work. On the basis of his on-site observations as an architect/engineer, he will keep the Owner informed of the progress of the Work, and will endeavor to guard the Owner against defects and deficiencies in the Work.
- 2.2.5 The Architect/Engineer will not be responsible for and will not have control or charge of construction means, methods, techniques, sequences or procedures, or for safety precautions and programs in connection with the Work. The Architect/Engineer will not be responsible for or have control or charge over the acts or omissions of the Contractor, Subcontractors, or any of their agents or employees, or any other person performing any of the Work or failure of any of the aforementioned to carry out the Construction Work in accordance with the Construction Contract Documents.
- 2.2.6 The Architect/Engineer shall at all times have access to the Work wherever it is in preparation or progress. The Contractor shall provide facilities for such access so the Architect/Engineer may perform his functions under the Construction Contract.
- 2.2.7 Based on the Architect/Engineer's observations and an evaluation of the Contractor's Applications for Payment, as defined herein, the Architect/Engineer may, upon the Owner's request, advise the Owner on the amounts owing to the Contractor.

- 2.2.8 The Architect/Engineer shall render interpretations necessary for the proper execution or progress of the Construction Work with reasonable promptness upon receipt of a written request from the Owner or the Contractor. He shall render written decisions, within a reasonable time but no greater than ten (10) calendar days after receipt of Requests for Information (RFI's), and no more than fifteen (15) calendar days after receipt of all claims, disputes, and other matters in question between the Owner and the Contractor relating to the execution or progress of the Construction Work or the interpretation of the Construction Contract Documents. Architect/Engineer shall notify the Owner immediately if more time is required for reasonable cause. The Owner shall review the cause for the extension, and if it is justified, issue a time extension. Interpretations and decisions of the Architect/Engineer shall be consistent with the intent of and reasonably inferable from the Contract Documents and shall be in written and/or graphic form. In his capacity as interpreter, he will endeavor to secure faithful performance by the Contractor.
- 2.2.9 The Architect/Engineer shall have the authority, with the concurrence of the ARDOT, to reject Work that does not conform to the Construction Contract Documents. When, in the Architect/Engineer's reasonable opinion, it is necessary or advisable in order to implement the intent of the Construction Contract Documents, the Architect/Engineer shall, with the Owner's prior approval, have authority to require special inspection or testing of the Construction Work in accordance with the provisions of the Construction Contract Documents, whether or not such Construction Work be then fabricated, installed or completed.
- 2.2.10 However, neither the Architect/Engineer's nor the Owner 's authority to act under this subparagraph 2.2.10, nor any decision made by them in good faith either to exercise or not to exercise such authority, shall give rise to any duty or responsibility of the Architect/Engineer or the Owner to the Contractor, any Subcontractor, any of their agents or employees, or any other person performing any of the Work.
- 2.2.11 The Architect/Engineer and the Owner will review and approve or take other appropriate action upon Contractor's submittals, such as Shop Drawings, Product Data and Samples, as defined in Section 01300, but only for conformance with the design concept of the Work and with the information given in the Construction Contract. Such action shall be taken in accordance with the Submittal Schedule outlined in Section 01300. The Architect/Engineer shall notify the owner immediately of any potential delays in meeting the response time. The Architect/Engineer's approval of a specific item shall not indicate approval of any assembly of which the item is a component. Approval of a specific item by either the Architect/Engineer or the Owner shall not indicate approval of an assembly of which the item is a component. The Owner has the option to delegate review of any submittal to the Architect/Engineer as sole reviewer. Generally, all color selections must have Owner approval.
- 2.2.12 The Architect/Engineer shall prepare Change Orders, as defined herein, in accordance with Article 12, and will have authority to order minor changes in the Work provided such changes do not require an adjustment of the Contract Sum or the Substantial Completion Date.
- 2.2.13 In accordance with paragraph 9.8, upon receipt from the Contractor of a request for a Substantial Completion inspection with a list of items to be completed or corrected, the Architect/Engineer and Owner will perform an inspection. As a result of this inspection, the Architect/Engineer will prepare a punch list of the items needing correction. Upon determination by the Owner that the Construction Work has been substantially completed, the Architect/Engineer will issue a Certificate of Substantial Completion.
- 2.2.14 After the Contractor completes the required corrections, and notifies the Architect/Engineer, then the Owner will accompany the Architect/Engineer and the Contractor on the final inspection to ensure that the Construction Work has been completed in accordance with the Contract Documents and to the satisfaction of the Owner and the Architect/Engineer. Architect/Engineer will notify the Owner in writing that the Construction Work has been performed according to the Construction Contract Documents.
- 2.2.15 In accordance with paragraph 9.9, the Architect/Engineer shall receive from the Contractor and inspect all warranties, guarantees, bonds, O&M manuals and similar required material to make sure that all such materials are received and satisfy the requirements of the Construction Contract Documents. The Architect/Engineer will send to the Owner for review these close-out documents, and will issue a final Certificate for Payment upon compliance with the requirements of paragraph 9.9.
- 2.2.16 The extent of the duties, responsibilities and limitations of authority of the Architect/Engineer during the construction

shall not be modified or extended without the prior written consent of the Owner and the Architect/Engineer.

- 2.2.17 The Architect/Engineer shall report observation of any suspected hazardous materials. The Owner will be responsible for any necessary hazardous materials abatement work.
- 2.2.18 In case of the termination of the employment of the Architect/Engineer, the Owner shall appoint an architect/engineer, against whom the Contractor makes no reasonable objection, whose status under the Construction Contract shall be that of the former Architect/Engineer.

ARTICLE 3

THE OWNER

3.1 DEFINITION

The Owner is Arkansas Department of Transportation (ARDOT) and shall be referred to as if singular in number and masculine in gender. The term Owner means the Arkansas Department of Transportation building Committee, the State Facilities Management Engineer (SFME) of the ARDOT Facilities Management Section (the "Section Head"), or authorized representatives of the Section Head.

3.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

- 3.2.1 Unless otherwise provided in the Contract Documents, the Owner will furnish all surveys describing the physical characteristics, legal limitations, and utility locations for the site of the Project, and a legal description of the site.
- 3.2.2 Except as provided in subparagraph 4.7.1, or unless otherwise provided in the Contract Documents, the Owner shall secure and pay for necessary rights of way and easements required for the construction, use or occupancy of permanent structures or for permanent changes in existing facilities.
- 3.2.3 Information or services under the Owner's control shall be furnished by the Owner with reasonable promptness to avoid delay in the orderly progress of the Work.
- 3.2.4 The Owner shall forward all instructions to the Contractor in writing. Any verbal directions given by the Owner shall be consistent with the Architect/Engineer's interpretations of the Construction Contract and confirmed in writing. No communication or direction from the Owner shall be interpreted as a change to the Construction Contract unless provided in writing and processed as a Change Order in accordance with Article 12, Changes in Work.
- 3.2.5 The Owner shall approve and monitor the Construction Schedule.
- 3.2.6 The Owner shall observe the construction work for quality assurance, notify the Contractor in writing of defective work, and maintain a log of such deficiencies. This activity does not relieve the Architect/Engineer of his responsibility for construction observations as noted in subparagraph 2.2.3. The Owner's right to accept defective work is described in subparagraph 13.3.
- 3.2.7 The Owner shall maintain a log of outstanding issues until they are closed.
- 3.2.8 The foregoing are in addition to other duties and responsibilities of the Owner enumerated in articles 6, 9, and 11.

3.3 OWNER'S RIGHT TO STOP THE WORK

If the Contractor fails to correct defective work as required by paragraph 13.2 or persistently fails to carry out the Work in accordance with the Construction Contract, the Owner may, in writing, order the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated. However, this right of the Owner to stop the Work shall not give rise to any duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by subparagraph 6.1.3.

3.4 OWNER'S RIGHT TO CARRY OUT THE WORK

If the Contractor defaults or neglects to carry out the Work in accordance with the Construction Contract and fails

within ten (10) days after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, after ten (10) days following receipt by the Contractor of any additional written notice and without prejudice to any other remedy he may have, make good such deficiencies. In such case an appropriate Change Order shall be issued deducting from the payments then or thereafter due the Contractor the cost of correcting such deficiencies, including compensation, if any, for the Architect/Engineer's additional services made necessary by such default, negligence, or failure. If the payments then or thereafter due the Contractor are not sufficient to cover such amount, the Contractor shall pay the difference to the Owner within thirty (30) days after receipt of written demand therefor.

ARTICLE 4

CONTRACTOR

4.1 DEFINITION

The Contractor is the person or entity identified as such in the Construction Contract and shall be referred to as if singular in number and masculine in gender. The term Contractor means the Contractor or his authorized representative.

4.2 REVIEW OF CONTRACT DOCUMENTS

4.2.1 The Contractor shall exercise due diligence in carefully studying the Contract Documents and shall report to the Architect/Engineer and the Owner, in a timely manner, any error, inconsistency or omission he may discover. The report should be in the form of an RFI, as described in Division 1. For purposes of this paragraph 4.2, the RFI shall be considered "timely" if it is provided as soon as practicable but in no event later than 10 days after the Contractor's discovery of the error, inconsistency or omission. Should the Contractor fail to timely report such errors, inconsistencies, or omissions in the Contract Documents, and such delay results in additional costs incurred by the Owner and/or in schedule delays, the Contractor will not be entitled to a Contract Time extension or an increase in the Contract Sum for additional work, incidental damages, or Project delays unless the Contractor demonstrates to the Owner's satisfaction that such additional costs and/or Project delays would have resulted even if the RFI had been timely issued. The Contractor shall perform no portion of the Work at any time without the necessary part of the Construction Contract or, where required, approved Shop Drawings, Product Data, or Samples for such portion of the Work.

4.2.2 If the Contractor observes that any of the Contract Documents are at variance with applicable laws, statutes, building codes, or regulations in any respect, he shall promptly notify the Architect/Engineer and the Owner in writing. Any necessary changes shall be accomplished by appropriate modification, as described in the Construction Contract.

4.3 SUPERVISION AND CONSTRUCTION PROCEDURES

4.3.1 The Contractor shall supervise and direct the Work, using his best skill and attention. He shall be solely responsible for all construction means, methods, techniques, sequences and procedures, and for coordinating all portions of the Work.

4.3.2 The Contractor shall be responsible to the Owner for the acts and omissions of his employees, Subcontractors and their agents and employees, and other persons performing any of the Work under a contract with the Contractor.

4.3.3 The Contractor shall not be relieved from his obligations to perform the Work either by the activities or duties of the Architect/Engineer in his administration of the Construction Contract, or by inspections, tests, or approvals required or performed under Article 7 by persons other than the Contractor.

4.3.4 In the execution of the Construction Contract, the Contractor must comply with all applicable state and federal laws, including but not limited to laws concerned with labor, equal employment opportunity, safety and minimum wages. The Contractor shall make himself familiar with and at all times shall observe and comply with all federal, state and local laws, ordinances and regulations which in any manner affect the conduct of the Work, and shall indemnify, save and hold harmless the Owner and its official representatives against any claim arising from violation of any such law, ordinance or regulation by himself or by his subcontractor or his employees.

4.4 LABOR AND MATERIALS

4.4.1 Unless otherwise provided in the Construction Contract, the Contractor shall provide and pay for all labor, materials,

equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for the proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

4.4.2 The Contractor shall at all times observe and conduct himself with strict discipline and shall enforce such strict discipline and good order among his employees. The Contractor shall not employ to perform the Work any unfit person or anyone not skilled in the task assigned to him. The Contractor and all workers employed by him shall have such skill and experience as will enable them to properly perform the duties assigned them. If, in the opinion of the Owner, the Contractor, or any person employed by the Contractor or a Subcontractor, does not perform the Work in a proper and skillful manner, or is disrespectful, intemperate, disorderly, or otherwise objectionable, such person shall at the written request of the Owner be forthwith removed from the Project. If the person so removed is employed by the Contractor or a Subcontractor, such person shall be discharged and shall not be employed again on any portion of the Work without the written consent of the Owner. If the person so removed is the Contractor himself, the Owner may treat the incident giving rise to such removal as a breach of contract and may enforce any and all remedies for default provided herein. The Contractor shall furnish such suitable machinery, equipment, and construction forces as may be necessary, in the opinion of the Owner, for the proper prosecution of the Work. Failure to do so may cause the Owner to withhold all payments which have or may become due or the Owner may suspend the Work until his requests are complied with.

4.4.3 Delivery of all products under this Construction Contract shall be made Free on Board to final destination. The title and risk of loss of the goods shall not pass to the Owner until acceptance takes place at the F.O.B.

4.4.4 **Storage of Materials**

4.4.4.1 Contractor shall store materials to preserve their quality and fitness for the Work. When considered necessary by the Architect/Engineer, they shall be placed on wooden platforms or other hard, clean surfaces and not on the ground. They shall be placed under cover when so directed. Stored materials shall be located so as to facilitate prompt inspection.

4.4.4.2 When approved by the Architect/Engineer, selected materials or products may be pretested and approved for use, provided they are stored in an area meeting the requirements set forth by the Architect/Engineer.

4.5 **WARRANTY**

The Contractor represents and warrants to the Owner and the Architect/Engineer that all materials and equipment furnished under this Construction Contract will be new unless otherwise specified, and that the Work will be of good quality, free from faults and defects, and in conformance with the Construction Contract. Any portion of the Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. If required by the Owner, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment. The Contractor further represents and warrants to the Owner that all items delivered and all services rendered will conform to the Construction Contract Documents, and will be of merchantable quality, good workmanship, and free from defects. The Contractor further agrees to provide copies of applicable warranties or guaranties to the Purchasing Agent. Copies will be provided within ten (10) days after the Certificate of Substantial Completion is issued. Return of merchandise under warranty shall be at the Contractor's expense.

4.6 **TAXES**

The Contractor shall comply with the provisions set forth in the Supplemental Conditions regarding all sales, consumer, use, and other similar taxes for the Work or portions thereof.

4.7 **PERMITS, FEES, AND NOTICES**

4.7.1 The Contractor shall cooperate with applicable city or other governmental officials at all times where their jurisdiction prevails. The Contractor shall secure and pay for the building permit (as applicable) and for all permits, permanent utilities and governmental fees, licenses, and inspections necessary for the proper execution and completion of the Work which are legally required at the time the Bids are received. . Costs of temporary and permanent utilities for which the Contractor is responsible include, but are not limited to, tap fees, net capital recovery fees, meter fees, connection fees, inspection fees, extending services from point of connection to the building(s), and utility service costs during construction. Refer to Sections 012100 Allowances and 015000 Temporary Facilities

and Controls for additional information and clarification.

- 4.7.2 The Contractor shall give all notices and comply with all laws, ordinances, rules, regulations, and lawful orders of any public authority bearing on the performance of the Work. The parties acknowledge that some of the ordinances, rules, regulations or orders of some public authorities may not be enforceable against a ARDOT project.
- 4.7.3 If the observes that any of the Contract Documents are at variance with applicable laws, statutes, building codes, and regulations in any respect, he shall promptly notify the Owner in writing, and any necessary changes shall be accomplished by appropriate modification, as described in the Construction Contract.
- 4.7.4 If the Contractor performs any Work when he knows or should know it to be contrary to such laws, ordinances, rules and regulations, and without such notice to the Architect/Engineer and the Owner, he shall assume full responsibility therefor and shall bear all costs attributable thereto.

4.8 ALLOWANCES

- 4.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Construction Contract Documents. Items covered by these allowances shall be supplied for such amounts and by such persons as the Owner may direct, but the Contractor will not be required to employ persons against whom he makes a reasonable objection.
- 4.8.2 Unless otherwise provided in the Construction Contract:
- A. these allowances shall cover the cost to the Contractor, less any applicable trade discount, of the materials and equipment required by the allowance delivered at the site, and all applicable taxes;
 - B. the Contractor's costs for unloading and handling on the site, labor, installation costs, overhead, profit, and other expenses contemplated for the original allowance shall be included in the Contract Sum and not in the allowance; and
 - C. whenever the costs are more than or less than the allowance, the Contract Sum shall be adjusted accordingly by Change Order, as defined in the Construction Contract, the amount of which will recognize changes, if any, in handling costs on the site, labor, installation costs, overhead, profit, and other expenses.

4.9 SUPERINTENDENT

The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during the progress of the Work. The superintendent shall be satisfactory to the Owner and shall not be changed without written approval of the Owner. The superintendent shall represent the Contractor and all communications given to or by the superintendent shall be as binding as if given to or by the Contractor. Important communications shall be confirmed in writing.

4.10 CONTRACTOR'S CONSTRUCTION SCHEDULE

The Contractor, in accordance with Section 013200, shall prepare and submit for the Owner's approval and Architect/Engineer's information a fully developed Contractor's construction schedule for the Work (the "Construction Schedule"). The Construction Schedule shall relate to the entire Project as the Contract Documents require, and shall provide for expeditious and practicable execution of the Work. The Construction Schedule shall be in a format approved by the Owner and shall show the critical path through the project. The Construction Schedule shall directly relate to the Schedule of Values in a line-by-line manner. The Contractor shall adhere to the Construction Schedule. Should the Contractor depart more than seven (7) days from this schedule for the projected Substantial Completion Date, then Contractor shall deliver a plan to the Owner as to how Contractor shall reform his practices to return to the original Construction Schedule; or should the Owner allow, deliver a new Construction Schedule.

4.11 DOCUMENTS AND SAMPLES

The Contractor shall maintain at the site for the Owner one record copy of the Specifications and any amendments related thereto or to other parts of the Construction Contract, in good order and marked currently to record all changes made during construction, and approved Shop Drawings, Product Data, and Samples. These

shall be available to the Architect/Engineer and the Owner and shall be delivered to the Architect/ Engineer for the Owner upon completion of the Work.

4.12 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

- 4.12.1 "Shop Drawings" shall mean drawings, diagrams, schedules, and other data specifically prepared for the Work by the Contractor or any Subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work.
- 4.12.2 "Product Data" shall mean illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate a material, product, or system for some portion of the Work.
- 4.12.3 "Samples" shall mean physical examples which illustrate materials, equipment or workmanship, and establish standards by which the Work will be judged.
- 4.12.4 The Contractor shall review, approve and submit, in accordance with Section 01300, so as to cause no delay in the Work or in the Work of the Owner or any separate contractor, all Shop Drawings, Product Data, and Samples required by the Construction Contract.
- 4.12.5 By approving and submitting Shop Drawings, Product Data, and Samples, the Contractor represents that he has determined and verified all materials, field measurements, and field construction criteria related thereto, or will do so, and that he has checked and coordinated the information contained within such submittals with the requirements of the Work and of the Construction Contract.
- 4.12.6 The Contractor shall not be relieved of responsibility for any deviation from the requirements of the Construction Contract by the Architect/Engineer's or the Owner's approval of Shop Drawings, Product Data, or Samples under subparagraph 2.2.10 unless the Contractor has specifically informed the Owner in writing of such deviation at the time of submission and the Owner has given written approval to the specific deviation. The Contractor shall not be relieved from responsibility for errors or omissions in the Shop Drawings, Product Data, or Samples by the Architect/Engineer's or the Owner's approval thereof.
- 4.12.7 No portion of the Work requiring submission of a Shop Drawing, Product Data, or Sample shall be commenced until the submittal has been approved by the Architect/Engineer and the Owner as provided in subparagraph 2.2.10. All such portions of the Work shall be in accordance with approved submittals.

4.13 USE OF SITE

The Contractor shall confine operations at the site to areas permitted by law, ordinances, permits, and the Construction Contract and shall not unreasonably encumber the site with any materials or equipment. If the Owner contemplates more than one contractor being on the Owner's property, then the Contractor shall respect the sites designated for work by other contractors.

4.14 CUTTING AND PATCHING OF WORK

- 4.14.1 The Contractor shall be responsible for all cutting, fitting, or patching that may be required to complete the Work or to make its several parts fit together properly, in accordance with Section 017300.
- 4.14.2 The Contractor shall not damage or endanger any portion of the Work or the work of the Owner or the work of any contractors by cutting, patching or otherwise altering any work, or by excavation. The Contractor shall not cut or otherwise alter the work of the Owner or any other contractor except with the written consent of the Owner and of such other contractor. The Contractor shall not unreasonably withhold from the Owner or any other contractor his consent to cutting or otherwise altering the Work.

4.15 CLEANING UP

- 4.15.1 The Contractor at all times shall keep the worksite free from accumulation of waste materials or rubbish caused by his operations. At the completion of the Work he shall remove all his waste materials and rubbish from and about the Project as well as all his tools, construction equipment, machinery, and surplus materials.
- 4.15.2 If the Contractor fails to clean up at the completion of the Work, the Owner may do so as provided in paragraph

3.4 and the cost thereof shall be charged to the Contractor.

4.16 COMMUNICATIONS

The Contractor shall forward all communications to the Owner with information copy to the Architect/Engineer. Requests for technical information may be forwarded directly to the Architect/Engineer with information copy to the Owner. The Contractor shall advise the Architect/Engineer and the Owner of coordination needs with other contractors on the Owner's property.

4.17 ROYALTIES AND PATENTS

The Contractor shall pay all royalties and license fees. He shall defend all suits or claims for infringement of any patent, copyright, trade secret or other proprietary or intellectual property rights of any third party. He shall save and hold harmless the Owner from loss on account thereof, except that the Owner shall be responsible for all such loss when a particular design, or process or the product of a particular manufacturer or manufacturer is specified. But if the Contractor has reason to believe that the design, process, or product specified is an infringement of a patent or other proprietary or intellectual property right of any third party, he shall be responsible for such loss unless he promptly gives such information to the Owner in writing. The Contractor warrants that all applicable patents, copyrights or other proprietary or intellectual property rights of any third party which may exist on items that will be supplied under the contract have been adhered to and further warrants that the Owner shall not be liable for any infringement of those rights. Warranties granted the Owner shall apply for the duration of this Construction Contract or for the life of equipment or supplies purchased, whichever is longer. The Owner must not extend use of the granted exclusive rights to any party other than the Owner's employees or those persons with whom the Owner has established a relationship aimed at furthering the public interest, and then only for official public uses. The Owner will not knowingly or intentionally violate any applicable patent, license, copyright or other proprietary or intellectual property right of any third party. The Contractor must indemnify the Owner, its officers, agents, and employees against all claims, suits, and liability of every kind, including all expenses of litigation, court costs, and attorney's fees arising in connection with any alleged or actual infringement of existing patents, licenses, copyrights, or other proprietary or intellectual property right of any third party applicable to items sold.

4.18 INDEMNIFICATION

- 4.18.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner and its officials, agents and employees from and against all claims, damages, losses, causes of action, suits, judgements, expenses, and liability of any kind including but not limited to attorneys' fees, arising out of or resulting from the performance of the Work, or provision of goods by Contractor under this Contract, provided that any such claim, damage, loss, cause of action, suit, judgement or expense (1) is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property, including the loss of use resulting therefrom, and (2) is caused in whole or in part by any negligent act or omission of the Contractor, any Subcontractor, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, regardless of whether or not the injury, death, damage claim, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or otherwise reduce any other right or obligation or indemnity which would otherwise exist as to any party or person described in this paragraph.
- 4.18.2 In any and all claims against the Owner or any of their agents or employees by any employee of the Contractor, any Subcontractor, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, the indemnification obligation under this paragraph 4.18 shall not be limited in any way by any limitation in the amount or type of damages, compensation or benefits payable by or for the Contractor or any Subcontractor under workers' or workmen's compensation acts, disability benefits acts, or other employee benefit acts.

4.19 RESPONSIBILITY FOR DAMAGE CLAIMS

- 4.19.1 In addition, the Contractor agrees to indemnify, save, and hold harmless the Owner, its agents and employees from all suits, attorneys' fees, action or claims and from all liability and damages for any and all injuries, death or damages sustained by any person or property in consequence of any negligence, error or omission in the performance of the Construction Contract by the Contractor He shall further so indemnify and be responsible for any and all injuries, death or damages sustained by any person or liability or damages to property

of any character occurring or resulting from any act, omission, neglect or misconduct on his part in the manner or method of executing the Work; or from failure to properly execute the Work; or from defective Work or materials.

4.19.2 The Contractor shall not be released from these responsibilities until all claims have been settled and suitable evidence to that effect furnished to the ARDOT Building Committee.

4.19.3 The Contractor's attention is directed to the fact that pipelines and other underground installations as may be shown on the plans have been taken from the best available information. The Owner makes no representations that information provided on underground installations is complete or accurate. There may be other pipelines or installations. The Contractor shall save and hold harmless the Owner from any and all suits or claims resulting from damage by his operations to any pipeline or underground installation.

4.20 **PERSONAL LIABILITY**

In carrying out the provisions of the Construction Contract or in exercising any power or authority granted thereunder, there shall be no personal liability upon agents of the Owner, the Architect/Engineer, or their authorized assistants, as they are agents and representatives of the Owner.

4.21 **WAGE RATES**

4.21.1 The Contractor is required to pay not less than the wage scale of the various classes of labor for State of Arkansas. The wage rates are minimum rates only, and the Contractor is encouraged to pay all laborers, workmen, and mechanics employed on this job fair compensation. However, the Owner will not consider any claims for additional compensation made by the Contractor because of payment by the Contractor of any wage rates in excess of the applicable minimum rate contained in the Prevailing Wage Schedule.

4.21.2 The Contractor and each Subcontractor shall keep, or cause to be kept, an accurate record showing the names and occupations of all laborers, workmen and mechanics paid less than the said stipulated minimum rates for any work done under the Construction Contract, by him, or by any subcontractor under him. The Contractor and each Subcontractor shall keep, or cause to be kept, accurate records showing the names and occupations of all laborers, workmen and mechanics employed in connection with the Work, and showing also the actual per diem wages paid to such workers, which record shall be open at all reasonable hours for the inspection by the Owner.

4.22 **CLAIMS FOR DAMAGES**

Should the Contractor suffer injury or damage to person or property because of any act or omission of the Owner or of any of his employees, agents, or others for whose acts he is legally liable, the claim shall be made in writing to the Owner within five (5) calendar days after the first observance of such injury or damage.

4.23 **INDEPENDENT CONTRACTOR**

The Parties expressly acknowledge and agree that Contractor is an independent contractor, operating solely in that capacity, and assumes all of the rights, obligations and liabilities applicable to him as an independent contractor. No employee of Contractor shall be considered an employee of ARDOT, or gain any rights against ARDOT pursuant to the ARDOT's personnel policies. Both parties expressly acknowledge and agree that none of Contractor's employees have a contractual relationship with ARDOT.

4.24 MAINTENANCE OF AND RIGHT OF ACCESS TO RECORDS

- 4.24.1 The Contractor agrees to maintain appropriate accounting records of costs, expenses, and payrolls of employees working on the Project, for a period of five years after final payment for completed services and all other pending matters concerning this Contract have been closed.
- 4.24.2 The Contractor further agrees that the Owner or its duly authorized representatives shall have access to any and all books, documents, papers, reports and records of the Contractor, which the Owner deems are directly pertinent to the services to be performed under this Contract for the purposes of making audits, examinations, excerpts, and transcriptions, and to ascertain compliance with federal and state employment discrimination laws. Contractor shall provide all information and reports required by Title VI of the 1964 Civil Rights Act (42 USC Section 2000d, et. seq.) and any regulations or directives issued pursuant to them. Contractor shall permit access to its books, records, accounts, other sources of information and its facilities as ARDOT may determine to be pertinent to ascertain compliance with these regulations, orders, and instructions. Where any information required of Contractor is in the exclusive possession of another who fails or refuses to furnish this information, Contractor shall so certify to the ARDOT, as appropriate, and shall state what efforts it has made to obtain the information.

4.25 ASSIGNABILITY

- 4.25.1 Written Approval. Neither party may assign any of the rights or duties created by this Contract without the prior written approval of the other party. It is acknowledged by Contractor that no officer, agent, employee or representative of ARDOT has any authority to assign any part of this Contract unless expressly granted that authority by the Owner.
- 4.25.2 Binding Contract. This Contract shall be binding upon the successors, assigns, administrators, and legal representatives of the parties to this Contract.

4.26 CIVIL RIGHTS AND EQUAL OPPORTUNITY IN EMPLOYMENT

- 4.26.1 The Contractor agrees, during the performance of the services under this Contract, that the Contractor shall provide all services and activities required in a manner that complies with the Civil Rights Act of 1964, as amended, the Rehabilitation Act of 1973, Public Law 93-1122, Section 504, the provisions of the Americans with Disabilities Act of 1990, Public Law 101-336 [S.933], and all other federal and state laws, rules, regulations, and orders pertaining to equal opportunity in employment, as if the Contractor were an entity bound to comply with these laws. The Contractor shall not discriminate against any employee or applicant for employment based on race, religion, color, sex, national origin, age or handicapped condition. In accordance with Title VI of the Civil Rights Act of 1964:
- 4.26.2 Compliance with Regulations: Contractor shall comply with the requirements relative to nondiscrimination in Federally-Assisted programs, including but not limited to Title VI of the 1964 Civil Rights Act (42 USC Section 2000d, et. seq.), and 49 CFR Part 21, both as explained in Federal Transit Administration (FTA) Circular 4702.1A, as they may be amended ("the Regulations") which are herein incorporated by reference and made a part of this Contract.
- 4.26.3 Nondiscrimination: Regarding the work performed by Contractor under this Contract, it shall not discriminate on the grounds of race, color, or national origin in the selection and retention of subcontractors, including procurements of materials and leases of equipment. Seller shall not participate either directly or indirectly in the discrimination prohibited by section 21.5 of the Regulations, including employment practices.
- 4.26.4 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 shall be notified by the contractor of the contractor's obligations under this Contract and the Regulations relative to nondiscrimination on the grounds of race, color, or national origin.
- 4.26.5 Sanctions for Noncompliance: If Contractor does not comply with the nondiscrimination provisions of this Contract, ARDOT shall impose the sanctions that it determines are appropriate, including, but not limited to,

withholding of payments to Contractor under the Contract until Contractor complies, or until cancellation, termination or suspension of the Contract, in whole or in part.

ARTICLE 5

SUBCONTRACTORS

5.1 DEFINITION

- 5.1.1 A "Subcontractor" means a person or entity who has a direct contract with the Contractor to perform any of the Work. The term Subcontractor is referred to as if singular in number and masculine in gender and means a Subcontractor or his authorized representative. The term Subcontractor does not include any separate contractor or his subcontractors.
- 5.1.2 A "Sub-subcontractor" means a person or entity who has a direct or indirect contract with a Subcontractor or another Sub-subcontractor to perform any of the Work. The term Sub-subcontractor is referred to as if singular in number and masculine in gender and means a Sub-subcontractor or an authorized representative thereof.

5.2 AWARD OF SUBCONTRACT AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

- 5.2.1 Unless otherwise required by the Construction Contract, the Contractor, as soon as practicable after the award of the Construction Contract, shall furnish to the Owner and the Architect/Engineer in writing the names of the persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for all portions of the Work. The Owner will promptly reply to the Contractor in writing stating whether or not the Owner or the Architect/Engineer, after due investigation, has reasonable objection to any such proposed person or entity. Failure of the Owner or the Architect/Engineer to reply within ten (10) days after receipt of the names shall constitute notice of no reasonable objection.
- 5.2.2 The Contractor shall not contract with any such proposed person or entity to whom the Owner or the Architect/Engineer has made reasonable objection under the provisions of subparagraph 5.2.1. The Contractor shall not be required to contract with anyone to whom he has a reasonable objection.
- 5.2.3 If the Owner or the Architect/Engineer has reasonable objection to any such proposed person or entity, the Contractor shall submit a substitute to whom the Owner or the Architect/Engineer has no reasonable objection. The Contract Sum shall be increased or decreased by the difference in cost occasioned by such substitution and an appropriate amendment shall be issued. However, no increase in the Contract Sum shall be allowed for such substitution if the substitution occurs before award of the Construction Contract or if the Contractor has not acted promptly and responsively in submitting names as required by subparagraph 5.2.1.
- 5.2.4 The Contractor shall request approval from the Owner or Architect/Engineer for any substitution for any Subcontractor, person, or entity previously selected and shall not commence with substitution unless the Owner or Architect/Engineer does not make a timely and reasonable objection to such substitution.

5.3 SUBCONTRACTUAL RELATIONS

By an appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by the terms of the Construction Contract, and to assume toward the Contractor all the obligations and responsibilities which the Contractor, by the Construction Contract, assumes toward the Owner and the Architect/Engineer. The agreement shall preserve and protect the rights of the Owner and the Architect/Engineer under the Construction Contract with respect to the Work to be performed by the Subcontractor so that the subcontracting thereof will not prejudice the Owner's nor the Architect/Engineer's rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the Contractor-Subcontractor agreement, the benefit of all rights, remedies, and redress against the Contractor that the Contractor, by the Construction Contract, has against the Owner. Where appropriate, the Contractor shall

require each Subcontractor to enter into similar agreements with his Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract, a copy of the Construction Contract to which the Subcontractor will be bound by this paragraph 5.3, and identify to the Subcontractor any terms and conditions of the proposed subcontract which may be at variance with the Construction Contract. Each Subcontractor shall similarly make copies of such documents available to his Sub-subcontractors.

ARTICLE 6

WORK BY THE OWNER OR BY SEPARATE CONTRACTORS

6.1 THE OWNER'S RIGHT TO PERFORM WORK AND TO AWARD SEPARATE CONTRACTS

- 6.1.1 The Owner reserves the right to perform work related to the Project with his own forces, and award separate contracts in connection with other portions of the Project.
- 6.1.2 When separate contracts are awarded for different portions of the Project or other work on the site, the term Contractor in the Construction Contract in each case shall mean the Contractor who executes such separate Agreement for Construction Services.
- 6.1.3 The Contractor shall coordinate the Work with other contractors and with the Owner and the Owner's labor crews.

6.2 MUTUAL RESPONSIBILITY

- 6.2.1 The Contractor shall afford the Owner and other contractors reasonable opportunity for the introduction and storage of their materials and equipment and the execution of their work, and shall connect and coordinate his Work with theirs as required by the Construction Contract.
- 6.2.2 If any part of the Work depends for proper execution or results upon the work of the Owner or any other contractor, the Contractor shall, prior to proceeding with the Work, promptly report to the Architect/Engineer any apparent discrepancies or defects in such other work that render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acceptance of the Owner's or separate contractors' work as fit and proper to receive his Work.
- 6.2.3 Contractor may share responsibility for defective work not reported, yet known by Contractor to be deficient.
- 6.2.4 Should the Contractor wrongfully cause damage to the Work or property of the Owner, or to other work on the site, the Contractor shall promptly remedy such damage as provided in subparagraph 10.2.5.
- 6.2.5 Should the Contractor wrongfully cause damage to the Work or property of any other contractor, the Contractor shall upon due notice promptly attempt to settle with such other contractor by agreement, or otherwise to resolve the dispute. If such separate contractor sues or initiates a proceeding against the Owner on account of any damage alleged to have been caused by the Contractor, the Owner shall notify the Contractor who shall defend such proceedings at the Contractor's expense. If any judgment or award against the Owner arises therefrom the Contractor shall pay or satisfy it and shall reimburse the Owner for all attorneys' fees and court or other costs which the Owner has incurred. The Owner shall have the right to select counsel for any such defense.

6.3 THE OWNER'S RIGHT TO CLEAN UP

If a dispute arises between the Contractor and other contractors as to their responsibility for cleaning up as required by paragraph 4.15, the Owner may clean up and charge the cost thereof to the contractors the Owner determines responsible therefor.

ARTICLE 7

TESTING

- 7.1 If the Construction Contract, laws, ordinances, rules, regulations or orders of any public authority having

jurisdiction require any portion of the Work to be inspected, tested, or approved, the Contractor shall give the Owner and Architect/Engineer timely notice of its readiness so the Owner and Architect/Engineer may observe such inspection, testing, or approval. The Contractor shall bear all costs of such inspections, tests, or approvals required by public authorities. Unless otherwise provided, the Owner shall bear all costs of other inspections, tests, or approvals.

- 7.2 If the Architect/Engineer determines that any portion of the Work requires special inspection, testing, or approval which paragraph 7.1 does not include, he will, upon written authorization from the Owner, instruct the Contractor to order such special inspection, testing or approval, and the Contractor shall give notice as provided in paragraph 7.1. The Owner shall bear the costs of such tests, and an appropriate amendment shall be issued.
- 7.3 If any special inspection or testing reveals a failure of the Work to comply with the requirements of the Construction Contract, the Contractor shall bear all costs thereof and of any subsequent testing, including compensation for the Architect/Engineer's additional services made necessary by such failure.
- 7.4 Required certificates of inspection, testing or approval shall be requested by the Contractor and promptly delivered by him to the Architect/Engineer. After reviewing the certificates of inspection, the Architect/Engineer will forward the certificates to the Owner with approvals or recommendations as appropriate.
- 7.5 If the Architect/Engineer is to observe the inspections, tests, or approval required by the Construction Contract, he will do so promptly and, where practicable, at the source of supply.
- 7.6 The Architect/Engineer may require materials to be inspected, tested and approved before being incorporated in the Work. Any of the Work in which such materials are used without prior required test and approval or written permission of the Architect/Engineer may be ordered removed and replaced at the Contractor's expense. The selection of the method of testing shall be designated by the Owner. When requested, the Contractor shall furnish a complete written statement of the origin, composition, and/or manufacture of any or all materials that are to be used in the Work. The Owner may contract with an independent testing laboratory to perform field testing. Where the Contractor notifies the Owner of scheduled Work requiring sampling and testing and the Contractor cancels the Work for any reason whatsoever after the laboratory personnel have departed their office for the project site, the testing laboratory shall bill the Owner for their time and travel expenses and the Owner shall deduct said charges from amounts due the Contractor.

7.7 PLANT INSPECTION

If the volume of the Work, Progress Schedule, and other considerations warrant, the Architect/Engineer may undertake the inspection of materials at the source. It is understood, however, that no obligation is assumed to inspect materials in that manner.

Plant inspection will be undertaken only upon condition that:

- (a) The cooperation and assistance of the Contractor and the producer with whom he has contracted for materials is assured.
- (b) The representative of the Architect/Engineer shall have full entry at all times to such parts of the plant as may concern the manufacture or production of the materials ordered.
- (c) Where inspection requirements are such that it is necessary to use scales, measures and/or other equipment which may be required by the Architect/Engineer for the control of production and use of materials, the Contractor shall be responsible for furnishing and calibrating such equipment.
- (d) In those cases where inspection of any item is requested for periods other than daylight hours, it shall be provided under the following conditions:
 - (1) Continuous production of materials for the Owner's use is necessary due to the production volume being handled by the plant.
 - (2) The lighting provided by the plant is approved by the Architect/Engineer to be adequate to allow satisfactory inspection of the material being produced.

- (e) Materials produced under the Owner's inspections will be for the Owner's use only unless released in writing by the Architect/Engineer.

7.8 PRETESTED MATERIALS

Subject to conditions established in a written agreement between a supplier and the Architect/Engineer, pretested and approved materials may be incorporated into the Work.

7.9 SOURCES OF SUPPLY AND QUALITY OF MATERIALS

- 7.9.1 The Architect/Engineer shall approve the source of supply of each of the materials before delivery is started. At his option, the Architect/Engineer may sample and test materials to determine compliance with the Construction Contract Documents before delivery is started. If it is found after testing that sources of supply previously approved do not produce uniform and satisfactory products, or if the product from any source proves unacceptable at any time, the Contractor shall furnish materials from other approved sources. Only materials conforming to the requirements of the Construction Contract Documents and approved by the Architect/Engineer shall be used in the Work. All materials being used are subject to inspection or test at any time during their preparation or use. Any material which has been tested and accepted at the source of supply may be subjected to a check test after delivery and all materials which, when retested, do not meet the requirements of the Specifications, will be rejected. No material which after approval has in any way become unfit for use shall be used in the Work.

If, for any reason, the Contractor selects a material which is approved for use by the Architect/Engineer by sampling and testing or other means, and then decides to change to a different material requiring additional sampling and testing for approval, the expense for such sampling and testing may be deducted from any monies due or to become due to the Contractor.

- 7.9.2 Where reference is made to the test procedures, ASTM, AASHTO or bulletins for the quality of materials or sampling and testing, the latest standard, tentative standard or bulletin issued prior to the date of the Bid shall govern.
- 7.9.3 If it is the normal trade practice for manufacturers to provide warranties or guaranties for the materials and equipment provided herein, the Contractor shall turn over and/or pass through the guarantees and warranties over to the Architect/Engineer. The scope and extent of such warranties or guarantees will not be a factor in selecting the successful Bidder.

ARTICLE 8

TIME

8.1 DEFINITIONS

- 8.1.1 Unless otherwise provided, the "Contract Time" is the period of time allotted in the Contract Documents for Substantial Completion of the Work as defined in subparagraph 8.1.3, including authorized adjustments thereof.
- 8.1.2 The "Date of Commencement" of the Work is the date established in the Notice to Proceed. If there is no Notice to Proceed, it shall be the date of the Construction Contract or such other date as may be established therein.
- 8.1.3 The date of "Substantial Completion" of the Work or designated portion thereof is the date approved by the Owner and certified by the Architect/Engineer when construction is sufficiently complete, in accordance with the Contract Documents, so the Owner can occupy or utilize the Work or designated portion thereof for the use for which it is intended. A Certificate of Occupancy or Temporary Certificate of Occupancy, issued by the governing authority, is required for Substantial Completion unless waived by the Owner.
- 8.1.4 The word "day" as used in the Contract Documents shall mean a calendar day.

8.2 PROGRESS AND COMPLETION

- 8.2.1 Time is of the essence in the performance of the Construction Contract.

8.2.2 The Contractor shall begin the Work on the Date of Commencement. The Contractor shall carry the Work forward expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

8.3 DELAYS AND EXTENSIONS OF TIME

8.3.1 When a delay defined herein as excusable prevents the Contractor from completing the work within the Contract Time, the Contractor shall be entitled to an extension of time, and in certain instances to compensation for the direct cost of delay, as set forth in 8.3.1.3. The Contract Time shall be extended by the number of calendar days lost by reason of excusable delay, as measured by the Contractor's Construction Schedule (or current update). All extensions of time shall be given in calendar days. In no event will an extension of time be granted for delays that merely extend the duration of non-critical activities, or which consume only float without delaying the Project completion date.

8.3.1.1 Time Extensions for weather days shall be granted in accordance with Section 018000.

8.3.1.2 Non-Weather Excusable Noncompensable Delay. The Contractor shall be entitled only to an extension of time for unforeseen delays not within the control of or arising from the fault of either the Contractor or the Owner caused by the following:

- a. Strikes and labor disputes that cause unusual delay to the Work onsite or to the delivery of materials or equipment to be incorporated into the Work;
- b. Physical damage to the work caused by circumstances beyond the control of the Contractor;
- c. War, acts or threats of terrorism, civil unrest, or insurrection;
- d. Other unforeseeable causes beyond the control of either the Contractor or the Owner.

8.3.1.3 Excusable Compensable Delay. The Contractor shall be entitled to an equitable adjustment of cost as well as a time extension for delays caused by the following:

- a. Failure of the Owner or the Architect/Engineer to take timely actions as required under the Contract Documents, or to provide information required by the Contract Documents and necessary for the Contractor to proceed with the Work in a timely manner;
- b. Detrimental or obstructive actions of separate contractors employed by the Owner;
- c. Failure of the Owner to provide access to the Work site as provided in this Construction Contract;
- d. Failure of the Owner to provide materials which are to be furnished by the Owner, as required under the Contract Documents, consistent with the Construction Schedule;
- e. Errors or omissions in design which the Architect/Engineer corrects by means of Change Order(s);
- f. Unanticipated physical conditions at the Site which the Architect/Engineer corrects by means of Change Order(s);
- g. Owner requested Change Orders;
- h. Suspensions for cause under 8.3.1.4 which are determined not to have been within the control of the Contractor; or
- i. Suspensions for convenience under 8.3.1.5 which prevents the Contractor from completing the Work within the Contract Time, except for required suspensions described as Unavailable Work Period.

The Contractor's compensation in the event of such delays, items 8.3.1.3.a – i above, shall be the cost of extended general conditions for the period of delay. Extended general conditions costs incurred solely as a result of the delay shall be determined pursuant to Article 12.

8.3.1.4 Suspension of Work for Cause. The Owner may, at any time without prior notice, suspend all or any part of the Work, if, in the Owner's sole discretion, it is considered reasonably necessary to do so to prevent or correct any condition of the Work, which constitutes an immediate safety hazard, or which may reasonably be expected to impair the integrity, usefulness or longevity of the Work when completed. The Owner shall give the Contractor a written notice of suspension for cause, setting forth the reason for the suspension and identifying the Work to be suspended. Upon receipt of such notice, the Contractor shall immediately stop the Work so identified. As soon as practicable following the issuance of such a notice, the Owner, with the assistance of the Architect/Engineer, shall initiate and complete an investigation of the circumstances giving rise to the suspension, and shall issue a written determination of their cause. The Contractor will not be entitled to an extension of time or compensation for delay resulting from a

suspension if the Owner's investigation determines that the cause was within the control of the Contractor.

If the cause is determined not to have been within the control of the Contractor, and the suspension prevents the Contractor from completing the Work within the Contract Time, the suspension is an Excusable Compensable Delay. Suspensions of work under this provision shall be no longer than is reasonably necessary to identify and remedy the conditions giving rise to the suspension.

8.3.1.5 Suspension of Work for Owner's Convenience. Upon seven (7) Construction days' prior written notice to the Contractor, the Owner may at any time without breach of the Construction Contract suspend all or any portion of the Work for a period of up to thirty (30) days for its own convenience. The Owner shall give the Contractor a written notice of suspension for convenience, which shall set forth the number of days for which the Work, or any portion of it, will be suspended, and the date on which the suspension of Work shall cease. When such a suspension prevents the Contractor from completing the Work within the Contract Time, it is Excusable Compensable Delay. A notice of suspension for convenience may be modified by the Owner at any time on seven (7) calendar days' prior written notice to the Contractor. If the Owner suspends the Work for its convenience for more than sixty (60) consecutive calendar days, the Contractor may elect to terminate the Construction Contract pursuant to the provisions of Article 14.

8.3.1.6 Concurrent Delay. When the completion of the Work is simultaneously delayed by more than one of the categories described under 8.3.1, the Contractor will be entitled to a time extension only for the period of concurrent delay determined to be excusable and will be entitled to compensation only for the period of concurrent delay determined to be excusable and compensable.

8.3.1.7 Except as expressly provided under 8.3.1, the Contractor shall not be entitled to an extension of the Contract Time, and shall bear all responsibility for financial risks which may accrue from various causes of delay in the construction progress.

8.3.2 Any request for extension of time shall be made in writing to the Owner not more than five (5) business days after the commencement of the delay; otherwise, it shall be waived. Such request shall state the nature of the delay, activities potentially affected, and shall be accompanied by sufficient written evidence to document the delay. In the case of a continuing delay only one (1) request is necessary. The Contractor shall provide an estimate of the probable effect of such delay on the progress of the Work. A conference shall be held between the Contractor and Owner within five (5) business days of the commencement of the delay to establish a proposed new Construction Schedule for the Work.

8.3.2.1 Contents of Time Extension Requests. Each time extension request shall be accompanied by a quantitative demonstration of the impact of the delay on Project completion time, based on the current Construction Schedule. Time extension requests shall include a reasonably detailed narrative setting forth (1) the nature of the delay and its cause, (2) the basis of the Contractor's proposed entitlement to a time extension, (3) documentation of the actual impacts of the delay, and any concurrent delays, (4) description and documentation of steps taken by the Contractor to mitigate the effect of the delay, including, when appropriate, the modification of the Construction Schedule, and (5) such other information that the Contractor considers necessary to justify its request for an extension of time. No time extensions shall be granted for delays that do not affect the Project completion time.

8.3.2.2 Owner's Response. The Owner shall respond to the time extension request by providing to the Contractor written notice of the number of days granted, and giving its reason if this number differs from the number of days requested by the Contractor. A Change Order reflecting the extension of time shall be executed by the parties in accordance with Article 12 and the extension of time is effective on the date the Change Order is approved.

8.3.3 All changes to the Contract Time or Contract Sum made as a result of such requests shall be by Change Order, as provided under Article 12.

8.4 FAILURE TO COMPLETE WORK ON TIME

8.4.1 The Contract Time for the completion of the Work is an essential element of the Construction Contract. The Contractor's failure to complete the Work within such time will cause damage to the Owner.

8.4.2 Should the Contractor fail to complete the Work within the Contract Time, including all officially approved extensions thereto, the Owner shall collect from the Contractor or deduct from any funds owed him the amount named as liquidated damages in the Contract Documents. It is agreed that the Owner's actual damages would be extremely difficult, impractical, or impossible to calculate and, therefore, the amount of liquidated damages, as set forth in the Agreement for Construction Services, is agreed to be a reasonable estimate of the Owner's actual damages and will be retained as liquidated damages and not as a penalty.

8.4.3 After the Substantial Completion inspection by the Owner, the Contractor will be allowed thirty (30) days within which to correct all deficiencies listed in the inspection Punch List, unless extended by mutual agreement. Failure of the Contractor to complete such corrections within the stipulated time will be reported to the Contractor's surety for correction. In the event there is no surety, the Owner may initiate action to complete corrective work out of the remaining Construction Contract funds in accordance with paragraph 3.4 and 14.1.

8.5 **FORCE MAJEURE**

If the performance by either party of any of its obligations under this Contract is interrupted or delayed due to an act of God or the common enemy or as the result of war, riot, civil commotion, sovereign conduct, or the act or conduct of any person or persons not a party to this Contract, then it shall be excused from performance for such period of time as is reasonably necessary to remedy the effects thereof.

ARTICLE 9 PAYMENTS AND COMPLETION

9.1 **CONTRACT SUM**

9.1.1 The Contract Sum is defined and described in the Agreement for Construction Services and, including authorized adjustments thereto, is the total amount payable by Owner to the Contractor for the performance of the Work under the Contract Documents.

9.2 **SCHEDULE OF VALUES**

9.2.1 Before the first Application for Payment, as defined herein, the Contractor shall submit to the Architect/Engineer a schedule of values allocated to the various portions of the Work, prepared in such form and supported by such data to substantiate its accuracy as the Owner or the Architect/Engineer may require. This schedule, unless objected to by the Owner or the Architect/Engineer, shall be used only as a basis for the Contractor's Applications for Payment.

9.3 **APPLICATIONS FOR PAYMENT**

9.3.1 At least ten (10) days before the date for each progress payment established in the Construction Contract, the Contractor shall submit to Owner an itemized "Application for Payment", dated and substantiated, as the Owner may require, the Contractor's right to payment and reflecting retainage as provided elsewhere in the Contract Documents.

9.3.2 Payments may be made on account of materials or equipment not incorporated in the Work but delivered and suitably stored at the site. If approved in advance by the Owner, payments may similarly be made for materials or equipment suitably stored at some other location agreed upon in writing. Payments for materials or equipment stored on or off the site shall be conditioned upon submission by the Contractor of bills of sale or such other procedures satisfactory to the Owner to establish the Owner's title to such materials or equipment or otherwise protect the Owner's interest, including applicable insurance and transportation to the site for those materials and equipment stored off the site.

9.3.3 The Contractor warrants that title to all Work, materials, and equipment covered by an Application for Payment will pass to the Owner either by incorporation in the construction or upon the receipt of payment by the Contractor, whichever occurs first, free and clear of all liens, claims, security interests, or encumbrances, hereinafter referred to in this Article 9 as "liens"; and that no Work, materials, or equipment covered by an Application for Payment will have been acquired in the Contractor's behalf, or by any other person performing Work at the site or furnishing materials and equipment for the Project. Rather, the purchase shall be in the Owner's behalf.

9.4 **CERTIFICATES FOR PAYMENT**

- 9.4.1 Owner will, within ten (10) days after the receipt of the Contractor's Application for Payment, either certify his approval and forward the Application for Payment, with a copy to the Contractor, for such amount as the Owner determines is properly due, or notify the Contractor in writing his reasons for withholding a Certificate for Payment as provided in subparagraph 9.6.1.
- 9.4.2 The issuance of a Certificate for Payment will constitute a representation by Owner, based on his observations at the site as provided in subparagraph 2.2.3 and the data comprising the Application for Payment, that the Work has progressed to the point indicated, that the quality of the Work is in accordance with the Contract Documents, and that the Contractor is entitled to payment in the amount certified. This certification is subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to the results of any subsequent tests required by or performed under the Contract Documents, to minor deviations from the Contract Documents correctable prior to completion of the Work, and to any specific qualifications stated in the Certificate for Payment. However, by issuing a Certificate for Payment, Owner shall not thereby be deemed to represent that he had made continuous on-site inspections to check the quality or quantity of the Work or that he has made any examination to ascertain how or for what purpose the Contractor has used the monies previously paid on account of the Contract Sum.

9.5 PROGRESS PAYMENTS

- 9.5.1 After the Owner has received the Application for Payment, the Owner shall make payment within thirty (30) days or shall notify the Contractor in writing of any objections to payment which the Owner has within twenty-seven (27) days (the "Progress Payment(s)"). Objections to payment shall be for any incurred breach of the Contract Documents by the Contractor, including, but not limited to, the specific grounds for withholding payment set forth in subparagraph 9.6.1. The Owner shall retain not less than five percent (5%) of each payment until final completion and acceptance of all Work covered by the Construction Contract unless the retainage amount is reduced following Substantial Completion subject to paragraph 9.8.2.
- 9.5.2 The Contractor shall promptly pay each Subcontractor, upon receipt of payment from the Owner, out of the amount paid to the Contractor on account of such Subcontractor's work, the amount of which said Subcontractor is entitled, reflecting the percentage actually retained, from payments to the Contractor on account of such Subcontractor's work. The Contractor shall, by an appropriate agreement with each Subcontractor, require each Subcontractor to make payments to his Sub-subcontractors in similar manner. All payments to Subcontractors and Sub-subcontractors shall be made within ten (10) days of receipt of payment for work claimed in an Application for Payment that Subcontractor or Sub-subcontractor performed. Such Application for Payments shall designate the dollar amount of work which Subcontractor or Sub-subcontractor provided.
- 9.5.3 The Owner may, on request and at his discretion, furnish to any Subcontractor, if practicable, information regarding the percentage of completion or the amounts applied for by the Contractor and the action taken thereon by the Architect/Engineer and the Owner on account of work done by such Subcontractor.
- 9.5.4 Neither the Owner nor the Architect/Engineer shall have any obligations to pay or to see to the payment of any monies to any Subcontractor except as may otherwise be required by law.
- 9.5.5 No Certificate for Payment, nor any Progress Payment, nor any partial or entire use or occupancy of the Project by the Owner, shall constitute an acceptance of any Work not in accordance with the Contract Documents.

9.6 PAYMENTS WITHHELD

- 9.6.1 The Owner may decline to certify payment and may withhold his Certificate for Payment in whole or in part, to the extent reasonably necessary, if in his opinion he is unable to make representations to the Owner as provided in subparagraph 9.4.2. In such situations, The Owner will notify the Contractor as provided in subparagraph 9.4.1. If the Contractor and the Owner cannot agree on a revised amount, The Owner will promptly issue a Certificate for Payment for the amount for which he is able to make such representations to the Owner. The Owner may also decline to certify payment or, because of subsequently discovered evidence or subsequent observations, he may nullify the whole or any part of any Certificate for Payment previously issued, to such extent as may be necessary in his opinion to protect the Owner from loss because of:

1. defective Work not remedied;

2. third party claims filed or reasonable evidence indicating probable filing of such claims;
3. failure of the Contractor to make payments properly to Subcontractors or for labor, materials, or equipment;
4. reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
5. damage to the Owner or another Contractor;
6. reasonable evidence that the Work will not be completed within the Contract Time;
7. failure to carry out the Work in accordance with the Contract Documents; or
8. failure of the Contractor to correct any serious violation (as determined the ARDOT Project Safety Manager) of OSHA standards or non-compliance with Article 10 - Protection of Persons and Property.

9.6.2 When the above grounds in subparagraph 9.6.1 are removed, payment shall be made for amounts withheld because of them.

9.7 FAILURE OF PAYMENT

9.7.1 If the Owner does not issue a Certificate for Payment, through no fault of the Contractor, within thirty (30) days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within sixty (60) days of receipt of the Application for Payment, then the Contractor may, upon ten (10) additional days' written notice to the Owner, commencing upon Owner's receipt of such notice, stop the Work until payment of the amount owing has been received.

The Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shut-down, delay, and start-up, which shall all be effected by appropriate Change Order in accordance with paragraph 12.3.

9.8 SUBSTANTIAL COMPLETION

9.8.1 When the Contractor considers that the Work, or a designated portion thereof which is acceptable to the Owner, is substantially complete as defined in subparagraph 8.1.3, the Contractor shall prepare for submission to the Owner and the Architect/Engineer a list of items to be completed or corrected. The failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents. When the Owner and the Architect/Engineer, on the basis of an inspection, determine that the Work or designated portion thereof is substantially complete, the Architect/Engineer will then prepare a "Certificate of Substantial Completion" which shall show the date of Substantial Completion established by the Owner, shall state the responsibilities of the Owner and the Contractor for security, maintenance, heat, utilities, damage to the Work, and insurance, and the time within which the Contractor shall complete the items listed therein. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion. The Certificate of Substantial Completion shall be submitted to the Contractor and Owner for their written acceptance of the responsibilities assigned to them in such Certificate of Substantial Completion.

9.8.2 Upon Substantial Completion of the Work or designated portion thereof and upon application by the Contractor and certification by the Architect/Engineer, the Owner shall make payment, reflecting adjustment in retainage, if any, for such Work or portion thereof, as provided in the Contract Documents or shall notify the Contractor in writing of any objections to payment within the time provided in the Contract Documents for payment. Objections to payment shall be for any uncured breach of the Contract Document by the Contractor, including, but not limited to, the specific grounds for withholding payment set forth in paragraph 9.6.1.

9.9 FINAL COMPLETION AND FINAL PAYMENT

9.9.1 Upon receipt of written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect/Engineer will promptly make such inspection and, when he finds the Work acceptable under the Contract Documents and the Construction Contract fully performed, he will promptly issue a final Certificate for Payment stating that on the basis of his observations, and inspections the Work has

been completed in accordance with the terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor, and noted in said final Certificate for Payment is due and payable. The Architect/Engineer's final Certificate for Payment will constitute a further representation that the conditions precedent to the Contractors being entitled to final payment as set forth in subparagraph 9.9.2 have been fulfilled.

- 9.9.2 Neither the final payment nor the remaining retained percentage shall become due until the Contractor submits to the Architect/Engineer (1) an affidavit that all payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or his property might in any way be responsible, have been paid or otherwise satisfied, (2) consent of surety, if any, to final payment, and (3) if required by the Owner, another date establishing payment or satisfaction of all such obligations, such as receipts, releases and waivers of liens arising out of the Construction Contract, to the extent and in such form as may be designated by the Owner. If any Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify Owner against any such lien. If any such lien remains unsatisfied after all payments are made, the Contractor shall refund to the Owner all monies that the latter may be compelled to pay in discharging such lien, including costs and reasonable attorneys' fees.
- 9.9.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by the issuance of Change Orders affecting final completion, and the Architect/Engineer so confirms, the Owner shall, upon application by the Contractor and certification by the Architect/Engineer, and without terminating the Construction Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance for Work not fully completed or corrected is less than the retainage stipulated in the Contract Documents, and if bonds have been furnished as provided in paragraph 9.9.2, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect/Engineer prior to certification of such payment. Such payment shall be made under the terms and conditions governing final payment.
- 9.9.4 The acceptance of final payment shall constitute a waiver of all claims by the Contractor.

ARTICLE 10

PROTECTION OF PERSONS AND PROPERTY

10.1 SAFETY REGULATIONS

- 10.1.1 It shall be the duty and responsibility of the Contractor to be familiar with and comply with all requirements of Public Law 91-596, 29 U.S.C. Secs. 651 et seq., the Occupational Safety and Health Act of 1970. (OSHA) and all amendments thereto, and to strictly enforce and comply with all of the provisions of the Act.
- 10.1.2 The Contractor shall have a copy of the current applicable OSHA safety and health regulations on site.
- 10.1.3 Contractor shall be responsible for any fines, penalties or charges by any regulatory body by reason of any violation of safety or health regulations by the Contractor or Sub-contractor.

10.2 SAFETY OF PERSONS AND PROPERTY

The Provisions of this paragraph 10.2 and of paragraphs 10.3, 10.4, 10.5, 10.6, 10.7, and 10.8 shall be referred to collectively as the "Safety Program".

- 10.2.1 The Contractor shall take all reasonable precautions for the safety of, and shall provide all reasonable protection to prevent damage, injury, or loss to:
1. all employees on the Work and all other persons who may be affected thereby;
 2. all the Work and all materials and equipment to be incorporated therein, whether in storage on or off the site, under the care, custody, or control of the Contractor or any of his Subcontractors or Sub-subcontractors; and

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

- 10.2.2 The Contractor shall give all notices and comply with all applicable laws, ordinances, rules, regulations and lawful orders of any public authority or authority having jurisdiction bearing on the safety of persons or property for their protection from damage, injury, or loss.
- 10.2.3 The Contractor shall erect and maintain, as required by existing conditions and progress of the Work, all reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations, and notifying owners and users of adjacent utilities.
- 10.2.4 When the use or storage of explosives or other hazardous materials or equipment is necessary for the execution of the Work, the Contractor shall exercise the utmost care and shall carry on such activities under the supervision of properly qualified personnel.
- 10.2.5 The Contractor shall promptly remedy all damage or loss to any property referred to in paragraph 6.2.4 and clauses 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, any Subcontractor, any Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable and for which the Contractor is responsible under clauses 10.2.1.2 and 10.2.1.3, except damage or loss attributable to the acts or omissions of the Owner or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to his obligations under paragraph 4.18.
- 10.2.6 The Contractor shall designate a responsible member of his organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's Superintendent unless otherwise designated by the Contractor in writing to the Owner.
- 10.2.7 The Contractor shall not load or permit any part of the Work to be loaded so as to endanger the safety of the Contractor or the work.

10.3 **EMERGENCIES**

- 10.3.1 In any emergency affecting the safety of persons or property, the Contractor shall act, at his discretion, to prevent threatened damage, injury, or loss. Any additional compensation or extension of time claimed by the Contractor on account of emergency work shall be determined as provided in Article 12 Changes in Work.

10.4 **CONTRACTOR DUTIES FOR SAFETY PROGRAM**

- 10.4.1 The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. This requirement applies continuously and is not limited to normal working hours.
- 10.4.2 Temporary items such as, but not limited to; scaffolding, staging, lifting, and hoisting devices, barricades, and safety and construction procedures necessary for completion of the Project shall be the responsibility of the Contractor and his sub-contractors and shall comply with all applicable codes and regulations. It shall not be the responsibility of the Owner, Facilities Management Project Manager, as defined herein, or their representatives to determine if the Contractor, a sub-contractor or their representatives are in compliance with the aforementioned regulations.

10.5 **SAFETY PLANNING**

- 10.5.1 The effectiveness of the Safety Program depends upon the active participation and sincere cooperation of all Contractors' employees and the coordination of their efforts in carrying out the following basic responsibilities. It shall be the responsibility of all Contractors to:
 1. Properly plan all work to eliminate personal injury, property damage, and the loss of productive efforts.
 2. Establish and maintain a system for early detection and correction of unsafe practices and conditions.

3. Provide adequate protection for adjacent public and private properties and to ensure the safety of the public at all times.
4. Establish and conduct safety education programs designed to gain, stimulate and maintain the interest and active participation of all employees through:
 - A. Safety meetings and communication.
 - B. Investigation of accidents/incidents that have caused or could cause injuries and damage to determine the cause and the taking of necessary corrective actions.
 - C. Use of proper work procedures, personal protective equipment and mechanical guards.
 - D. Safety instruction for individual employees and safety training programs.
 - E. Maintenance of records of accidents, incidents and losses and development of injury/losses experience summaries.
5. Ensure that all employees of Contractor, as well as all employees of subcontractors of any tier, who perform any portion of the Work have completed the 10-hour minimum OSHA construction safety-training course prior to commencement of the Work. Contractor shall submit a copy of all training certificates to the Project Safety Manager prior to commencement of the Work.

10.6 ADMINISTRATION AND ORGANIZATION

- 10.6.1 The Owner will designate an Owner's representative to act as the "Project Safety Manager". The Project Safety Manager will:
 1. Interpret regulations and Construction Contract requirements as they apply to the safety and health of persons on the Work site.
 2. Perform regular inspections of the Work areas to monitor and enforce Contractor compliance with the Safety Program.
 3. Stop any unsafe work practices in progress.
 4. Report all accidents immediately to Owner and the Owner Risk Manager.
 5. Identify hazards and their mitigation.
 6. Attend all meetings that can impact safety.
 7. Be a resource for safety and health to all entities involved in the construction Project.
- 10.6.2 All Contractors and Sub-contractors working on the Project shall designate an experienced and competent onsite "Safety Representative".
 1. The name of the onsite Safety Representative will be provided to the Owner and the Project Safety Manager prior to the Contractor or Sub-contractor starting Work at the job site.
 2. The Safety Representative shall have successfully completed the 10-hour minimum OSHA construction safety-training course prior to commencement of the Work.
 3. The Contractor shall submit a copy of its training certificates, issued by the training organization, as evidence of completion of the aforementioned safety training courses to the Owner and the Project Safety Manager prior to commencement of the Work.
 4. The Safety Representative shall be responsible for implementing the Safety Program, ensuring that job site safety requirements and procedures are being accomplished, conducting safety inspections of Work being performed,

conducting weekly safety meetings with craft employees and submitting reports as identified in the Contract Documents.

5. The Safety Representative shall have the authority to correct unsafe acts or conditions.
6. The Safety Representative shall be responsible for a continuing survey of its operations, to ensure that the probable causes of injury of accident are controlled and that operating equipment, tools and facilities are used, inspected and maintained as required by applicable safety and health regulations.
7. The Safety Representative shall make frequent and regular inspections of the job site. Unsafe acts and/or conditions noted during inspections shall be corrected immediately.

10.6.3 Contractor Construction Safety Responsibilities

1. All Contractors, Subcontractors and Sub-subcontractors working on this Project shall comply with this Safety Program and shall be responsible for its implementation and for providing the means and methods required for compliance.
2. The Contractor shall furnish all information concerning safety of his operation on the Project as may be reasonably required by Owner or the Project Safety Manager.
3. The Contractor shall develop, present, ensure attendance and successful completion of each Contractor and Sub-contractor worker in a Site Specific Safety Orientation prior to their deployment on the jobsite and start of Work. The training will include topics specific to the scope of Work including:

Procedures for emergency evacuation
Hazardous material used on the job site.
Proper work attire
Personal protective equipment
Reporting injuries and accidents
Stopping/restarting work in an imminently hazardous situation

4. The Contractor shall instruct each employee on the job site in the recognition and avoidance of unsafe acts and/or conditions applicable to the Work environment to control or eliminate injury or illness. The Contractor shall enforce the Project and statutory safety rules with its employees.
5. The Contractor is responsible for notifying Owner of any hazardous chemicals or substances that are brought or caused to have been brought on the job site. The Contractor is responsible for the legal storage, use and disposal of waste of any hazardous chemicals or substances.
6. The Contractor shall provide Owner with a copy of Contractor's "Hazard Communication Program" and the "Material Safety Data Sheet(s)" (MSDS) for the chemical(s) or substance(s) intended for use on the site. A bookcase, centrally located, will be dedicated for this information. The Contractor is responsible for keeping this information current.
7. The Contractor and any subcontractors so notified shall make all reasonable efforts to correct unsafe conditions or acts. Satisfactory corrective action shall be taken within the specified abatement time. If the Sub-contractor refuses to correct unsafe or unhealthy conditions or acts, or eliminate fire hazards, Facilities Management project Manager may take steps in accordance with the Construction Contract.
8. The Contractor shall require each of his Subcontractors (all tiers), vendors and suppliers to abide by the Project safety and health requirements.
9. The Contractor shall not load or permit any part of the Work to be loaded so as to endanger the safety of the Contractor or the Work.
10. The Contractor shall provide to Owner and Project Safety Manager an emergency on-call phone number, suitable to contact the Contractor's representative 24 hours a day, seven days a week, during the duration of the Construction Contract and Work.

11. Tool Box Training – The Contractor and Subcontractors will hold weekly safety training in their work area with their entire crew.

10.7 STOPPING AND RESTARTING WORK

- 10.7.1 The Owner shall have the right to stop Work whenever safety violations are observed which could imminently jeopardize the well being of personnel and equipment. The expense of any such Work stoppage and resultant standby time shall be charged to the Contractor and deducted from the next Application for Payment.
- 10.7.2 Work that has been stopped for safety reasons can only be restarted when the full corrective action have been implemented and the hazardous conditions or actions no longer exist. The decision to restart the Work will be made with the concurrence of Owner, the Project Safety Manager, the Contractor and his affected Sub-contractor(s) and will be documented in writing.

10.8 SPECIFIC SAFETY REQUIREMENTS

10.8.1 Fall Protection

1. At no time shall any employee be exposed to the potential of a fall of six (6) feet or more without using required fall protection. Each employee on a walking/working surface six (6) feet or more above lower levels shall be protected from falling by the use of a guardrail system, a safety net system, or a personal fall arrest system.
2. The Contractor shall prepare a "Fall Protection Program", which means a detailed written description of how the Contractor and his Subcontractors will comply with the six (6) foot fall protection requirements for the protection of all employees throughout all phases of the Work. The Fall Protection Program shall be submitted to the Project Safety Manager for review and acceptance prior to the commencement of Work. The Fall Protection Program shall be maintained on site and be available upon request.

10.8.2 Drug and Alcohol Testing

1. Employee impairment is prohibited - No employee will use unlawful drugs or report for work or will work impaired by any substance, lawful or unlawful.
2. All Contractor and Sub-contractor employees are required to report to work in proper condition to perform their assigned duties.

As a necessary part of the overall commitment to maintaining a safe and productive Work environment, the possession, use, manufacture, distribution, dispensation, or presence of any controlled substance or alcohol will be prohibited on all ARDOT construction sites.

3. All employees of the Contractor and any Subcontractors will be required to be tested for substance abuse. Results of all post-accident and reasonable suspicion tests will be provided to Owner and the Project Safety Manager.
4. Post-accident test.
 - A. Contractor and Sub-contractor employees involved in accidents or incidents will be required to be tested for substance abuse.
 - B. The costs for this testing will be the responsibility of the Contractor, Subcontractor, or as set forth in their contracts with ARDOT.
 - C. Specimen collection for drug testing and the alcohol test will be completed within four (4) hours of the accident.
 - D. Employees who produce a confirmed positive test will be permanently prohibited from working on any ARDOT construction site permanently.
5. Reasonable suspicion test.

- A. Where reasonable suspicion exists that an employee of the Contractor or any Subcontractor exhibits signs of substance abuse as detected by trained and knowledgeable supervision, the employee will be required to be tested for substance abuse.
- B. The costs for this testing will be the responsibility of the Contractor, Subcontractor, or as set forth in their contracts with the Owner.
- C. Specimen collection for drug testing and alcohol testing will be completed within four (4) hours of the accident.
- D. Employees who produce a confirmed positive test will be permanently prohibited from working on any ARDOT construction site permanently.

6. Reporting Testing Results

- A. Confidentiality - All test results will be treated as medically confidential.
- B. All test results will be maintained in a secure file maintained by Owner or the Project Safety Manager.
- C. Acceptable documentation in lieu of actual test results, shall include a memorandum on the employer's letterhead stating:
 - The employee's full name,
 - The employee's social security number,
 - The drug test date,
 - an indication that drug results were negative, and
 - the name of laboratory in which the tests were performed.

10.8.3 Fire Protection

- 1. The Contractor is responsible for the development of the following programs and procedures:
 - A. a fire protection and prevention program,
 - B. a flame/spark/hot work permit procedure, and
 - C. a flammable/combustible liquid storage/dispensing procedure

These programs and procedures are to conform to OSHA and NFPA standards and must be submitted to the Project Safety Manager for review and acceptance prior to the commencement of Work.

- 2. The Contractor shall be responsible for fire protection in his work and operational areas, including offices, tool rooms, and storage area 24 hours per day, seven days per week through the duration of the Construction Contract. Approved fire fighting equipment, in adequate quantities must be provided and maintained by the Contractor and the Contractors employees must be trained in the usage of such equipment.
- 3. Fire protection equipment will be made available during all phases of construction.

10.8.4 All lifting and rigging procedures will be submitted to the Project Safety Manager for review and acceptance prior to lifting and erecting materials and/or equipment.

10.8.5 The Contractor shall immediately report all accidents and incidents relating to construction activity to the Owner and the Project Safety Manager. The primary responsibility for the accident/incident investigation lies with the Contractor. However, each Contractor is expected to cooperate to the fullest extent in the Owner's investigation of all accidents and incidents.

10.8.6 Personnel Clothing

- 1. Shirts shall be worn at all times. Sleeveless shirts and tank tops are not permitted.

2. Long pants are required.
3. Hard leather work shoes/boots are required. Tennis type shoes, sandals, docksiders, hush puppies, steel-toed sneakers or bare feet are prohibited. Additional foot protection shall be worn for certain operations such as, operating tamping equipment or jackhammers and where employees handle or carry heavy tools, objects, etc. Contractors are urged to recommend safety shoes to be worn by all employees.

10.8.7 Personnel Protective Equipment

1. Contractor is responsible for determining, training in use, providing and requiring the use of appropriate personal protective equipment in all operations where there is an exposure to hazardous conditions. There will be specific job site requirements established by Owner and the Project Safety Manager. All records shall be maintained at a location accessible to Facilities Management Project Manager and the Project Safety Manager.
2. Approved hard hats meeting specifications contained in American National Standards Institute (ANTI), Z16.89.1-1916.81 and/or Z16.89.2-1971 are required in the construction area at all times. Contractor's personnel must wear hard hats clearly marked with employee name, and company logo.
3. Safety glasses with attached side shields meeting ANTI Z87.1-1989 are required in construction areas at all times.

10.8.8 As required by OSHA, the Contractor shall designate all "Competent Persons" in writing to the Owner and Project Safety Manager prior to such any work requiring their participation. Their qualifications for such designation as a Competent Person will be submitted with their designation. Competent persons are required for areas that shall include but may not be limited to:

1. Scaffolding
2. Excavation and Trenching
3. Fall Protection
4. Rigging Equipment
5. Cranes and Hoists
6. Aerial Lift Procedures
7. Sling and Wire Rope Inspection
8. Demolition
9. Fire Protection
10. Ionizing Radiation
11. Assured Grounding Conductor Program

10.8.9 First Aid

1. The Contractor shall have at least one onsite employee trained in first aid at all times, and that employee shall be able to administer first aid when needed.
2. The Contractor shall ensure that first aid supplies approved by the Contractor's consulting physician shall be easily accessible onsite when required.

10.8.10 The Contractor is responsible for maintaining a copy of "Contractor's Hazard Communication Program" and "Material Safety Data Sheet(s)" on site for the Contractor's own reference and employee training.

10.8.11 The use of explosives is strictly prohibited unless authorized in writing by the Owner and any other governing entities having jurisdiction in the locality of the Project. When the use or storage of explosives or other hazardous materials or equipment is necessary for the execution of the Work, the Contractor shall exercise the utmost care and shall carry on such activities under the supervision of properly qualified personnel.

10.8.12 Critical Lifts

1. Critical lifts are determined by any one of the following conditions:
 - A. Individual loads weighing 30 tons or more

- B. Lifts requiring more than one crane to handle a common load
- C. Load exceeds eighty-five percent (85%) of the crane capability as shown on the applicable crane manufacturer's load charts for the configuration to be used.
- D. Items specially classified due to physical dimensions, susceptibility to internal damage and schedule impact.
- E. Parts, components, assemblies, or lifting operations designated as such because the effect of dropping, upset, or collision of items could:
 - 1. Cause significant delay
 - 2. Cause undetectable damage resulting in future operational or safety problems
 - 3. Result in significant release of radioactivity or other undesirable condition
 - 4. Present a potentially unacceptable risk of personal injury or property damage.
- 2. Critical lifts require a written rigging plan for handling operations, approved by the Contractor's superintendent, Contractor's Safety Representative, the Facilities Management Project Manager and the Project Safety Manager prior to lift.

10.8.13 Environmental

- 1. The Contractor shall notify the Owner of any hazardous waste it will generate during performance of the Work. The Contractor has the direct responsibility for maintaining proper storage of these wastes while on site and will verify to the Owner in writing that the wastes have been disposed of in a legal manner.
- 2. The Contractor shall keep the site, free from accumulation of water, no matter what source or cause. The Contractor shall dispose of water in such manner as will not endanger public health or cause damage or expense to Owner's or adjacent property. The Contractor shall comply with requirements of any public agencies having jurisdiction. If sewers and streets are allowed to be used for drainage or disposal of water during construction, the Contractor shall maintain and leave these satisfactorily clean upon completion of Work.
- 3. Contractor shall not pour, bury, burn, nor in any way dispose of a chemical on the job site without the permission of the Owner.
- 4. Contractor shall, at its expense, provide suitable facilities to prevent the introduction of any substances or materials into any stream, lake or other body of water which may pollute the water or constitute substances or materials deleterious to fish and wildlife.
- 5. Contractor shall perform the Work as not to discharge into the atmosphere from any source whatever, smoke, dust, or other air contaminants in violation of the laws, rules and regulations of the governmental entities having jurisdiction.

ARTICLE 11

INSURANCE

11.1 CONTRACTOR'S/SUB-CONTRACTOR'S LIABILITY INSURANCE

11.1.1 The Contractor shall purchase and maintain liability insurance, and shall likewise ensure that all of his Subcontractors and their Sub-subcontractors purchase and maintain such insurance, as will protect them from claims set forth below which may arise out of or result from the Contractor's operations under the Construction Contract, whether such operations are carried out by the Contractor, by any Subcontractor or by anyone directly or indirectly employed by any of the, or by anyone for whose acts any of them may be liable:

1. Claims under workers' compensation laws, disability benefits, and other similar employee benefit acts;
2. Claims for damages because of bodily injury, occupational sickness or disease, or death of an employee;
3. Claims for damages because of bodily injury, sickness or disease, or death of any person other than an employee;
4. Claims for damages insured by usual personal injury liability coverage which are sustained (1) by any person as a result of an offense directly or indirectly related to the employment or failure to offer employment, of such person by the Contractor, or (2) by any other person;
5. Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom; and
6. Claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance, or use of any motor vehicle.

11.1.2 The insurance required by subparagraph 11.1.1 shall include contractual liability insurance applicable to the Contractor's obligations under paragraph 4.18.

11.2 OWNER'S LIABILITY INSURANCE

11.2.1 The Contractor shall purchase and maintain an Owner's Protective Liability policy as will protect the Owner and his employees, agents, officers, elected officials, and consultants against claims which may arise from operations of the Contractor, his subcontractors, and their sub-contractors and/or premises which are the subject of the Construction Contract unless equivalent coverage is provided by Contractor's Commercial or Comprehensive General Liability policy.

11.3 PROPERTY INSURANCE

11.3.1 The Owner may purchase and maintain property insurance upon the entire Work at the site to the full insurable value thereof. This insurance shall include the interests of the Owner, the Contractor, Subcontractors, and Sub-subcontractors of the Work and shall insure against the perils of fire and extended coverage and shall include "all risk" insurance for physical loss or damage including, without duplication of coverage, theft, vandalism, and malicious mischief.

11.3.2 The Owner may purchase and maintain such boiler and machinery insurance as may be required by the Contract Documents or by law. This insurance shall include the interest of the Owner, the Contractor, Subcontractors, and Sub-subcontractors of the Work.

11.3.3 Any loss insured under subparagraphs 11.3.1 and 11.3.2 is to be adjusted with the Owner and made payable to the Owner as trustee for the insureds, as their interests may appear. The Contractor shall pay each Subcontractor a just share of any insurance monies received by the Contractor, and by appropriate agreement shall require such Subcontractor to make payments to his Sub-subcontractors in similar manner.

- 11.3.4 The Owner may purchase insurance for risks other than those described in subparagraphs 11.3.1 and 11.3.2 in the Contract Documents.
- 11.3.5 The Owner as trustee shall deposit in a separate account any insurance proceeds so received, and he shall distribute it in accordance with such agreement as the parties in interest may reach.
- 11.3.6 The Owner as trustee shall have power to adjust and settle any loss with the insurers.
- 11.3.7 If the Owner finds it necessary to occupy or use a portion or portions of the Work prior to substantial completion thereof, such occupancy or use shall not commence prior to a time mutually agreed to by the Owner and Contractor and to which the insurance company or companies providing the property insurance have consented by endorsement to the policy or policies. This insurance shall not be canceled or lapsed on account of such partial occupancy or use. Consent of the Contractor and of the insurance company or companies to such occupancy or use shall not be unreasonably withheld.
- 11.3.8 The Contractor shall be responsible for paying to repair any such losses as enumerated in Article 10 to the extent that such losses are not covered by the Owner's insurance, including all policy deductibles.

11.4 INSURANCE SCHEDULES

- 11.4.1 The Contractor shall not commence Work under the Construction Contract until he has obtained all the insurance required hereunder and certificates of such insurance have been filed with and reviewed by the Owner. Acceptance of the insurance certificates by the Owner shall not relieve or decrease the liability of the Contractor. Owner shall be named as an additional insured on the policies. Contractor shall not change or modify the insurance coverage without prior notice to the Owner.
- 11.4.2 Unless otherwise provided for in the Contract Documents, the Contractor shall provide and maintain, until the Work covered in the Construction Contract is completed and accepted by the Owner, the minimum insurance coverages in the following schedule.

The minimum required limits may be achieved by purchasing an excess liability policy so long as such policy provides coverages at least as broad as the primary insurance.

- 11.4.3 1. Worker's Compensation and Employer's Liability Insurance
- a. Worker's Compensation Insurance shall be as required by law and shall include an "all states" or "universal" endorsement.
 - b. Employer's Liability Insurance shall be written for not less than \$500,000 per occurrence.
2. Commercial General and Automobile Liability Insurance
- a. Minimum Limits:
Per Occurrence \$1,000,000
Aggregate \$1,000,000
 - b. The following coverages must be specifically insured and certified with no internal sublimits. A separate aggregate limit is acceptable for the Products/Completed Operations hazard:
 - 1) Independent Contractors Contingent Liability or Owners Protective Liability
 - 2) Products/Completed Operations Liability
 - 3) Contractual Liability
 - 4) "X, C, U" Hazard Liability (if applicable)

- 5) Personal Injury Liability including claims related to employment
- 6) Broad Form Property Damage Liability, or deletion of the "Care, Custody, and Control" exclusion
- 7) Owned, Hired and Non-Owned Automobile Liability
- 8) Waiver of Defense of Municipal Liability Immunity

3. Builders Risk Insurance

- 1) Completed value form in an amount equal to the initial contract amount plus Architect fees on a replacement cost basis.
- 2) The policy shall name as insured The Owner, General Contractor, and all subcontractors on an equal basis.
- 3) The policy shall be written on an "All Risk" form, to include at least the perils of Fire, Lightning and extended coverage theft, vandalism, malicious mischief, and collapse

11.4.4 This furnishing of the required insurance coverages, as may be modified by special Conditions, is one of the Contractor's initial requirements of the Construction Contract that must be performed before a Notice to Proceed can be issued, and if not provided within 15 calendar days after receipt of the Notice of Award, may result in forfeiture of the Contractor's Bid Security. All insurance policies shall be open to inspection by the Owner, and copies of policies shall be submitted to the Owner upon written request.

11.4.5 The contractual liability is to be written on a blanket basis for all written or oral contracts, or specifically endorsed to acknowledge the contractual relationship between the insured and ARDOT.

11.4.6 All certificates of insurance shall provide that the insurance company shall give the Owner an affirmative statement, with no qualifications, that thirty (30) days prior written notice will be given to the Owner in the event of policy cancellation, non-renewal or material reduction in coverage provided under the policy, including impairment of any aggregate limits less than \$1,000,000.

11.4.7 A waiver of subrogation in favor of ARDOT will be endorsed to all policies. ARDOT will be named as an additional insured where the Owner's interest may appear.

ARTICLE 12

CHANGES IN WORK

12.1 CHANGE ORDERS

12.1.1 A "Change Order" is a written modification to the Contract signed by the Owner, the Architect/Engineer, and the Contractor issued after award of the Construction Contract authorizing a change in the Work and an adjustment, if any, in the Contract Sum or the Contract Time. The Contract Sum and the Contract Time may be changed only by Change Order. A Change Order signed by the Contractor indicates his agreement therewith, including the adjustment in the Contract Sum or the Contract Time.

12.1.2 Routine changes in the Construction Contract shall be formally initiated by the Architect/Engineer by means of a "Change Proposal Request" form detailing requirements of the proposed change. The Contractor shall prepare a Change Proposal ("CP") based on the CPR form. This action may be preceded by communications between the Contractor, Architect/Engineer, and Owner concerning the need for and nature of the change, but such communications shall not constitute a basis for beginning the proposed Work by the Contractor. Except for emergency conditions defined in subparagraph 12.1.10 or for conditions described in subparagraph 12.2.3, approval of the Contractor's Change Proposal by the Architect/Engineer and Owner will be required for authorization to proceed with the Work being changed. Without prior approval the Contractor may be required to remove Work so installed.

- 12.1.3 The cost or credit to the Owner resulting from change in the Work shall be determined in one or more of the following ways:
1. by mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
 2. by unit prices stated in the Contract Documents or subsequently agreed upon; or
 3. by a cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee. (The Contractor shall keep and present, in such form as the Architect/Engineer or the Owner may prescribe, an itemized accounting together with appropriate supporting data for inclusion in a Change Order.)
- 12.1.4 All proposed costs for Change Order Work must be supported by an itemized accounting of material, equipment, and associated itemized installation costs in sufficient detail to permit analysis by the Architect/Engineer and Owner using current estimating guides and/or prices. Photocopies of Subcontractor and significant vendor proposals supporting the Contractor's Change Proposal shall be furnished unless specifically waived by the Owner. The Contractor shall provide written response to a Change Proposal Request within ten (10) days of receipt, unless otherwise specified in the Supplementary Conditions.
- 12.1.5 Unless otherwise provided in the Contract Documents, the "Change Order Base Cost" shall be limited to the following:
- a. The total cost of materials and supplies, reflecting all available discounts, itemized by cost and quantity;
 - b. The total cost of all labor, including the cost of additional supervision, itemized to show man-hours by trade and classification and burdened hourly rates (which include social security tax, unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance);
 - c. The rental value of equipment and machinery calculated for each type of equipment used in performing the changed Work, based on hours of use. Unless otherwise specified, prices for use of machinery and equipment shall be determined by using 80 percent of the latest schedule of "Equipment Ownership Expense" adopted by Associated General Contractors of America. Mobilization costs will not be allowed except when the Contractor demonstrates that the need to mobilize a piece of equipment arose solely because of the changed Work;
 - d. All transportation costs for delivery and handling of materials, equipment, and supplies, and the removal of waste or debris;
 - e. All storage costs in excess of thirty (30) days for materials and supplies, if necessitated solely by the changed Work;
- 12.1.6 The amounts that the Contractor or a Subcontractor adds to the Change Order Base Cost for overhead and profit will also be considered by the Owner before approval is given. The amounts established hereinafter are the maximums that are acceptable to the Owner without a full and complete justification acceptable to the Owner.
- a. To the total of the Change Order Base Cost, the Contractor will be allowed to add a percentage as noted below to cover overhead and profit combined. Overhead shall be considered to include insurance other than mentioned above, office supervisors and assistants, use of small tools, incidental job burdens and general home office expense, and no separate allowance will be made therefor except as allowed under Article 8. Allowable percentages for overhead and profit on changes will not exceed 15% on the first \$10,000.00, 10% on the next \$10,000.00 and 7 1/2% on the balance over \$20,000.00.

- b. The allowance to the Contractor for profit and overhead for work done by his own forces or by Subcontractors will be a minimum of \$75.00.
- c. On changes involving both additions and deletions, percentages for overhead and profit will be allowed only on the net addition.
- d. The amount of credit to be allowed by the Contractor to the Owner for any deletion or change which results in a net decrease in the Contract Sum will be the amount of the actual net cost.

12.1.7 When an Excusable Compensable Delay, as defined under 8.3.1.3, occurs, the Contractor shall be entitled to an extension of time and to compensation for the cost of extended general conditions related to the delay, as set forth below:

1. The Contractor shall notify the Owner of a request for an extension of time as described under 8.3.2. The Contractor and Owner recognize and agree that it is beneficial to each other to identify factors affecting the Contractor's cost of performance, and to take prompt action to control them. Therefore, it is agreed that the Contractor shall not be entitled to request a cost adjustment for extended general conditions unless the required notice is submitted timely.
2. The cost adjustment proposal shall be based on itemized documented costs actually incurred. If and only if the actual cost claimed cannot be demonstrated with reasonable certainty, the Contractor may utilize industry-recognized mathematical formulas or models to compute the proposed cost adjustment.
3. No mark up is authorized on the Change Order Base Cost of extended general conditions.

12.1.8 No payments can be made on such work until the final amount is agreed and the Change Order approved.

12.1.9 The execution of a Change Order by the Owner and the Contractor constitutes the full, final and complete settlement of all claims with regard to the modifications contained in the Change Order for foreseeable impacts on the Contract Sum or the Contract Time.

12.1.10 Emergency changes to save life or property may be initiated by the Contractor alone with the claimed cost of such Work to be fully documented as to necessity and detail of the reported costs in accordance with subparagraph 12.1.5.

12.1.11 The cumulative total of all Change Orders may not increase the Contract Sum by more than twenty-five percent (25%). The Contract Sum may be decreased by more than eighteen percent (18%) only with the consent of the Contractor.

12.2 CONSTRUCTION CHANGE DIRECTIVE

12.2.1 A Construction Change Directive, (a "CCD"), is a written order prepared by the Architect/Engineer and signed by the Owner and Architect/Engineer, directing a change in the Work and stating a proposed basis for adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Construction Contract, order changes in the Work within the general scope of the Construction Contract consisting of additions, deletions or other revisions, the Contract Sum, and the Contract Time being adjusted accordingly. All such changes in the Work shall be performed under the applicable conditions of the Contract Documents.

12.2.2 A Construction Change Directive shall be used if one of the following circumstances applies:

1. If the Contractor fails to provide a written Change Proposal within 10 days of receiving a Change Proposal Request or fails or refuses to execute an agreed Change Order within the time required to prevent a delay to the Construction Schedule;
2. If negotiations fail to achieve an agreed price; or

3. If, in the Owner's judgement based on the Construction Schedule, a failure to authorize the Contractor to proceed with a Change Order under the normal process may adversely affect the timely completion of the Work.

- 12.2.3 Any unexpected circumstances which necessitates an immediate change in order to prevent damage to the Work in place, to avoid a delay in the Construction Schedule, or to maintain safety shall be expedited by verbal communication and authorization between the Contractor, Architect/Engineer and Owner with written Construction Change Directive following as soon as may be practical. Should consultation with all other interested parties be precluded by events, the Owner may act alone. A limiting not-to-exceed estimate of cost will be requested prior to authorizing Work to proceed. Should a cost estimate be impractical for any reason, the Owner may authorize the use of detailed cost records of such Work to establish and confirm the actual costs for documentation in a formal Change Order.
- 12.2.4 If the Construction Change Directive provides for an adjustment to the Contract Sum, the basis and method for determining the cost or credit to the Owner shall be in accordance with either subparagraph 12.1.3 or as described below.
- 12.2.5 If the Contractor does not respond promptly or disagrees with the method for adjustment of the Contract Sum, the Contractor shall be paid "Actual Field Cost" plus overhead and profit. "Actual Field Cost" is calculated to include the same costs as outlined in 12.1.5, also known as the Change Order Base Cost. Overhead and profit is determined in accordance with subparagraph 12.1.6. The Owner may direct the form in which accounts of Actual Field Cost shall be kept and records of those accounts shall be made available to the Owner. When Contractor's field office must be maintained solely on account of such extra work; then the cost to maintain and operate the same shall be included in Actual Field Cost.
- 12.2.6 When Actual Field Cost is used to determine the cost of the Construction Change Directive, the Contractor's representative and the Owner inspector shall compare records of Work done for the CCD at the end of each day. Copies of these records will be made upon suitable forms approved for this purpose by the Owner and signed by both the Owner's and the Contractor's representatives, one copy being forwarded to the ARDOT Project Manager and one to the Contractor. All claims for work performed for the CCD shall be submitted to the Architect/Engineer by the Contractor upon certified statements to which shall be attached certified copies of invoices covering the cost of, and the freight charges on, all materials used in such Work. Such statements shall be filed not later than the tenth day of the month following that in which the work was actually performed. The statements shall separate charges in accordance with subparagraph 12.1.5.
- 12.2.7 When the estimated cost of work related to the CCD is less than \$500.00, payment of same may be made on the basis of an invoice submitted to the Architect/Engineer by the Contractor. The invoice shall include the Contractor's actual cost for materials, labor, equipment and incidentals necessary to complete the extra work.
- 12.2.8 When the Owner and Contractor agree on the adjustments to the Contract Sum and Contract Time, such agreement shall be recorded by preparation and execution of an appropriate Change Order in accordance with 12.1.

12.3 CONCEALED CONDITIONS

- 12.3.1 The Contractor is responsible for having visited the site and having ascertained pertinent local conditions such as location, accessibility, and general character of the site or building, the character and extent of existing Work within and adjacent to the site, and any other Work being performed thereon at the time of the submission of its proposal. Any failure to do so will not relieve it from responsibility for successfully performing the Work without additional expense to the Owner.
- 12.3.2 If, in the performance of the Contract, subsurface, latent or concealed conditions at the site are found to be materially different from the information included in the Bid Documents, or if unknown conditions of an unusual nature are discovered differing materially from the conditions usually inherent in Work of the character shown and specified, the Contractor shall notify Owner in writing of such conditions before proceeding with the Work. If necessary, the Owner shall develop a solution and provide it to Contractor. If the solution prompts changes to the Contract Sum and/or Time, the Contract shall be adjusted under Article 12 hereof.

12.4 CLAIMS FOR ADDITIONAL COST

- 12.4.1 If the Contractor wishes to make a claim for an increase in the Contract Sum, he shall give the Architect/Engineer written notice thereof within twenty (20) days after the occurrence of the event giving rise to such claim. This notice shall be given by the Contractor before proceeding with the Work, except in an emergency endangering life or property in which case the Contractor shall proceed in accordance with paragraph 10.3. No such claims shall be valid unless so made. Any change in the Contract Sum resulting from such claim shall be authorized by Change Order.
- 12.4.2 If the Contractor claims that additional cost is involved because of, but not limited to, (1) any written interpretation (2) any order by the Owner to stop the Work pursuant to paragraph 3.3 where the Contractor was not at fault, or (3) failure of payment by the Owner pursuant to paragraph 9.7, the Contractor shall make such claim as provided in subparagraph 12.4.1.

12.5 DISPUTES

- 12.5.1 The Purchasing Agent acts as the Owner representative in the issuance and administration of this Construction Contract. In the case of a Dispute, any document, notice, or correspondence not issued by or to the Purchasing Agent is void unless otherwise stated in this Contract. If Contractor does not agree with any document, notice, or correspondence issued by the Purchasing Agent, or other authorized Owner person, Contractor must submit a written notice to the Purchasing Agent within ten (10) calendar days after receipt of the document, notice, or correspondence, outlining the exact point of disagreement in detail. If the matter is not resolved to Contractor's satisfaction, Contractor may submit a Notice of Appeal to the Building Committee, through the Purchasing Agent, if the Notice is submitted within ten (10) calendar days after receipt of the unsatisfactory reply. Contractor then has the right to be heard by ARDOT Building Committee.

ARTICLE 13

UNCOVERING AND CORRECTION OF WORK

13.1 UNCOVERING OF WORK

- 13.1.1 If any portion of the Work should be covered contrary to the request of the Architect/Engineer or the Owner or to requirements specifically expressed in the Contract Documents, it must, if required in writing by the Architect/Engineer or the Owner, be uncovered for their observation and shall be replaced at the Contractor's expense.

13.2 CORRECTION OF WORK

- 13.2.1 The Contractor shall promptly correct all Work rejected by the Architect/Engineer or the Owner as defective or as failing to conform to the Contract Documents whether observed before or after Substantial Completion and whether or not fabricated, installed, or completed. The Contractor shall bear all costs of correcting such rejected Work, including any and all additional costs incurred by the Owner as a result thereof.
- 13.2.2 If any of the Work is found to be defective or not in accordance with the Contract Documents, the Contractor shall correct it promptly after receipt of a written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. This obligation shall survive termination of the Construction Contract. The Owner shall give such notice within ten (10) days after discovery of the condition.

- 13.2.3 The Contractor shall remove from the site all portions of the Work which are defective or non-conforming and which have not been corrected under subparagraphs 4.5, 13.2.1, and 13.2.2, unless removal is waived in writing by the Owner.
- 13.2.4 If the Contractor fails to correct defective or non-conforming Work as provided in subparagraphs 4.5, 13.2.1 and 13.2.2, the Owner may correct it in accordance with Paragraph 3.4.
- 13.2.5 If the Contractor does not proceed with the corrections of such defective non-conforming Work within a reasonable time fixed by written notice from the Architect/Engineer or the Owner, the Owner may remove it and may store the materials or equipment at the expense of the Contractor. If the Contractor does not pay the cost of such removal and storage within ten (10) days thereafter, the Owner may upon ten (10) additional days' written notice sell such work at auction or at private sale and shall account for the net proceeds therefor, after deducting all costs that should have been borne by the Contractor, including compensation for the Architect/Engineer's additional services made necessary thereby. If such proceeds of sale do not cover all costs which the Contractor should have borne, the difference shall be charged to the Contractor and an appropriate Change Order shall be issued. If the payments then or thereafter due the Contractor are not sufficient to cover such amount, the Contractor shall pay the difference to the Owner.
- 13.2.6 The Contractor shall bear all costs of making good all Work of the Owner or separate contractors destroyed or damaged by such correction or removal.
- 13.2.7 Nothing contained in this Paragraph 13.2 shall be construed to establish a period of limitation with respect to any other obligation which the Contractor might have under the Contract Documents, including Paragraph 4.5 hereof. The establishment of the specific obligation of the Contractor to correct the Work has no relationship to his obligation to comply with the Contract Documents, nor to proceedings which may be commenced to establish the Contractor's liability with respect to his obligations other than specifically to correct the Work.
- 13.3 **ACCEPTANCE OF DEFECTIVE OR NON-CONFORMING WORK**
- 13.3.1 If the Owner prefers to accept defective or nonconforming Work, he may do so instead of requiring its removal and correction, in which case a Change Order will be issued to reflect a reduction in the Contract Sum where appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 14

TERMINATION OF THE CONTRACT

14.1 TERMINATION BY THE OWNER

- 14.1.1 If the Contractor is adjudged a bankrupt, or if he makes a general assignment for the benefit of his creditors, or if a receiver is appointed on account of his insolvency, or if he persistently or repeatedly refuses or fails, except in cases for which extension of time is provided, to supply enough properly skilled workmen or proper materials, or if he fails to make prompt payment to Subcontractors or for materials or labor, or persistently disregards laws, ordinances, rules, regulations or order of any public authority having jurisdiction, or otherwise is guilty of a substantial violation of a provision of the Contract Documents, then the Owner may, without prejudice to any right or remedy and after giving the Contractor and his surety, if any, seven (7) days' written notice, terminate the employment of the Contractor and take possession of the site and all materials, equipment, tools, construction equipment, and machinery thereon owned by the Contractor and may finish the Work by whatever method he may deem expedient. In such case the Contractor shall not be entitled to receive any further payment until the Work is finished.
- 14.1.2 If the unpaid balance of the Contract Sum exceeds the cost of finishing the Work, including compensation for the Architect/Engineer's additional services made necessary thereby, such excess shall be paid to the Contractor. If such costs exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or to the Owner, as the case may be, shall be certified by the Architect/Engineer, upon application, in the manner provided in paragraph 9.4, and this obligation for payment shall survive the termination of the Construction Contract.

14.2 TERMINATION FOR DEFAULT

Failure by either party in performing any of its provisions shall be a breach of contract, in which case, either party may require corrective action within ten (10) days after date of receipt of written notice citing the exact nature of the breach. Failure to take corrective action or failure to provide a satisfactory written reply excusing failure within the prescribed ten (10) days shall be a default. The defaulting party shall be given a twenty (20) day period within which to show cause why the Construction Contract should not be terminated for default. ARDOT Building Committee may take whatever action as its interest may appear, resulting from the notice. All notices shall be issued by the Purchasing Agent or the Owner's legal representative only and all replies shall be made in writing to the Purchasing Agent at the address provided herein. Notices issued by or to anyone other than the Purchasing Agent or Owner's legal representative shall be void, and shall be considered as not having been issued or received. The defaulting party shall be liable for actual damages as stipulated in this Construction Contract. Liquidated damages, if specified in the Construction Contract, may also apply. The Owner may enforce the performance of this Construction Contract in any manner allowed by law in the event of breach or default, and may contract with another party with or without solicitation of bids or further notification to the Contractor. As a minimum, the Contractor shall be required to pay any difference in the cost of securing the products or services covered by this Construction Contract, or compensate for any loss or damage the Owner derived if it is necessary to contract with another source because of his default, plus reasonable administrative costs and attorney's fees. If termination for default occurs, Owner and its officials, agents and representatives shall not be liable for loss of any profits anticipated to be made.

14.3 TERMINATION FOR CONVENIENCE

The Owner may terminate this Construction Contract upon thirty (30) days written notice if the ARDOT Building Committee finds that termination serves the public interest, or results from any law, ordinance, regulation, or court order. If the Owner terminates this Construction Contract under this paragraph, it must pay the Contractor the cost directly attributable to Work done or supplies obtained in preparation for compliance with this Construction Contract prior to termination. The Owner is not required to pay costs that are recoverable in the normal course of doing the business in which the Contractor is engaged or costs which can be recouped by selling the Work done or supplies obtained. If the Owner pays for supplies or materials, these supplies and materials become the property of the Owner and the Contractor must deliver them to the place designated by the Purchasing Agent. The Owner is not liable for any loss of profits caused by this termination.

ARTICLE 15

OTHER CONDITIONS OR SERVICES

- 15.1 Notwithstanding anything herein to the contrary, the Contractor shall perform all services and responsibilities required of the Contractor by these General Conditions for ARDOT Building Construction Contracts using at least that standard of care which a reasonably prudent contractor in Arkansas would use under the same or similar circumstances. Nothing in these General Conditions for ARDOT Building Construction Contracts shall be construed to relieve the Contractor of this duty.
- 15.2 Any oral representations or modifications concerning these General Conditions for ARDOT Building Construction Contracts shall be of no force or effect, excepting a subsequent modification in writing, signed by the party to be charged. **NO OFFICIAL, AGENT, EMPLOYEE, OR REPRESENTATIVE OF THE OWNER MAY MODIFY OR AMEND THESE GENERAL CONDITIONS FOR ARDOT BUILDING CONSTRUCTION CONTRACTS, EXCEPT PURSUANT TO EXPRESS AUTHORITY GRANTED BY THE ARDOT Building Committee.**
- 15.3 The obligations and undertakings of each of the parties to these General Conditions for ARDOT Building Construction contracts shall be performable at Little Rock, Arkansas.

END OF GENERAL CONDITIONS

**ARKANSAS DEPARTMENT OF TRANSPORTATION
JOB NO. 110816
I-40 TRUCK PARKING EXPANSION PROJECT
(Ph. II) (WEST MEMPHIS) (S)
CONSTRUCTION OF RESTROOM AND AHP SUBSTATION
PROJECT MANUAL**

SECTION 01 10 00 – SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes:
 - 1. Project information.
 - 2. Work covered by Contract Documents.
 - 3. Work by Owner.
 - 4. Work under separate contracts.
 - 5. Future work.
 - 6. Purchase contracts.
 - 7. Work that is Owner-furnished/Owner-installed (OF/OI)
 - 8. Work that is Contractor-furnished, Owner-installed (CF/OI)
 - 9. Access to site.
 - 10. Work restrictions.
 - 11. Specification and drawing conventions.
- B. Related Section:
 - 1. Division 01 Section "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 PROJECT INFORMATION

- A. Project Identification: I-40 Truck Parking Expansion Project (Ph. II), Construction of restroom and AHP Substation.
 - 1. Project Location: 5001 West I-40, West Memphis AR 72364
- B. Owner: ARDOT
 - 1. Owner's Representative: Mina Awadalla, P.E., State Facilities Management Engineer, Facilities Management.
 - 2. Owner's Project Manager: Travis Christensen, P.E., Facility Management Engineer, Facilities Management.

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1.4 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of the Project is defined by the Contract Documents and consists of the following:
1. The Base bid will consists of the construction for approximately 1460.0 sq. ft. restroom building including all the related site work and utilities. All the site works, sidewalks, utilities lines, generator, generator bad, and all utilities works are part of the base bid.
 2. The Additive bid will consists of the construction for approximately 820.0 sq. ft. AHP substation building.
 3. Arkansas Department of Transportation reserves the rights to award the base bid only or to award both the base bid and the additive bid together.
 4. Arkansas Department of Transportation reserves the rights to reject all bids if the bids are higher than the project budget.
- B. Type of Contract
1. Project will be constructed under a single prime contract.

1.5 PHASED CONSTRUCTION

- A. The Work shall be conducted in one phase.
- B. Prior to commencing Work, in accordance with requirements in Paragraph 4.10 of General Conditions and Section 01 32 00 of General Requirements, submit the Contractor's Construction Schedule indicating tasks, the critical path sequence of the Work, commencement, substantial completion and final completion dates.

1.6 WORK BY OWNER

- A. General: Cooperate fully with Owner so work may be carried out smoothly, without interfering with or delaying work under this Contract or work by Owner. Coordinate the Work of this Contract with work performed by Owner.
- B. Preceding Work: None anticipated.
- C. Concurrent Work: None anticipated.
- D. Subsequent Work: None anticipated.

1.7 OWNER-FURNISHED PRODUCTS

- A. Owner will furnish products indicated. The Work includes receiving, unloading, handling, storing, protecting, and installing Owner-furnished products.

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B. Owner-Furnished Products: Not applicable.

1.8 ACCESS TO SITE

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

1.9 WORK RESTRICTIONS

- A. Work Restrictions, General: Comply with restrictions on construction operations.
 - 1. Comply with limitations on use of public streets and other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: Work outside of normal business hours must be coordinated with Owner,
 - 1. Weekend Hours: Schedule with Owner.
 - 2. Early Morning Hours: Schedule with Owner.
 - 3. Hours for Utility Shutdowns: Schedule with Owner.
 - 4. Hours for noisy activities: Coordinate with Owner.
- C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions:
 - 1. Notify Owner not less than seven days in advance of proposed utility interruptions.
 - 2. Coordinate schedule for utility interruptions with Owner.
 - 3. Obtain Owner's written permission before proceeding with utility interruptions. If required by Owner provide temporary utilities at no additional cost to Owner.
- D. Nonsmoking Building: Smoking is not permitted within the building or within 15 feet of entrances, operable windows, or outdoor air intakes.
- E. Controlled Substances: Use of controlled substances on the Project site is not permitted.

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

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SECTION 01 21 00 - ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements governing allowances.
 - 1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when direction will be provided to the Contractor. If necessary, additional requirements will be issued by Change Order.
- B. Types of allowances include the following:
 - 1. Lump-sum allowances.

1.3 SELECTION AND PURCHASE

- A. At the earliest practical date after award of the Contract, advise Owner of the date when final selection and purchase of the product described by an allowance must be completed to avoid delaying the Work.
- B. At Owner's request, obtain proposals for the allowance for use in making final selections. Include recommendations that are relevant to performing the Work.
- C. For this project the allowance is the actual cost for work that will be provided by the named Subcontractor. The Contractor shall include in the bid any costs related to the coordination and support of this Subcontractor.

1.4 SUBMITTALS

- A. Submit proposals for purchase of products included in allowances, in the form specified for Change Orders.
- B. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.
- C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

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1.5 LUMP-SUM ALLOWANCES

- A. Allowance shall include cost to Contractor of specific products and materials ordered or selected by Owner under allowance and shall include taxes, freight, and delivery to Project site.
- B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered and selected by Owner under allowance shall be included as part of the Contract Sum and not part of the allowance.

1.6 ADJUSTMENT OF ALLOWANCES

- A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.
 - 1. Include installation costs in purchase amount only where indicated as part of the allowance.
 - 2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.
 - 3. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.
- B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit.
 - 1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.
 - 2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

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3.2 PREPARATION

- A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULE OF ALLOWANCES

- A. Allowance No. 1: Include the sum of twenty four thousand dollars (\$24,000.00 in Base Bid for the materials and installation of security camera, and access control systems associated with new work as installed by Elliott Data Systems Inc. Contact Alishia Long at (901) 674-5665 or along@elliottdata.com.

END OF SECTION

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SECTION 01 23 00 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the base bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed, in the products, materials, equipment, systems, installation methods or project schedule described in the Contract Documents. For the I-40 Truck Parking Expansion Project (Ph. II) project each alternate is a substitution for the Base Bid. Refer to the Bidding Documents that are part of this JOB 110816 for specific requirements and conditions for the Base Bid and the Alternate Bid indicated in 3.1 SCHEDULE OF ALTERNATES below.

- 1. Alternates described in this Section are part of the Work only if enumerated in the Contract.

1.4 PROCEDURES

- A. Alternates, if accepted, shall replace the Base Bid and be subject to all the conditions of the Base Bid work except for the project schedule durations.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

- A. Additive Alternate No. 1: Construction of the AHP Substation and all associated concrete walks and utilities as called for in the Contract Documents.

END OF SECTION

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SECTION 01 25 00 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.

1.3 DEFINITIONS

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

1.4 SUBMITTALS

- A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specifications Section number and title and Drawing numbers and titles.
 - 1. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
 - b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable specification section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.

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

1.5 QUALITY ASSURANCE

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

1.6 PROCEDURES

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

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PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately upon discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.
1. Conditions: Owner will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Owner will return requests without action, except to record noncompliance with these requirements:
- a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - b. Substitution request is fully documented and properly submitted.
 - c. Requested substitution will not adversely affect Contractor's construction schedule.
 - d. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - e. Requested substitution is compatible with other portions of the Work.
 - f. Requested substitution has been coordinated with other portions of the Work.
 - g. Requested substitution provides specified warranty.
 - h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- B. Substitutions for Convenience: Owner will consider requests for substitution if received within 60 days after the Notice of Award. Requests received after that time may be considered or rejected at discretion of Owner.
1. Conditions: Owner will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Owner will return requests without action, except to record noncompliance with these requirements:
- a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Owner's consultants for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
 - b. Requested substitution does not require extensive revisions to the Contract Documents.
 - c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - d. Substitution request is fully documented and properly submitted.

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- e. Requested substitution will not adversely affect Contractor's construction schedule.
 - f. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - g. Requested substitution is compatible with other portions of the Work.
 - h. Requested substitution has been coordinated with other portions of the Work.
 - i. Requested substitution provides specified warranty.
 - j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- C. The Contractor's submittal and the Owner's acceptance of Shop Drawings, Product Data or Samples for construction activities not complying with the Contract Documents do not constitute an acceptable or valid request for substitution, nor do they constitute approval.

PART 3 - EXECUTION (Not Used)

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SECTION 01 26 00 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specifications Sections, apply to this Section. Refer particularly to Section 00 70 00, Article 12 Changes in Work.

1.2 SUMMARY

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

1.3 CHANGES IN THE WORK

- A. Authority to issue changes in the work rests solely with the Owner.

1.4 CHANGE PROPOSAL REQUEST (CPR)

- A. The Change Proposal Request (CPR) will be issued for all construction changes necessitated as a result of design errors or omissions, unknown conditions, code compliance requirements or Owner requested changes.
- B. Owner-Initiated CPR's: Owner will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
 - 1. CPR's issued by Owner are not instructions either to stop work in progress or to execute the proposed change.
 - 2. Within 10 working days after receipt of a CPR, submit a detailed proposal for adjustments to the Contract Sum and, if applicable, the Contract Time necessary to execute the change.
 - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include costs of labor and supervision directly attributable to the change.
 - d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 - e. Quotation Form: Use forms acceptable to Owner.
- C. Contractor-Initiated CPR's: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a CPR to Owner.

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1. Include a statement outlining reasons for the requested change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Division 01 Section "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
7. CPR form: Use form acceptable to Owner.

1.5 ADMINISTRATIVE CHANGE ORDERS

- A. Allowance Adjustment: Refer to Division 01 Section "Allowances" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect actual costs of allowances.

1.6 CHANGE ORDER (CO) PROCEDURES

- A. Following Owner's approval of a CPR, or several CPR's, Owner will issue a CO for approval signatures.
 1. The CO form will be first signed by Contractor and 3 original signed documents returned to Owner. The FM Project Manager and State Facilities Management Engineer will sign and forward to the Purchasing Agent. If required, the CO will then be considered for approval by the Building Committee
 2. Original signed and approved CO documents will be distributed to Contractor, Purchasing Office and FM.

1.7 CONSTRUCTION CHANGE DIRECTIVE (CCD)

- A. Owner may issue a CCD instructing the Contractor to proceed with a change in the Work prior to execution of a CO.
 1. The CCD contains a complete description of changes in the Work and designates method to be followed to later determine changes in the Contract Sum and/or the Contract Time. Refer to Section 00700, Article 12 for specific requirements.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the CCD.

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1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

1.8 Architect's Supplemental Instructions (ASI)

- A. Owner or, if applicable, Owner's consulting Architect will issue ASI's authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, "Architect's Supplemental Instructions."

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

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SECTION 01 29 00 - PAYMENT PROCEDURES

PART 1 - GENERALRELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.

1.3 DEFINITIONS

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

1.4 SCHEDULE OF VALUES

- A. The Schedule of Values shall comply with the General Conditions, Article 9. The Schedule of Values is a breakdown of the various costs included in the Construction Contract and is used as the basis for reviewing Contractor's Applications for Payment. Contractor is required to submit this schedule to the Owner's Representative at the earliest possible date but no later than 15 days following issuance of the Notice to Proceed. Included with this submission must be the Contractor's Construction Schedule for the entire Project. Refer to Section 01 32 00 for Construction Schedule requirements.
- B. Coordination: Coordinate preparation of the items in the Schedule of Values with preparation of the tasks in Contractor's Project Schedule. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including the following:
1. Application for Payment forms with Continuation Sheets.
 2. Tasks in Contractor's Project Schedule.
 3. Submittal Schedule
- C. Format and Content: Use AIA form G703. Use Contractor's Project Manual table of contents, arranged in accordance with CSI "Masterformat", as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Section of the Specifications or as necessary to indicate subcontract division of the Work.

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1. Include the following Project identification on the Schedule of Values:
 - a. Project name and location
 - b. ARDOT Project Number, Contract Number, and Purchase Order Number
 - c. Contractor's name and address
 - d. Date of submittal.

2. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:
 - a. Related Specifications Section or Division.
 - b. Description of Work.
 - c. Signed Change Orders (nos.) that affect value.
 - d. Dollar value. Percentage of Contract Sum to nearest one hundredth percent, adjusted to total 100 percent.

3. Provide a breakdown of the Contract Sum in sufficient detail to facilitate continued evaluation of Applications for Payment and progress reports.
 - a. Provide separate line items of principal subcontract amounts in excess of five percent of Contract Sum.
 - b. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
 - c. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 - d. Differentiate between items stored on-site and items stored off-site. If specified, include evidence of insurance or bonded warehousing.
 - e. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
 - f. At a minimum, provide separate line items in the Schedule of Values for the following parts of the Work:
 - a) General Conditions
 - b) Mobilization and demobilization
 - c) Insurance and bonds
 - g. Temporary facilities and other major cost items that are not direct cost of actual work-in-place shall be shown as separate line items in the Schedule of Values.
 - h. Each item in the Schedule of Values and Applications for Payment shall be complete.
 - i. Schedule Updating: Update and resubmit the Schedule of Values before the next Application for Payment when fully executed and signed Change Orders result in a change in the Contract Sum.

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1.5 APPLICATIONS FOR PAYMENT

- A. Contractor's monthly Application for Payment shall comply with General Conditions, Article 9. It shall be on AIA form G702, showing the time period of the Work covered. The Application for Payment shall include and be consistent with an updated Schedule of Values. Each Application for Payment shall be consistent with previous Owner-approved applications and shall include supporting documents, including:
1. Updated Contractor's Construction Schedule, as required by Section 01 32 00.
 2. List of stored materials, related insurance letter or certificate, and other required documentation
- B. In each Application for Payment, the amount requested for General Conditions items may not exceed the percentage of completion of the Project as shown in the Application, and the Owner shall not be obligated to pay any such excess amount, unless otherwise approved in writing by the Owner prior to approval of the initial Schedule of Values.
- C. At least five (5) days prior to the due date for submission of Application for Payment, Contractor shall provide to the Owner's Representative a draft Application for Payment. Upon receipt of the draft Application for Payment, the Owner's Representative, with Contractor's representative, may visit the area(s) where the Work is in progress. Based on his observations, the Owner's Representative may request Contractor to make adjustments before submitting the notarized Application for Payment.
- D. Contractor shall submit to the Owner one (1) signed, notarized copy of the Application for Payment, Schedule of Values and supporting documents. Applications for Payment shall be submitted and Owner shall make payments in accordance with Article 9 of the General Conditions.
- E. Owner will approve payment for stored major items provided they can be designated for use on this Project only and are on site or in a bonded warehouse within Crittenden County. Materials stored off-site must be insured and tagged as belonging to Owner prior to payment being issued. These materials must be available for inspection by the Owner. These materials must be indicated on Contractor's Application for Payment as stored materials and the value noted accordingly. Provide the following documentation with Contractor's Application for Payment:
1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment for stored materials.
 2. Provide supporting documentation that verifies material quantities and amount requested such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
 3. Provide the address where the materials are stored.
 4. Provide summary documentation for stored materials indicating the following:

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- a. Materials previously stored and included in previous Applications for Payment.
 - b. Work completed for this Application utilizing previously stored materials.
 - c. Additional materials stored with this Application.
 - d. Total materials remaining stored, including materials stored with this Application.
- F. Initial Application For Payment
1. Administrative actions and submittals that must precede submittal of initial Application for Payment include the following:
 - a. List of subcontractors, principal suppliers, and fabricators
 - b. Project Directory
 - c. Schedule of Values
 - d. Contractor's Construction Schedule
 - e. Submittal Schedule
 2. The first Application for Payment shall include the following:
 - a. Any of the above submittals not previously provided.
 - b. Copies of building permits as applicable at the time of submission.
 - c. Copies of authorizations and licenses from governing authorities for performance of the Work.
- G. Application For Payment At Substantial Completion
1. Prior to submitting the Application for Payment at Substantial Completion, Contractor shall confirm that all of the requirements for Substantial Completion described in the General Conditions and in Section 01 77 00, Closeout Procedures, have been satisfied and all Substantial Completion deliverables have been provided to Owner.
 2. Following issuance of the Certificate of Substantial Completion, Contractor shall submit an Application for Payment showing 100 percent completion for the portion of the Work claimed as substantially complete. If 100 percent completion cannot be shown, Contractor shall include a Punchlist of incomplete items, and the value of incomplete construction.
- H. Final Application For Payment: The final Application for Payment will not be reviewed until all prerequisites for Project close-out have been satisfactorily completed and delivered to Owner per the General Conditions, Article 9, and Section 01 77 00 Closeout Procedures, including:
1. All Project close-out submittals detailed in Sections 017700, 017823, and 017839 for both Substantial Completion and Final Completion.
 2. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
 3. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
 4. AIA Document G707, "Consent of Surety to Final Payment", or equivalent

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document provided by surety

5. Lien releases from Subcontractors and suppliers.
6. Final cleaning completed, including removal of surplus materials, rubbish, and similar elements.
7. Transmittal of required Project construction records to Owner.
8. Insurance certificates for products and completed operations, where required.
9. Final liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 29 00

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SECTION 01 31 00 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. General Project coordination procedures.
 - 2. Administrative and supervisory personnel.
 - 3. Coordination drawings.
 - 4. Requests for Information (RFIs).
 - 5. Project meetings.
- B. Each contractor and subcontractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.

1.3 DEFINITIONS

- A. RFI ("Requests for Information"): Request from Owner or Contractor seeking information from each other during construction.

1.4 COORDINATION

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work, including with those operations of other contractors and entities. Coordinate construction operations included in different Sections that depend on each other for proper installation, connection, and operation; each contractor shall coordinate its operations with others.
 - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 - 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
 - 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

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- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
1. Preparation and updating of Contractor's Construction Schedule.
 2. Preparation of the Schedule of Values.
 3. Installation and removal of temporary facilities and controls.
 4. Delivery and processing of submittals.
 5. Progress meetings.
 6. Preinstallation conferences.
 7. Startup and adjustment of systems.
 8. Project closeout activities.
- D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. Refer to other Sections for disposition of salvaged materials that are designated as Owner's property.

1.5 COORDINATION DRAWINGS

- A. Coordination Drawings, General: If Coordination Drawings are required to comply with requirements in individual Sections, where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity then comply with the following requirements.
1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
 - a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
 - b. Coordinate the addition of trade-specific information to the coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
 - c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - d. Indicate space and access requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
 - e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
 - f. Indicate required installation sequences.

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- g. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Owner indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations, as determined by Owner in its sole discretion, will not be considered changes to the Contract.

B. Coordination Drawing Organization: Organize coordination drawings as follows:

1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire protection, fire alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire protection, fire alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Mechanical and Plumbing Work: Show the following:
 - a. Sizes and bottom elevations of equipment, ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
 - b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
 - c. Fire-rated enclosures around ductwork.
7. Electrical Work: Show the following:
 - a. Runs of vertical and horizontal conduit 1-1/4 inch diameter and larger.
 - b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire alarm locations.
 - c. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
 - d. Location of pull boxes and junction boxes dimensioned from column center lines.
8. Fire Protection System: Show the following:
 - a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.

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9. Review: Owner will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If the Owner determines that the coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, the Owner will so inform Contractor, who shall make changes as directed and resubmit.
 10. Coordination Drawing Prints: Prepare coordination drawing prints in accordance with requirements of Division 01 Section "Submittal Procedures."
- C. Coordination Digital Data Files: Prepare coordination digital data files in accordance with the following requirements:
1. File Preparation Format: Same digital data software program, version, and operating system as the original Drawings.
 2. File Preparation Format: DWG, Version Autocad 2006, operating in Microsoft Windows operating system.
 3. File Submittal Format: Submit or post coordination drawing files using Portable Data File (PDF) format.
 4. Owner will furnish Contractor one set of digital data files of the Drawings for use in preparing coordination digital data files.
 - a. Owner makes no representations as to the accuracy or completeness of digital data files as they relate to the Drawings.
 - b. Digital Data Software Program: The Drawings are available in Autocad 2006.
 - c. Contractor shall execute a data licensing agreement in the form of AIA Document C106.

1.6 KEY PERSONNEL (Project Directory)

- A. Key Personnel Names: At Pre-Construction Conference, submit Project Directory with a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and email addresses. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.
1. Post copies of list in project meeting room, in temporary field office and by each temporary telephone. Keep list current at all times.

1.7 REQUESTS FOR INFORMATION (RFIs)

- A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
1. Owner will return RFIs submitted to Owner by other entities controlled by Contractor with no response.
 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

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- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
1. Project name.
 2. Project number.
 3. Date.
 4. Name of Contractor.
 5. Name of Owner.
 6. RFI number, numbered sequentially.
 7. RFI subject.
 8. Specifications Section number and title and related paragraphs, as appropriate.
 9. Drawing number and detail references, as appropriate.
 10. Field dimensions and conditions, as appropriate.
 11. Contractor's suggested resolution. If Contractor's solution(s) impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 12. Contractor's signature.
 13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
 - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFI Forms: Software-generated form with substantially the same content as indicated above and acceptable to Owner.
- D. Owner's Action: Allow seven working days for Owner's response for each RFI. RFI's received by Owner after 1:00 p.m. will be considered as received the following working day. Refer to Section 00 70 00 Paragraph 3.3.7 and Paragraph 4.2.1 for time limits on RFI's and additional requirements.
1. The following RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for coordination information already indicated in the Contract Documents.
 - d. Requests for adjustments in the Contract Time or the Contract Sum.
 - e. Requests for interpretation of Owner's actions on submittals.
 - f. Incomplete RFIs or inaccurately prepared RFIs.
 2. Owner's action may include a request for additional information, in which case Owner's time for response will date from time of receipt of additional information.
 3. Owner's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 01 Section "Contract Modification Procedures."

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- a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Owner in writing within 10 days of receipt of the RFI response.
- E. On receipt of Owner's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Owner within seven days if Contractor disagrees with response.
- F. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log at Progress Meetings.
 - 1. Project name.
 - 2. Name and address of Contractor.
 - 3. Name and address of Owner.
 - 4. RFI number including RFIs that were dropped and not submitted.
 - 5. RFI description.
 - 6. Date the RFI was submitted.
 - 7. Date Owner's response was received.
 - 8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
 - 9. Identification of related Field Order and Proposal Request, as appropriate.

1.8 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.
 - 1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner of scheduled meeting dates and times.
 - 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 - 3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner, within seven days of the meeting.
- B. Preconstruction Conference: Owner will schedule and conduct a preconstruction conference before instructing Contractor to begin construction, at a time convenient to Owner, but no later than 15 days after award of the Contract.
 - 1. Conduct the conference to review responsibilities and personnel assignments.
 - 2. Attendees: Authorized representatives of Owner, Owner's Consultants as required, Contractor's authorized representatives and others invited at discretion of Owner and Contractor. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 3. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Tentative construction schedule.

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- b. Phasing if applicable.
 - c. Critical work sequencing and long-lead items.
 - d. Designation of key personnel and their duties.
 - e. Lines of communications.
 - f. Procedures for processing field decisions and Change Orders.
 - g. Procedures for RFIs.
 - h. Procedures for testing and inspecting.
 - i. Procedures for processing Applications for Payment.
 - j. Distribution of the Contract Documents.
 - k. Submittal procedures and due dates for early important submittals.
 - l. Sustainable design requirements.
 - m. Preparation of record documents.
 - n. Use of the premises.
 - o. Work restrictions.
 - p. Working hours.
 - q. Owner's occupancy requirements.
 - r. Responsibility for temporary facilities and controls.
 - s. Procedures for moisture and mold control.
 - t. Procedures for disruptions and shutdowns.
 - u. Construction waste management and recycling.
 - v. Parking availability.
 - w. Office, work, and storage areas.
 - x. Equipment deliveries and priorities.
 - y. First aid.
 - z. Security.
 - aa. Progress cleaning.
 - bb. Time and days for Progress Meetings.
4. Minutes: Owner will record and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
- 1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Owner and Owner's Commissioning Authority of scheduled meeting dates.
 - 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. Contract Documents.
 - b. Options.
 - c. Related RFIs.
 - d. Related Change Orders.
 - e. Purchases.
 - f. Deliveries.
 - g. Submittals.
 - h. Review of mockups.

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- i. Possible conflicts.
 - j. Compatibility problems.
 - k. Time schedules.
 - l. Weather limitations.
 - m. Manufacturer's written recommendations.
 - n. Warranty requirements.
 - o. Compatibility of materials.
 - p. Acceptability of substrates.
 - q. Temporary facilities and controls.
 - r. Space and access limitations.
 - s. Regulations of authorities having jurisdiction.
 - t. Testing and inspecting requirements.
 - u. Installation procedures.
 - v. Coordination with other work.
 - w. Required performance results.
 - x. Protection of adjacent work.
 - y. Protection of construction and personnel.
3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
 4. Reporting: Contractor shall record and distribute minutes of the meeting to each party present and to other parties requiring information.
 5. Do not proceed with installation if the conference is not successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Project Closeout Conference: Schedule and conduct a Project closeout conference, at a time convenient to Owner, but no later than 90 days prior to the scheduled date of Substantial Completion.
1. Conduct the conference to review requirements and responsibilities related to Project closeout.
 2. Attendees: Authorized representatives of Owner, Owner's Consultants as required, Contractor's authorized representatives and others invited at discretion of Owner and Contractor.
 3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
 - a. Preparation of record documents.
 - b. Commissioning activities.
 - c. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
 - d. Submittal of written warranties.
 - e. Requirements for preparing sustainable design documentation.
 - f. Requirements for preparing operations and maintenance data.
 - g. Requirements for demonstration and training.
 - h. Preparation of Contractor's punch list.
 - i. Procedures for processing Applications for Payment at Substantial Completion and for final payment.

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- j. Submittal procedures.
 - k. Coordination of separate contracts.
 - l. Owner's partial occupancy requirements.
 - m. Installation of Owner's furniture, fixtures, and equipment.
 - n. Responsibility for removing temporary facilities and controls.
4. Minutes: Owner will record and distribute meeting minutes.
- E. Progress Meetings: Conduct progress meetings at weekly intervals unless modified by mutual agreement between Owner and Contractor.
- 1. Coordinate dates of meetings with preparation of payment requests.
 - 2. Attendees: Owner's and Contractor's authorized representatives and others required to attend as necessary for proper coordination of the project. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - 1) Review Look Ahead schedule for next period.
 - b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements
 - 2) Safety issues.
 - 3) Sequence of operations.
 - 4) Status of submittals.
 - 5) Deliveries.
 - 6) Off-site fabrication.
 - 7) Access.
 - 8) Site utilization.
 - 9) Temporary facilities and controls.
 - 10) Progress cleaning.
 - 11) Quality and work standards.
 - 12) Status of correction of deficient items.
 - 13) Field observations.
 - 14) Status of RFIs.
 - 15) Status of proposal requests.
 - 16) Pending changes.

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- 17) Status of Change Orders.
 - 18) Pending claims and disputes.
 - 19) Documentation of information for payment requests.
4. Minutes: Owner will record and distribute the meeting minutes to each party present and to parties requiring information.
- a. Schedule Updating: Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.
- F. Coordination Meetings: Conduct Project coordination meetings at biweekly intervals unless modified by mutual agreement between Owner and Contractor. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.
1. Attendees: Owner's and Contractor's authorized representatives and others required to attend as necessary for proper coordination of the project. All participants at the meetings shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - b. Schedule Updating: Revise Contractor's Construction Schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
 - c. Review present and future needs of each contractor present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Deliveries.
 - 5) Off-site fabrication.
 - 6) Access.
 - 7) Site utilization.
 - 8) Temporary facilities and controls.
 - 9) Work hours.
 - 10) Hazards and risks.
 - 11) Progress cleaning.

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- 12) Quality and work standards.
- 13) Change Orders.

- 3. Reporting: Owner will record and distribute meeting minutes.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

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SECTION 01 32 00 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
 - 1. Contractor's Construction Schedule.
 - 2. Daily construction reports.
 - 3. Material location reports.
 - 4. Field condition reports.
 - 5. Special reports.

1.3 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
 - 1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times in order not to impact the Project completion date.
 - 2. Predecessor Activity: An activity that precedes another activity in the network.
 - 3. Successor Activity: An activity that follows another activity in the network.
- B. Cost Loading: The allocation of the schedule of values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum, unless otherwise approved by Owner.
- C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of the Project.
- D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- E. Event: The starting or ending point of an activity.
- F. Float: The measure of leeway in starting and completing an activity.

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1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
 2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
 3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
- G. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

1.4 INFORMATIONAL SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:
1. PDF electronic file.
 2. Two paper copies.
- B. Contractor's Construction Schedule: Initial schedule, of size required to display detailed schedule for entire construction period.
- C. Daily Construction Reports: Submit at weekly intervals.
- D. Field Condition Reports: Submit at time of discovery of differing conditions.
- E. Special Reports: Submit at time of unusual event.

1.5 QUALITY ASSURANCE

- A. Employ staff or consultant experienced and proficient in CPM scheduling with the capability of producing CPM reports and diagrams within 24 hours of Owner's request.
- B. During the Pre-Construction Conference, or another time by mutual agreement between Owner and Contractor, review methods and procedures related to the preliminary construction schedule and Contractor's Construction Schedule, including, but not limited to, the following:
1. Software, content and format for reports.
 2. Verify availability of qualified personnel needed to develop and update schedule.
 3. Discuss constraints.
 4. Delivery dates for Owner-furnished products.
 5. Schedule for work of Owner's separate contracts.
 6. Identify list of long lead items.
 7. Turn-around times required for review of submittals and resubmittals.
 8. Requirements for tests and inspections by independent testing and inspecting agencies.
 9. Durations for completion and startup procedures.
 10. Finalize list of construction activities to be included in schedule.
 11. Submittal requirements and procedures.

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12. Procedures for updating schedule.

1.6 COORDINATION

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

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Substantial Completion.
 - 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- B. Activities: Comply with the following:
 - 1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Owner.
 - 2. Procurement Activities: Include procurement process activities for long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery. Contractor shall include all long lead items as separate activities in Contractor's Construction Schedule.
 - 3. Submittal Review Time: Include review and resubmittal times indicated in Division 01 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with submittal schedule.
 - 4. Startup and Testing Time: Include not less than 15 days for startup and testing.
 - 5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Owner's administrative procedures necessary for certification of Substantial Completion.
 - 6. Punch List and Final Completion: Include not more than 30 days for resolution of the final punch list and achievement of final completion.
- C. Constraints: Include constraints and work restrictions indicated in the Contract Documents, and as follows, and show how the sequence of the Work is affected.

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1. Work under More Than One Contract: Include a separate activity for each contract.
 2. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
 3. Products Ordered in Advance
 4. Owner-Furnished Products
 5. Work Restrictions: Show the effect of the following items on the schedule:
 - a. Uninterruptible services at adjacent buildings.
 - b. Provisions for future construction.
 - c. Seasonal variations.
 - d. Environmental control.
 6. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
 - a. Submittals.
 - b. Purchases.
 - c. Mockups.
 - d. Fabrication.
 - e. Sample testing.
 - f. Installation.
 - g. Tests and inspections.
 - h. Adjusting.
 - i. Curing.
 7. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
 - a. Structural completion.
 - b. Permanent space enclosure.
 - c. Completion of mechanical installation.
 - d. Completion of electrical installation.
 - e. Substantial Completion.
- D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion.
- E. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
1. Unresolved issues.
 2. Unanswered RFIs.
 3. Rejected or unreturned submittals.
 4. Notations on returned submittals.

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- F. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.
- G. Computer Scheduling Software: Prepare schedules using current version of Microsoft Project for Windows.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal Gantt-chart-type schedule, demonstrating general compliance with format requirements, at the Pre-Construction Conference for review and comment. Submit the approved schedule within 15 days of issuance of the Notice to Proceed.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
 - 1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

2.3 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

- A. General: Prepare network diagrams using AON (activity-on-node) format.
- B. CPM Schedule: Prepare Contractor's Construction Schedule using a time-scaled CPM network analysis diagram for the Work.
 - 1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than 15 days after date established for the Notice to Proceed.
 - a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates, regardless of Owner's approval of the schedule.
 - 2. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
 - 3. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule in order to correlate with Contract Time.
- C. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the start-up network diagram, prepare a skeleton network to identify probable critical paths.

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1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:
 - a. Preparation and processing of submittals.
 - b. Mobilization and demobilization.
 - c. Procurement of long lead items.
 - d. Delivery.
 - e. Fabrication.
 - f. Utility interruptions.
 - g. Installation.
 - h. Work by Owner that may affect or be affected by Contractor's activities.
 - i. Testing and commissioning.
 - j. Punch list and final completion.
 2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
 3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
 4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.
 - a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.
- D. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall Project schedule.
- E. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
1. Identification of activities that have changed.
 2. Changes in early and late start dates.
 3. Changes in early and late finish dates.
 4. Changes in activity durations in workdays.
 5. Changes in the critical path.
 6. Changes in total float or slack time.
 7. Changes in the Contract Time.

2.4 REPORTS

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

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2. List of separate contractors at Project site.
 3. Approximate count of personnel at Project site.
 4. Equipment at Project site.
 5. Material deliveries.
 6. High and low temperatures and general weather conditions including presence of rain or snow.
 7. Accidents.
 8. Meetings and significant decisions.
 9. Unusual events (refer to special reports).
 10. Stoppages, delays, shortages, and losses.
 11. Meter readings and similar recordings.
 12. Orders and requests of authorities having jurisdiction.
 13. Change Orders received and implemented.
 14. Construction Change Directives received and implemented.
 15. Services connected and disconnected.
 16. Equipment or system tests and startups.
 17. Partial completions and occupancies.
 18. Substantial Completions authorized.
- B. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.5 SPECIAL REPORTS

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

PART 3 - EXECUTION (not used)

END OF SECTION

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SECTION 01 33 00 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
 - 1. Schedule of Values
 - 2. List of subcontractors, principal suppliers and fabricators
 - 3. Permits
 - 4. Insurance certificates
 - 5. Performance and payment bonds
 - 6. Project directory
 - 7. Construction Schedule
 - 8. Submittal Schedule
 - 9. Substitutions
 - 10. Shop drawings
 - 11. Coordination drawings
 - 12. Product data.
 - 13. Samples
 - 14. Color schedule
 - 15. Construction site submittals
 - 16. Safety submittals
 - 17. Weekly construction reports
 - 18. Requests for Information
 - 19. Quality Assurance submittals
 - 20. Existing conditions video recording where appropriate or required
 - 21. Construction progress photos if required
 - 22. Mock-ups if required by some Sections

1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Owner's responsive action. Action submittals are those submittals indicated in individual Specifications Sections as action submittals.
- B. Informational Submittals: Written and graphic information and physical samples that do not require Owner's responsive action. Submittals may be rejected for not

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complying with requirements. Informational submittals are those submittals indicated in individual Specifications Sections as informational submittals.

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

1.4 ACTION SUBMITTALS

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

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Owner's Digital Data Files: Electronic copies of CAD Drawings of the Contract Drawings will be provided by Owner for Contractor's use in preparing submittals.
1. Owner will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings and Project record drawings.

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- a. Owner makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
 - b. Digital Drawing Files will be prepared in either AutoCAD or Revit, latest edition, at Owner's sole discretion. Drawing files may be converted to another format if required by Contractor but Owner will not be responsible for compatibility of such converted drawing files with Contractor's drawing file format.
 - c. Contractor shall execute a data licensing agreement in the form of AIA Document C106, Digital Data Licensing Agreement.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 2. Submit all submittal items required for each Specifications Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 3. Submit action submittals and informational submittals required by the same Specifications Section as separate packages under separate transmittals.
 4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Owner reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Owner'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. Owner will advise Contractor when a submittal being processed must be delayed for coordination.
 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 3. Resubmittal Review: Allow 14 days for review of each resubmittal.
 4. Sequential Review: Where sequential review of submittals by Owner's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.
 5. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Owner and to Owner's consultants, allow 14 days for review of each submittal. Submittal will be returned to Owner before being returned to Contractor.
- D. Identification and Information: Place a permanent label or title block on each paper copy submittal item for identification.

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1. Indicate name of firm or entity that prepared each submittal on label or title block.
 2. Provide a space approximately 4 x 6 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
 3. Include the following information for processing and recording action taken:
 - a. Project name.
 - b. Date.
 - c. Name of Owner.
 - d. Name of Contractor.
 - e. Name of subcontractor.
 - f. Name of supplier.
 - g. Name of manufacturer.
 - h. Submittal number or other unique identifier, including revision identifier.
 - 1) Submittal number shall use Specifications Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).
 - i. Number and title of appropriate Specifications Section.
 - j. Drawing number and detail references, as appropriate.
 - k. Location(s) where product is to be installed, as appropriate.
- E. Identification and Information: If electronic submittal files are used, identify and incorporate information in each electronic submittal file as follows:
1. Assemble complete submittal package into a single indexed file with links enabling navigation to each item.
 2. Name file with submittal number or other unique identifier, including revision identifier.
 - a. File name shall use project identifier and Specifications 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).
 3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Owner.
 4. Include the following information on an inserted cover sheet:
 - a. Project name.
 - b. Date.
 - c. Name and address of Owner.
 - d. Name of Contractor.
 - e. Name of firm or entity that prepared submittal.
 - f. Name of subcontractor.
 - g. Name of supplier.
 - h. Name of manufacturer.
 - i. Number and title of appropriate Specifications Section.

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- j. Drawing number and detail references, as appropriate.
 - k. Location(s) where product is to be installed, as appropriate.
 - l. Related physical samples submitted directly.
- F. Options: Identify options requiring selection by the Owner.
- G. Deviations: Identify deviations from the Contract Documents on submittals.
- H. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
- 1. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Owner.
- I. Transmittal: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Owner will return submittals, without review received from sources other than Contractor.
- 1. Transmittal Form: Provide locations on form for the following information:
 - a. Project name.
 - b. Date.
 - c. Destination (To:).
 - d. Source (From:).
 - e. Names of subcontractor, manufacturer, and supplier.
 - f. Category and type of submittal.
 - g. Submittal purpose and description.
 - h. Specifications Section number and title.
 - i. Indication of full or partial submittal.
 - j. Drawing number and detail references, as appropriate.
 - k. Transmittal number, numbered consecutively.
 - l. Submittal and transmittal distribution record.
 - m. Remarks.
 - n. Signature of transmitter.
 - 2. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Owner on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.
- J. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
- 1. Note date and content of previous submittal.
 - 2. Note date and content of revision in label or title block and clearly indicate extent of revision.

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3. Resubmit submittals until they are marked with approval notation from Owner's action stamp.
- K. 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.
- L. Use for Construction: Use only final submittals that are marked with approval notation from Owner's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

- A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specifications Sections.
 1. Action Submittals: Submit five paper copies of each submittal, unless otherwise indicated. Owner will return four copies.
 2. Informational Submittals: Submit one paper copy of each submittal, unless otherwise indicated. Owner will not return copies.
 3. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Division 01 Section "Closeout Procedures."
 4. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
 - a. Provide a digital signature with digital certificate on electronically-submitted certificates and certifications where indicated.
 - b. Provide a notarized statement on original paper copy certificates and certifications where indicated.
 5. Test and Inspection Reports Submittals: Comply with requirements specified in Division 01 Section "Quality Requirements."
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
 1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
 2. Mark each copy of each submittal to show which products and options are applicable.
 3. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts.
 - b. Manufacturer's product specifications.
 - c. Standard color charts.

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- d. Statement of compliance with specified referenced standards.
 - e. Testing by recognized testing agency.
 - f. Application of testing agency labels and seals.
 - g. Notation of coordination requirements.
 - h. Availability and delivery time information.
4. For equipment, include the following in addition to the above, as applicable:
- a. Wiring diagrams showing factory-installed wiring.
 - b. Printed performance curves.
 - c. Operational range diagrams.
 - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
5. Submit Product Data before or concurrent with Samples.
6. Submit Product Data in the following format:
- a. Five paper copies of Product Data, unless otherwise indicated. Owner will return four copies.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data, unless submittal based upon Owner's digital data drawing files is otherwise permitted.
1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
- a. Identification of products.
 - b. Schedules.
 - c. Compliance with specified standards.
 - d. Notation of coordination requirements.
 - e. Notation of dimensions established by field measurement.
 - f. Relationship and attachment to adjoining construction clearly indicated.
 - g. Seal and signature of professional engineer if specified.
2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 42 inches.
3. Submit Shop Drawings in the following format:
- a. Five opaque (bond) copies of each submittal. Owner will return four copies.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.

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2. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Generic description of Sample.
 - b. Product name and name of manufacturer.
 - c. Sample source.
 - d. Number and title of applicable Specifications Section.

3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specifications Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit two full sets of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Owner will return one set of submittal with options selected.

5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Number of Samples: Submit two sets of Samples. Owner will retain one Sample set; remainder will be returned.
 - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

- E. Contractor's Construction Schedule: Comply with requirements specified in Division 01 Section "Construction Progress Documentation."

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- F. Application for Payment: Comply with requirements specified in Division 01 Section "Payment Procedures."
- G. Schedule of Values: Comply with requirements specified in Division 01 Section "Payment Procedures."
- H. Project Directory: Provide list of Key Personnel in accordance with Section 01 31 00 "Project Management and Coordination".
- I. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Submit Subcontract List within 15 days following issuance of Notice to Proceed. Include the following information in tabular form:
 - 1. Name, address, and telephone number of entity performing subcontract or supplying products.
 - 2. Number and title of related Specifications Section(s) covered by subcontract.
 - 3. Drawing number and detail references, as appropriate, covered by subcontract.
 - 4. Submit subcontract list in the following format:
 - a. Number of Copies: Five paper copies of subcontractor list, unless otherwise indicated. Owner will return four copies.
- J. Coordination Drawings: Comply with requirements specified in Division 01 Section "Project Management and Coordination."
- K. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- L. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on American Welding Society (AWS) forms. Include names of firms and personnel certified.
- M. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- N. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- O. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- P. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

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- Q. **Material Test Reports:** Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- R. **Product Test Reports:** Submit written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- S. **Research Reports:** Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
1. Name of evaluation organization.
 2. Date of evaluation.
 3. Time period when report is in effect.
 4. Product and manufacturers' names.
 5. Description of product.
 6. Test procedures and results.
 7. Limitations of use.
- T. **Schedule of Tests and Inspections:** Comply with requirements specified in Division 01 Section "Quality Requirements."
- U. **Preconstruction Test Reports:** Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- V. **Compatibility Test Reports:** Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- W. **Field Test Reports:** Submit reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- X. **Maintenance Data:** Comply with requirements specified in Division 01 Section "Operation and Maintenance Data."
- Y. **Design Data:** Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

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2.2 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Owner.
- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit three 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.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

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

3.2 OWNER'S ACTION

- A. General: Owner will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- B. Action Submittals: Owner will review each submittal, make marks to indicate corrections or modifications required, and return it. Owner will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.
 - 1. No exception taken
 - 2. Revise as noted
 - 3. Revise and resubmit
 - 4. Rejected

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- C. Informational Submittals: Owner will review each submittal and will not return it, or will return it if it does not comply with requirements. Owner will forward each submittal to appropriate party.
- D. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- E. Incomplete submittals are not acceptable, will be considered nonresponsive, and will be returned without review.
- F. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION

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SECTION 01 40 00 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specifications Sections, apply to this Section. Article 7 of the General Conditions specifically addresses additional testing requirements and procedures.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific quality-assurance and quality-control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-assurance and -control services required by Owner or authorities having jurisdiction are not limited by provisions of this Section.

1.3 DEFINITIONS

- A. Authority Having Jurisdiction (AHJ): Governmental regulatory agency responsible for inspecting, testing, and approving portions of the construction.
- B. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- C. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.
- D. Mockups: Full size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review

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coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

1. **Integrated Exterior Mockups:** Mockups of the exterior envelope erected separately from the building but on the project site, consisting of multiple products, assemblies and subassemblies.
 2. **Room Mockups:** Mockups of typical interior spaces complete with wall, floor, and ceiling finishes, doors, windows, millwork, casework, specialties and lighting.
- E. **Preconstruction Testing:** Tests and inspections performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.
- F. **Product Testing:** Tests and inspections that are performed by a National Recognized Testing Laboratory (NRTL), a National Voluntary Laboratory Accreditation Program (NVLAP), or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- G. **Source Quality-Control Testing:** Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.
- H. **Field Quality-Control Testing:** Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- I. **Testing Agency:** An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- J. **Installer/Applicator/Erector:** Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade or trades.
- K. **Experienced:** When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

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1.4 CONFLICTING REQUIREMENTS

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

1.5 ACTION SUBMITTALS

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

1.6 INFORMATIONAL SUBMITTALS

- A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.
- B. Contractor's Quality-Control Manager Qualifications: For supervisory personnel.

1.7 CONTRACTOR'S QUALITY-CONTROL PLAN

- A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice to Proceed, and not less than five days prior to preconstruction conference. Submit in format acceptable to Architect. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities. Coordinate with Contractor's Construction Schedule.
- B. Quality-Control Personnel Qualifications: Engage qualified full-time personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.
 - 1. Project quality-control manager may also serve as Project superintendent.
- C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.

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- D. **Testing and Inspection:** Include in quality-control plan a comprehensive schedule of Work requiring testing or inspection, including the following:
1. Contractor-performed tests and inspections including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections.
 2. Special inspections required by authorities having jurisdiction and indicated on the "Statement of Special Inspections."
 3. Owner-performed tests and inspections indicated in the Contract Documents, including tests and inspections indicated to be performed by the Commissioning Authority.
- E. **Continuous Inspection of Workmanship:** Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements and approved mockups.
- F. **Monitoring and Documentation:** Maintain testing and inspection reports including log of approved and rejected results. Include work Owner has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.8 REPORTS AND DOCUMENTS

- A. **Test and Inspection Reports:** Prepare and submit certified written reports specified in other Sections. Include the following:
1. Date of issue.
 2. Project title and number.
 3. Name, address, and telephone number of testing agency.
 4. Dates and locations of samples and tests or inspections.
 5. Names of individuals making tests and inspections.
 6. Description of the Work and test and inspection method.
 7. Identification of product and Specifications Section.
 8. Complete test or inspection data.
 9. Test and inspection results and an interpretation of test results.
 10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 12. Name and signature of laboratory inspector.
 13. Recommendations on retesting and reinspecting.

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- B. **Manufacturer's Technical Representative's Field Reports:** Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, and telephone number of technical representative making report.
 2. Statement on condition of substrates and their acceptability for installation of product.
 3. Statement that products at Project site comply with requirements.
 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 6. Statement whether conditions, products, and installation will affect warranty.
 7. Other required items indicated in individual Specifications Sections.
- C. **Factory-Authorized Service Representative's Reports:** Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, and telephone number of factory-authorized service representative making report.
 2. Statement that equipment complies with requirements.
 3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 4. Statement whether conditions, products, and installation will affect warranty.
 5. Other required items indicated in individual Specifications Sections.
- D. **Permits, Licenses, and Certificates:** For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.9 QUALITY ASSURANCE

- A. **General:** Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specifications Sections specify additional requirements.
- B. **Manufacturer Qualifications:** A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. **Fabricator Qualifications:** A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

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- D. **Installer Qualifications:** A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. **Professional Engineer Qualifications:** A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or products that are similar to those indicated for this Project in material, design, and extent.
- F. **Specialists:** Certain Specifications Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- G. **Testing Agency Qualifications:** An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- H. **Manufacturer's Technical Representative Qualifications:** An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. **Factory-Authorized Service Representative Qualifications:** An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- J. **Preconstruction Testing:** Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
1. Contractor responsibilities include the following:
 - a. Provide test specimens representative of proposed products and construction.

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- b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
 - d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
 - e. When testing is complete, remove test specimens, assemblies, mockups; do not reuse products on Project.
2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Owner, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
- K. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
1. Build mockups in location and of size indicated or, if not indicated, as directed by Owner.
 2. Notify Owner seven days in advance of dates and times when mockups will be constructed.
 3. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction at the Project.
 4. Demonstrate the proposed range of aesthetic effects and workmanship.
 5. Obtain Owner's approval of mockups before starting work, fabrication, or construction.
 - a. Allow seven days for initial review and each re-review of each mockup.
 6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 7. Demolish and remove mockups when directed, unless otherwise indicated.
- L. Integrated Exterior Mockups: Construct integrated exterior mockup in accordance with approved Shop Drawings. Coordinate installation of exterior envelope materials and products for which mockups are required in individual Specifications Sections, along with supporting materials.

1.10QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

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1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
 2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
 2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
 4. For quality-control services that are Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 01 Section "Submittal Procedures."
- D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- E. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

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- F. **Associated Services:** Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 4. Facilities for storage and field curing of test samples.
 5. Delivery of samples to testing agencies.
 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 7. Security and protection for samples and for testing and inspecting equipment at Project site.
- G. **Regulatory Agency Inspections:** It is Contractor's responsibility to arrange and schedule the regulatory agency inspections necessary to obtain the Certificate of Occupancy. Prior to the date of the regulatory agency inspection, Contractor should inspect the Project to insure that construction complies with the agency requirements. Contractor is responsible for being sufficiently familiar with the regulatory agency's requirements regarding inspection scheduling so that the inspections can be scheduled in a manner that will not delay the construction program. Contractor must understand the agency requirements and take all measures necessary to insure that these requirements are met. Contractor must give sufficient notice to all parties so that inspections can be arranged in advance and the proper personnel are present.
- H. **Coordination:** Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.
 2. Notify Owner of scheduled times for tests, inspections, obtaining samples, and similar activities at the same time that such activities are scheduled with the testing agency or AHJ.
 3. Contractor shall not cover up any underground site utilities or MEP systems within the building nor proceed with placing any structural concrete or exterior pavement without prior approval from the Owner. Contractor will request such approvals from the Owner concurrent with notice of associated AHJ inspections, as applicable. In no case shall such request be provided less than 24 hours from required inspection and approval.
- I. **Schedule of Tests and Inspections:** Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of Contractor's quality-control plan. Coordinate and submit concurrently with Contractor's Construction Schedule. Update as the Work progresses.

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1. Distribution: Distribute schedule to Owner, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.11 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Owner may engage a qualified testing agency or special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, and may include the following, as required. These special tests and inspections are in addition to the normal testing and inspections required by the authority having jurisdiction which are the responsibility of Contractor in accordance with Section 00 70 00 General Conditions, paragraph 4.7.1.
 1. Bolts installed in concrete
 2. Concrete (slump and compression cylinder breaks)
 3. High strength bolting
 4. Penetration firestopping
 5. Pilings, drilled piers and caissons
 6. Reinforcing steel and pre-stressing steel
 7. Soils bearing test
 8. Soil compaction
 9. Soils analysis
 10. Soils/base testing
 11. Special grading, excavations and filing
 12. Structural welding
 13. Welding of open-web steel joists – field welding
- B. Special Tests and Inspections: Conducted by a qualified testing agency or special inspector as required by authorities having jurisdiction, as indicated in individual Specifications Sections, and in Statement of Special Inspections attached to this Section, and as follows:
 1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
 2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
 3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
 4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
 5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
 6. Retesting and reinspecting corrected work.

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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 ACCEPTABLE TESTING AGENCIES

- A. ARDOT-approved testing agencies:
- B. 1. List to be provided upon request.

3.2 TEST AND INSPECTION LOG

- A. Prepare a record of tests and inspections. Include the following:
 - 1. Date test or inspection was conducted.
 - 2. Description of the Work tested or inspected.
 - 3. Date test or inspection results were transmitted to Architect.
 - 4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and modifications as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

3.3 REPAIR AND PROTECTION

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

END OF SECTION

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SECTION 01 42 00 - REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DEFINITIONS

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

1.3 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

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- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
 - 1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.4 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the United States."
- B. Submit RFI's if any doubt exists as to the meaning or intent of abbreviations and acronyms.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

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SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities. The scope of Work includes constructing primary utility service to the site, so utilities will not be available. Power must be supplied by generator until electrical service is completed. Communication, Water and sewer services must be supplied by Contractor.

1.3 USE CHARGES

- A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities engaged on this project to use temporary services and facilities without cost, including, but not limited to, Owner, testing agencies, and authorities having jurisdiction. Pay service use charges for usage by all entities for construction operations. Services include but are not limited to:
 - 1. Sewer service.
 - 2. Water service.
 - 3. Electric power service.
 - 4. Communication services.

1.4 SUBMITTALS

- A. Site Plan: Show temporary facilities, utility hookups, staging areas, signage, traffic controls and parking areas for construction personnel.
- B. Stormwater Pollution Prevention Plan (SWPPP): The contractor shall prepare a SWPPP plan to comply with requirements of authorities having jurisdiction.
- C. Moisture-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage, including delivery, handling, and storage provisions for materials subject to water absorption or water damage, discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water damaged Work.

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1. Indicate sequencing of work that requires water, such as sprayed fire-resistant materials, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
- D. Dust-Control and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust-control and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Identify further options if proposed measures are later determined to be inadequate. Include the following:
1. Locations of dust-control partitions at each phase of the work.
 2. HVAC system isolation schematic drawing.
 3. Location of proposed air filtration system discharge.
 4. Other dust-control measures.
 5. Waste management plan.
- E. Signage: Submit on 8½ x 11 or larger size if required for legibility. Graphics to be to scale, formatted to show finished appearance. Indicate materials, lettering font, symbols, colors, dimensions, thicknesses and installation details. Show locations on Temporary Facilities Site Plan submittal. Provide the following signage.
1. Project Identification Sign: Identifies name of project, owner, contractor and other information including the County seal graphic. Layout and content to be provided by Owner. Fabrication, installation, maintenance and removal by Contractor.
 2. Traffic Control signs: As required to direct vehicles, workers and visitors. May include directional and warning signs. Size, color and materials as required for legibility and durability.
 3. Informational signs: Identification of entrances, field office and other features as required. Size, color and materials as required for legibility and durability.

1.5 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70 and with authorities having jurisdiction.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.
- C. Accessible Temporary Egress: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

1.6 PROJECT CONDITIONS

- A. Temporary Use of Permanent Facilities: Engage installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent

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service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Portable Chain-Link Fencing: Minimum 0.148-inch-thick, galvanized steel, chain-link fabric fencing; minimum 6 feet high with galvanized steel pipe posts; minimum 2-3/8-inch-OD line posts and 2-7/8-inch-OD corner and pull posts, with 1-5/8-inch-OD top and bottom rails. Provide galvanized steel bases for supporting posts.
- B. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10 mils minimum thickness, with flame-spread rating of 15 or less per ASTM E 84.
- C. Dust Control Adhesive-Surface Walk-off Mats: Provide mats minimum 36 by 60 inches.
- D. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

2.2 TEMPORARY FACILITIES

- A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Common-Use Field Office: Of sufficient size to accommodate needs of construction personnel office activities and to accommodate project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip, at a minimum, as follows:
 - 1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
 - 2. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F.
 - 3. Lighting fixtures capable of maintaining average illumination of 20 fcad desk height.
- C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations as needed to ensure security, safety and protection of materials.
 - 1. Store combustible materials apart from building.
- D. Project Identification Sign: As soon as possible after approval of the temporary facilities site plan submittal, provide a sign near the project site entrance, located to be visible to visitors and passers-by and so as to not interfere with deliveries and construction activities. Comply with regulations of authorities having jurisdiction.

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1. 4'x8'x $\frac{3}{4}$ " thick weather-resistant plywood or other suitable material capable of withstanding weather without noticeable deterioration for the duration of the project.
2. Paint the sign in the colors and graphics to be provided by Owner and according to the approved submittal. Touch-up or repaint the sign as required during the duration of the project to maintain in as-new condition.
3. Mount on minimum 4"x4"x12' treated posts sunk minimum of 3' into the soil. If necessary due to soil conditions, concrete the post holes for stability and provide kickers if required to maintain sign plumb and stable. Alternative mounting may be discussed with Owner and utilized if approved.

2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
 1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
 2. Heating Units: Listed and labeled for type of fuel being consumed, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
 3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 13 at each return air grille in system and remove at end of construction and clean HVAC system as required in Division 01 Section "Closeout Procedures".
- C. Air Filtration Units: HEPA primary and secondary filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

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

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3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Contractor is responsible for supplying necessary utilities to support construction on the site in the absence of available utility service, and paying for generators, etc., as needed.
 - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
 - 1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.
- C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.
- D. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- E. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
 - 1. Toilets: Use of Owner's existing toilet facilities will not be permitted.
- F. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
- G. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
 - 1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.
- H. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
 - 1. Install electric power service overhead, unless otherwise indicated.

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2. Connect temporary service to Owner's existing power source, as directed by Owner and as authorized by authority having jurisdiction.
- I. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
- J. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install at least one telephone line for each field office.
 1. Provide additional telephone lines for the following:
 - a. Provide a dedicated telephone line for each facsimile machine in each field office.
 2. At each telephone, post a list of telephone numbers including the following:
 - a. Police and Fire Dept.(911 for emergency / 311 for non-emergency)
 - b. Contractor's home office
 - c. Principal subcontractors' field and home offices.
 - d. County Project Manager
 - e. Sheriffs Office contact information when working within or near jail facilities
 - f. County Security numbers (24-Hour)
 - g. Facilities Management Dept. Workorder Desk
 3. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.
- K. Electronic Communication Service: Provide a computer in the primary field office with internet-based email service in order to maintain electronic communications or maintain email service with a portable cell phone device in the possession of the Contractor's Project Manager and Superintendent.

3.3 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
 1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
 2. Maintain support facilities until Owner schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

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- B. Temporary Use of Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.
1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
 2. Prepare subgrade and install subbase and base for temporary roads and paved areas according to Division 31 Section "Earth Moving."
 3. Road surfaces during construction shall comply with requirements of authority having jurisdiction.
 4. Recondition base after temporary use, including removing contaminated material, regrading, proofrolling, compacting, and testing.
- C. Traffic Controls: Comply with requirements of authorities having jurisdiction.
1. Protect existing site improvements to remain including curbs, pavement, and utilities.
 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- D. Parking: Use designated areas of Owner's existing parking areas for construction personnel.
- E. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties nor endanger permanent Work or temporary facilities.
- F. Signs: Provide project signs as indicated. Unauthorized signs are not permitted.
1. Project Sign:
 2. Identification Signs
 3. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
 - a. Provide temporary, directional signs for construction personnel and visitors.
 4. Maintain and touchup signs so they are legible at all times.
- G. Waste Disposal Facilities: Comply with requirements specified in Division 01 Section "Construction Waste Management and Disposal."
- H. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

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3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and to minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
 - 1. Comply with work restrictions specified in Division 01 Section "Summary."
 - 2. Comply with requirements of Appendix B, Stormwater Pollution Prevention Plan.

- B. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and the Stormwater Pollution Prevention Plan.
 - 1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant- protection zones.
 - 2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
 - 3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from the project site during the course of the project.
 - 4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

- C. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

- D. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Obtain extended warranty for Owner. Perform control operations lawfully, using environmentally safe materials.

- E. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
 - 1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
 - 2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.

- F. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.

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- G. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- H. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.
- I. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
 - 1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.
- J. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.
 - 1. Prohibit smoking in construction areas.
 - 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
 - 3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
 - 4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.5 MOISTURE AND MOLD CONTROL

- A. Contractor's Moisture-Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.
- B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
 - 1. Protect porous materials from water damage.
 - 2. Protect stored and installed material from flowing or standing water.
 - 3. Keep porous and organic materials from coming into prolonged contact with concrete.
 - 4. Remove standing water from decks.
 - 5. Keep deck openings covered or dammed.
- C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:

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1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
 2. Keep interior spaces reasonably clean and protected from water damage.
 3. Periodically collect and remove waste containing cellulose or other organic matter.
 4. Discard or replace water-damaged material.
 5. Do not install material that is wet.
 6. Discard, replace or clean stored or installed material that begins to grow mold.
 7. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.
- D. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
 2. Use permanent HVAC system to control humidity.
 3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
 - a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective.
 - b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record daily readings over a forty-eight hour period. Identify materials containing moisture levels higher than allowed. Report findings in writing to Owner.
 - c. Remove materials that can not be completely restored to their manufactured moisture level within 48 hours.

3.6 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Operate Project-identification-sign lighting daily from dusk until 12:00 midnight.
- D. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- E. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no

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later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 01 Section "Closeout Procedures."

END OF SECTION

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SECTION 01 51 00 – CONSTRUCTION INDOOR AIR QUALITY (IAQ) MANAGEMENT PLAN

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specifications Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes requirements for construction indoor air quality, including:
 - 1. Construction Indoor Air Quality Management Purpose
 - 2. Construction Indoor Air Quality Procedures
 - 3. Construction Indoor Air Quality Submittals
- B. This section includes references to the following external documents:
 - 1. The U.S. Green Building Council's Leadership in Energy and Environmental Design (LEEDAP) "CI", for Commercial Interiors, version 2.2. This information is available from the U.S. Green Building Council, 1015 18th St NW, Ste. 105, Washington, DC 20036, 202-828-7422 or 866-828-7422, www.usgbc.org.
 - 2. "IAQ Guidelines for Occupied Buildings Under Construction", Sheet Metal and Air Conditioning Contractors' National Association (SMACNA), www.smacna.org, (703) 803-2980.
 - 3. "ANSI/AHSRAE 52.2-1999: Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size", American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), www.ashrae.org, (800) 527-4723.

1.3 PURPOSE

- A. The intent of Construction IAQ (Indoor Air Quality) management is to reduce indoor air quality problems resulting from the construction process in order to help sustain the health and well-being of construction workers and building occupants.

1.4 PROCEDURES

- A. The Contractor shall make every effort to reduce pollutants throughout the construction process in order to achieve compliance with IAQ testing maximum concentrations

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discussed below. The most significant method for achieving success is through source control, that is:

1. Install products and materials that are low- or zero-VOC, do not contain added formaldehyde, and are free of particulates
 2. Request in-factory flush-out from manufacturers wherever possible, to flush out pollutants before products arrive at the site
- B. The Contractor shall adopt an IAQ management plan to protect the HVAC system during construction, control pollutant sources, and interrupt contamination pathways.
- C. Contractor shall sequence the installation of materials to avoid contamination of absorptive materials such as insulation, carpeting, ceiling tile and gypsum wallboard.
- D. Temporary HVAC units (independent of permanent ductwork and distribution systems) are recommended as the optimal method for achieving the Construction IAQ requirements. This allows permanent HVAC equipment to be fully protected. If contractor is utilizing permanent HVAC equipment for fresh air, heating, or cooling during construction, all air intakes shall be protected from incoming construction debris. Contractor shall use filtration media in all permanent air handling equipment during construction, and replace this media immediately before occupancy.
1. Regularly occupied spaces: Filtration media during and after construction shall have a Minimum Efficiency Reporting Value (MERV) of 13 as determined by ANSI/ASHRAE 52.2-1999. Obtain a diagram from MEP Engineer indicating location of all regularly occupied spaces.
 2. All other spaces: Filtration media during and after construction shall have a Minimum Efficiency Reporting Value (MERV) of 8 as determined by ANSI/ASHRAE 52.2- 1999.
- E. The Contractor shall employ Green Housekeeping methods wherever practicable.
1. Use non-toxic cleaners per Green Seal, www.greenseal.org
 2. Conserve energy by shutting off lights and HVAC in all areas except those currently being cleaned.

1.5 1.5 SUBMITTALS

- A. With first Application for Payment, the Contractor shall submit a draft Construction IAQ Management Plan. Architect will return plan with revisions or approval, to be resubmitted as many times as necessary for Architect's final approval. The plan shall be divided into 6 parts, addressing each of the following topics per "IAQ Guidelines for Occupied Buildings Under Construction", Sheet Metal and Air Conditioning Contractors' National Association (SMACNA), www.smacna.org, (703) 803-2980. The plan shall also include requirements described in "Procedures" above.

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1. 1. HVAC protection
 2. 2. Source Control
 3. 3. Pathway Interruption
 4. 4. Housekeeping
 5. 5. Filter Maintenance Schedule
 6. 6. Scheduling
- B. B. With subsequent Applications for Payment, the Contractor shall submit documentation of IAQ procedures as follows:
1. Provide cut sheets of filtration media used during construction with MERV values highlighted (per ANSI/ASHRAE 52.2-1999). Fresh clean filters must be installed immediately prior to occupancy.
 2. During construction, take 18 total photographs of Construction IAQ Management procedures, that is: 6 photos on three different occasions and identify SMACNA approach featured, such as protection of ducts, physical barriers protecting areas under construction, and the sequencing of installation for absorptive materials.

END OF SECTION 01 56 39

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SECTION 01 73 00 - EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. Field engineering and surveying.
 - 3. Installation of the Work.
 - 4. Cutting and patching.
 - 5. Coordination of Owner-installed products.
 - 6. Progress cleaning.
 - 7. Starting and adjusting.
 - 8. Protection of installed construction.
 - 9. Correction of the Work.

1.3 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.
- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.4 INFORMATIONAL SUBMITTALS

- A. Certificates: If professionally prepared certificates are required by other sections, submit certificates signed by the appropriate licensed professional certifying compliance with requirements.
- B. Cutting and Patching Plan: Submit plan describing procedures at least 5 days prior to the time cutting and patching will be performed. Include the following information:

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1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
 3. Products: List products to be used for patching and firms or entities that will perform patching work.
 4. Dates: Indicate when cutting and patching will be performed.
 5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.
 - a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.
- C. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.
- D. Certified Surveys: Submit two copies signed by land surveyor.
- E. Final Property Survey: Submit two copies showing the Work performed and record survey data.

1.5 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.
- B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
1. Structural Elements: When cutting and patching structural elements, notify Owner of locations and details of cutting and await directions from Owner before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection
 2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements can include the following:
 - a. Fire separation assemblies.
 - b. Air or smoke barriers.
 - c. Fire-suppression systems.
 - d. Mechanical systems piping and ducts.

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- e. Control systems.
 - f. Communication systems.
 - g. Fire-detection and -alarm systems.
 - h. Conveying systems.
 - i. Electrical wiring systems.
3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Other construction elements can include but are not limited to the following:
- a. Water, moisture, or vapor barriers.
 - b. Membranes and flashings.
 - c. Exterior curtain-wall construction.
 - d. Sprayed fire-resistive material.
 - e. Equipment supports.
 - f. Piping, ductwork, vessels, and equipment.
 - g. Noise- and vibration-control elements and systems.
4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Owner's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- C. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.
- D. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
- 1. For projects requiring compliance with sustainable design and construction practices and procedures, use products for patching that comply with requirements in other sections of this project manual.
- B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the

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fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Owner for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.
 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
 1. Description of the Work.
 2. List of detrimental conditions, including substrates.
 3. List of unacceptable installation tolerances.
 4. Recommended corrections.
- D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

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3.2 PREPARATION

- A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Owner.

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Owner promptly.
- B. General: Engage a land surveyor to lay out or confirm lay out of the boundaries of the Work related to the site property lines or critical site elements. Use accepted surveying practices.
 - 1. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 - 2. Notify Owner when deviations from required lines and levels exceed allowable tolerances.
 - 3. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Lay out or confirm the lay out of site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
- D. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions and types of instruments and tapes used. Make the log available for reference by Owner.

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3.4 FIELD ENGINEERING

- A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
1. Do not change or relocate existing benchmarks or control points without prior written approval of Owner. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Owner before proceeding.
 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
- B. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
 2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
 3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.
- C. Final Property Survey: Engage a land surveyor to prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.
1. Show boundary lines, monuments, streets, site improvements and utilities, existing improvements and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to a legal point.

3.5 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
1. Make vertical work plumb and make horizontal work level.
 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
 4. Maintain minimum headroom clearance of 96 inches in occupied spaces and 90 inches in unoccupied spaces.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

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- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.
- F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
 - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Owner.
 - 2. Allow for building movement, including thermal expansion and contraction.
 - 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous and, if a LEED project, that comply with requirements.

3.6 CUTTING AND PATCHING

- A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore

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surfaces to their original condition.

- B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- C. Temporary Support: Provide temporary support of work to be cut.
- D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 01 10 00 "Summary."
- F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.
- G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 - 4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
 - 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 - 6. Proceed with patching after construction operations requiring cutting are complete.
- H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. 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.

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2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
 - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - b. Restore damaged pipe covering to its original condition.
 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
 4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.
- I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 OWNER-INSTALLED PRODUCTS

- A. Site Access: Provide access to Project site for Owner's construction personnel.
- B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.
 1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
 2. Preinstallation Conferences: Include Owner's construction personnel at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

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3.8 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
 - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 - 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
 - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
 - a. Use containers intended for holding waste materials of type to be stored.
 - 4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 - 1. Remove liquid spills promptly.
 - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in other sections.
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

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- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.9 STARTING AND ADJUSTING

- A. Coordinate startup and adjusting of equipment and operating components with requirements in Section 01 91 13 "General Commissioning Requirements."
- B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- E. Manufacturer's Field Service: Comply with qualification requirements in Section 01 40 00 "Quality Requirements."

3.10 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity

END OF SECTION

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SECTION 01 77 00 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 1. Substantial Completion procedures.
 2. Final completion procedures.
 3. Warranties.
 4. Final cleaning.

1.3 REGULATORY AGENCY INSPECTION

- A. Contractor shall schedule regulatory agency inspections as required so as to not delay Owner's occupancy. Coordinate inspection and occupancy scheduling with Owner. Cooperate with Owner for any planned partial occupancy. When A a Temporary Certificate of Occupancy (TCO) is required by Owner cooperate and coordinate with regulatory agencies to ensure proper authorizations are obtained prior to Owner's occupancy.

1.4 SUBSTANTIAL COMPLETION

- A. Prior to requesting Owner's inspection for determining date of Substantial Completion conduct a preliminary substantial completion inspection with appropriate subcontractors.
 1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
 2. Advise Owner of pending insurance changeover requirements.
 3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include all Certificates of Occupancy required by authorities having jurisdiction. Include operating certificates and similar releases.
 5. Prepare and submit operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
 6. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings.

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7. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
 8. Clean and repair, if required, permanent facilities used during the construction period including, but not limited to, the following:
 - a. Replace air filters and clean inside of ductwork and housings.
 - b. Replace significantly worn parts and parts subject to unusual operating conditions.
 - c. Replace lamps burned out or noticeably dimmed by hours of use.
 9. Coordinate final changeover of permanent locks with Owner. Advise Owner's personnel of changeover in security provisions.
 10. Complete startup testing of systems.
 11. Submit test/adjust/balance records.
 12. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 13. Advise Owner of changeover in heat and other utilities.
 14. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
 15. Complete final cleaning requirements, including touchup painting.
 16. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Owner will either proceed with inspection or notify Contractor of unfulfilled requirements. Owner will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Owner, that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected. Immediately following receipt of the Owner's Punch List, Contractor shall pursue correction of deficiencies. Continual delay with regard to the correction of deficiencies will be cause for withholding payments to the Contractor. The Punch List is expected to be completely resolved within 30 calendar days of the date of Substantial Completion.
 2. Results of completed inspection will form the basis of requirements for final completion.
- C. Partial Owner Occupancy: Owner reserves the right to occupy and to place and install equipment in completed areas of building before overall substantial completion provided such occupancy does not interfere with completion of the Work. Such placement of equipment and partial occupancy shall not constitute acceptance of the total Work. The specific requirements for partial Owner occupancy relevant to this project are as follows:
1. The Owner reserves the right to occupy the MDF Room approximately 30 days prior to the Contract Completion Date.

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2. Before partial Owner occupancy, the room shall meet the requirements of Substantial Completion: mechanical, electrical, and datacom systems shall be fully operational and required tests and inspections shall be successfully completed; all room finishes shall be complete, inspected by Contractor, and accepted by Owner; final cleaning of room shall be performed; and Owner's lock and keys shall be provided.
3. Upon Owner occupancy, Contractor's personnel and Subcontractors will no longer have access to the owner-occupied space without Owner's permission.
4. Upon occupancy, Owner shall assume responsibility for damages to finishes and custodial service within the Owner-occupied space.

1.5 FINAL COMPLETION

- A. Preliminary Procedures: Before requesting final inspection for determining final completion, complete the following:
 1. Submit a final Application for Payment according to Division 01 Section "Payment Procedures."
 2. Submit certified copy of Owner's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Owner. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 4. Submit pest-control final inspection report and warranty.
 5. Prepare and submit Project Record Documents
- B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Owner will either proceed with inspection or notify Contractor of unfulfilled requirements. Owner will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
 1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.6 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction. Use CSI Form 14.1A.
 1. Organize list of spaces in sequential order, starting with interior areas first and proceeding from lowest floor to highest floor.
 2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.

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3. Include the following information at the top of each page:
 - a. Project name.
 - b. Date.
 - c. Name of Owner.
 - d. Name of Contractor.
 - e. Page number.

4. Submit list of incomplete items in the following format:
 - a. PDF electronic file.
 - b. Three paper copies of product schedule or list, unless otherwise indicated. Owner will return two copies.

1.7 WARRANTIES

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

- B. **Partial Occupancy:** Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.

- C. **Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.**
 1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
 3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
 4. Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide table of contents at beginning of document.

- D. **Provide additional copies of each warranty to include in operation and maintenance manuals.**

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PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
 - 1. Use cleaning products that meet Green Seal GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
 - 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Remove snow and ice to provide safe access to building.
 - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - h. Sweep concrete floors broom clean in unoccupied spaces.
 - i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
 - j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring

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- materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
- k. Remove labels that are not permanent.
 - l. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
 - 1) Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates.
 - m. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - n. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
 - o. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - p. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - q. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter upon inspection.
 - 1) Clean HVAC system in compliance with NADCA Standard 1992-01. Provide written report upon completion of cleaning.
 - r. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
 - s. Leave Project clean and ready for occupancy.
- C. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid Project of rodents, insects, and other pests. Prepare a report.
- D. Construction Waste Disposal: Comply with waste disposal requirements in Division 01 Section "Construction Waste Management and Disposal."

3.2 WARRANTY PROCEDURES

- A. Unless stated otherwise in the Certificate of Substantial Completion, the beginning of the Warranty phase coincides with the issuance of the Certificate of Substantial Completion. The expectation of Owner is that Contractor will give prompt corrective attention to any warranty item submitted.
- B. Initiation of Requests: Owner will normally initiate a request for corrective work following a review to determine whether a maintenance or warranty issue. If determined to be a warranty item, Owner will address a warranty notification to Contractor for action and will retain a copy in a suspense file.

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- C. Response to Request: Contractor, upon receipt of a Warranty Notification Letter, shall either initiate the repair with his work force or forward a copy to the subcontractor for action. If Contractor forwards the action to the subcontractor, he will retain a copy in a suspense file. Prior to commencing any repairs, Contractor or subcontractor must contact Owner to coordinate schedule.
 - 1. Warranty repairs to critical life safety systems and health-related building systems must be performed within 48 hours of receipt of a warranty notification. Critical life safety systems and health-related building systems include, but are not limited to: fire alarm system, fire sprinkler system, plumbing system, and HVAC system.
- D. Coordination shall be made with Owner's maintenance personnel prior to commencing repairs. Owner's maintenance personnel must be present to acknowledge completion of the repair and must sign off and date a copy of the warranty request. Return of the signed copy to Contractor constitutes completion of the request and all file copies can be so annotated.
- E. Owner will maintain a log of all Warranty Items mailed to Contractor. After 10 days from initiation of the request, if the copy has not been returned, follow-up letters will be sent to Contractor for action. Warranty items which take longer than 15 days to complete, unless by prior arrangement with Owner, will be considered non-responsive.

END OF SECTION

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SECTION 01 78 23 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 1. Operation manuals for systems, subsystems, and equipment.
 2. Product maintenance manuals.
 3. Systems and equipment maintenance manuals.
 4. Emergency manuals as applicable to the system

1.3 CLOSEOUT SUBMITTALS

- A. Manual Content: Operations and maintenance manual content is specified in individual specification sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
 1. Where applicable, clarify and update reviewed manual content to correspond to modifications and field conditions.
- B. Format: Submit operations and maintenance manuals in the following format:
 1. PDF electronic file. Assemble each manual into a composite electronically-indexed file. Submit on digital media acceptable to Owner.
 - a. Title each indexed document file in composite index with applicable item name. Include a complete O&M directory.
- C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Owner and Commissioning Agent will comment on whether general scope and content of manual are acceptable.
- D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and before commencing demonstration and training. Owner and Commissioning Agent will return copy with comments.
 1. Correct or modify each manual to comply with Owner's and Commissioning Agent's comments. Submit copies of each corrected manual within 15 days of receipt of Owner's and Commissioning Agent's comments.

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PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

- A. Organization: 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."

2.2 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
 - 1. Title page.
 - 2. Table of contents.
 - 3. Manual contents.
- B. Title Page: Include the following information:
 - 1. Subject matter included in manual.
 - 2. Name and address of Project.
 - 3. Name and address of Owner.
 - 4. Date of submittal.
 - 5. Name and contact information for Contractor.
 - 6. Name and contact information for Commissioning Agent.
 - 7. Names and contact information for major consultants to the Owner that designed the systems contained in the manuals.
 - 8. Cross-reference to related systems in other operation and maintenance manuals.

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- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specifications Section number in Project Manual.
1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
- E. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.
1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
 - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
 - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents, and indicate Specifications Section number on bottom of spine. Indicate volume number for multiple-volume sets.
 2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specifications Section number and title of Project Manual.
 3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
 4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
 5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
 - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
 - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 EMERGENCY MANUALS

- A. Content: Organize manual into a separate section for each of the following:

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1. Type of emergency.
 2. Emergency instructions.
 3. Emergency procedures.
- B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
1. Fire.
 2. Flood.
 3. Gas leak.
 4. Water leak.
 5. Power failure.
 6. Water outage.
 7. System, subsystem, or equipment failure.
 8. Chemical release or spill.
- C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
- D. Emergency Procedures: Include the following, as applicable:
1. Instructions on stopping.
 2. Shutdown instructions for each type of emergency.
 3. Operating instructions for conditions outside normal operating limits.
 4. Required sequences for electric or electronic systems.
 5. Special operating instructions and procedures.

2.4 OPERATION MANUALS

- A. Content: In addition to requirements in this Section, include operation data required in individual Specifications Sections and the following information:
1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
 2. Performance and design criteria if Contractor is delegated design responsibility.
 3. Operating standards.
 4. Operating procedures.
 5. Operating logs.
 6. Wiring diagrams – Manufacturer's internal and Contractor's installation diagrams.
 7. Control diagrams.
 8. Piped system diagrams.
 9. Precautions against improper use.
 10. License requirements including inspection and renewal dates.
- B. Descriptions: Include the following:

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1. Product name and model number. Use designations for products indicated on Contract Documents.
 2. Manufacturer's name.
 3. Equipment identification with serial number of each component and Manufacturer's installation instructions.
 4. Equipment function.
 5. Operating characteristics.
 6. Limiting conditions.
 7. Performance curves.
 8. Engineering data and tests.
 9. Complete nomenclature and number of replacement parts.
- C. Operating Procedures: Include the following, as applicable:
1. Startup procedures.
 2. Equipment or system break-in procedures.
 3. Routine and normal operating instructions.
 4. Regulation and control procedures.
 5. Instructions on stopping.
 6. Normal shutdown instructions.
 7. Seasonal and weekend operating instructions.
 8. Required sequences for electric or electronic systems.
 9. Special operating instructions and procedures.
- D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.5 PRODUCT MAINTENANCE MANUALS

- A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- B. Source Information: List each product included in manual identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specifications Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- C. Product Information: Include the following, as applicable:
1. Product name and model number.
 2. Manufacturer's name.
 3. Color, pattern, and texture.
 4. Material and chemical composition.
 5. Reordering information for specially manufactured products.

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- D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
1. Inspection procedures.
 2. Types of cleaning agents to be used and methods of cleaning.
 3. List of cleaning agents and methods of cleaning detrimental to product.
 4. Schedule for routine cleaning and maintenance.
 5. Repair instructions.
 6. Materials, methods and requirements for lubrication.
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.

2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

- A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.
- B. Source Information: List each system, subsystem, and piece of equipment 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 Specifications Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
1. Standard maintenance instructions and bulletins.
 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 3. Identification and nomenclature of parts and components.
 4. List of items recommended to be stocked as spare parts.
 5. Control systems installation wiring diagrams and installation drawings and control sequences.
- D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
1. Test and inspection instructions.

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2. Troubleshooting guide.
 3. Valve tag list and schematic diagram.
 4. Precautions against improper maintenance.
 5. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 6. Aligning, adjusting, and checking instructions.
 7. Demonstration and training video recording, if available.
- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

- A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.
- B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
- C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
- E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from

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the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
- F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
1. Do not use original project record documents as part of operation and maintenance manuals.
 2. Comply with requirements of newly prepared record Drawings in Division 01 Section "Project Record Documents."
- G. Comply with Division 01 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION

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SECTION 01 78 39 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Submit Final Record Documents prior to required date for Final Completion.
- B. Section includes administrative and procedural requirements for project record documents, including the following:
 - 1. Record Drawings
 - 2. Record Specifications
 - 3. Miscellaneous record submittals.

1.3 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit one set of marked-up record prints.
 - 2. Number of Copies: Submit copies of record Drawings as follows:
 - a. Initial Submittal: Submit one paper copy set of marked-up record prints and one set of plots from corrected record digital data files if applicable. Owner will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
 - b. Final Submittal: Submit one paper copy set of marked-up record prints and one set of record digital data files if applicable. Plot each drawing file, whether or not changes and additional information were required to be recorded.
- B. Miscellaneous Record Submittals: Refer to other Specifications Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit one paper copy of each submittal.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings.
 - 1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record

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data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.

- a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Accurately record information in an acceptable drawing technique, using red pencil or pen for clear identification.
 - c. Record data as soon as possible.
 - d. Record and check the markup before enclosing concealed installations.
 - e. Cross-reference record prints to corresponding archive photographic documentation.
 - f. Cross-reference record prints to corresponding Change Order, RFI, or ASI, as appropriate.
2. Content: Types of items requiring marking include, but are not limited to, the following:
- a. Dimensional changes to Drawings.
 - b. Revisions to details shown on Drawings.
 - c. Depths of foundations below first floor.
 - d. Locations and depths of underground utilities.
 - e. Revisions to routing of piping and conduits.
 - f. Revisions to electrical circuitry.
 - g. Actual equipment locations.
 - h. Duct size and routing.
 - i. Locations of concealed internal utilities.
 - j. Changes made by Change Order or Construction Change Directive.
 - k. Changes made following Owner's written orders.
 - l. Details not on the original Contract Drawings.
 - m. Field records for variable and concealed conditions.
 - n. Record information on the Work that is shown only schematically.
3. Mark the Contract Drawings and Shop Drawings completely and accurately. Utilize personnel proficient at recording graphic information in production of marked-up record prints.
4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.

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2. Name each file with the sheet identification. Include identification in each digital data file.
3. Identification: As follows:
 - a. Project name.
 - b. Date.
 - c. Designation "PROJECT RECORD DRAWINGS."
 - d. Name of Owner.
 - e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and Contract modifications.
 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
 4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
 5. Note related Change Orders, record Product Data, and record Drawings where applicable.
- B. Format: Submit record Specifications as paper copy.

2.3 RECORD PRODUCT DATA

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 3. Note related Change Orders, record Specifications, and record Drawings where applicable.
- B. Format: Submit record Product Data as paper copy.
 1. Include record Product Data directory organized by specification section number and title, electronically linked to each item of record Product Data.

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2.4 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other Specifications Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.
- B. Format: Submit miscellaneous record submittals as paper copy.
 - 1. Include miscellaneous record submittals directory organized by specification section number and title, electronically linked to each item of miscellaneous record submittals.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and modifications to project record documents as they occur; do not wait until the end of Project.
- B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Owner's reference during normal working hours.
- C. Maintain accurate and up-to-date record drawing mark-ups during the course of construction. Cooperate with Owner's periodic review.

END OF SECTION

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SECTION 01 79 00 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 INFORMATIONAL SUBMITTALS

- A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
- B. Attendance Record: For each training module, submit list of participants and length of instruction time.

1.4 CLOSEOUT SUBMITTALS

- A. Submit two copies of training module information within seven days of end of each training module.
 - 1. Identification: On each copy, provide an applied label with the following information:
 - a. Name of Project.
 - b. Name of Owner.
 - c. Name of Contractor.
 - 2. Prepare on 8-1/2-by-11-inch paper, punched and bound in heavy-duty, three-ring, vinyl-covered binders. Mark appropriate identification on front and spine of each binder.
 - 3. At completion of training, submit complete training manual(s) for Owner's use.

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1.5 QUALITY ASSURANCE

- A. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Division 01 Section "Quality Requirements," experienced in operation and maintenance procedures and training.

1.6 COORDINATION

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

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

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- d. Operating instructions for conditions outside of normal operating limits.
 - e. Sequences for electric or electronic systems.
 - f. Special operating instructions and procedures.
4. Operations: Include the following, as applicable:
- a. Startup procedures.
 - b. Equipment or system break-in procedures.
 - c. Routine and normal operating instructions.
 - d. Regulation and control procedures.
 - e. Control sequences.
 - f. Safety procedures.
 - g. Hazards
 - h. Instructions on stopping.
 - i. Normal shutdown instructions.
 - j. Operating procedures for emergencies.
 - k. Operating procedures for system, subsystem, or equipment failure.
 - l. Seasonal and weekend operating instructions.
 - m. Required sequences for electric or electronic systems.
 - n. Special operating instructions and procedures.
5. Adjustments: Include the following:
- a. Alignments.
 - b. Checking adjustments.
 - c. Noise and vibration adjustments.
 - d. Economy and efficiency adjustments.
6. Troubleshooting: Include the following:
- a. Diagnostic instructions.
 - b. Test and inspection procedures.
7. Maintenance: Include the following:
- a. Inspection procedures.
 - b. Types of cleaning agents to be used and methods of cleaning.
 - c. List of cleaning agents and methods of cleaning detrimental to product.
 - d. Procedures for routine cleaning
 - e. Procedures for preventive maintenance.
 - f. Procedures for routine maintenance.
 - g. Instruction on use of special tools.
 - h. Lubrications and fuels.
8. Repairs: Include the following:
- a. Diagnosis instructions.
 - b. Repair instructions.

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- c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
- d. Instructions for identifying parts and components.
- e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Assemble educational materials necessary for instruction. Assemble training modules into a training manual organized in coordination with requirements in Division 01 Section "Operations and Maintenance Data."
- B. Set up instructional equipment, as applicable, at instruction location.

3.2 INSTRUCTION

- A. Engage a qualified instructor to prepare instruction program, training modules and to coordinate with Owner for number of participants, instruction times, and location.
- B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
 - 1. Owner will furnish Contractor with names and positions of participants.
- C. Scheduling: Provide instruction at mutually agreed upon times. For equipment that requires seasonal operation, provide instruction as necessary for particular operating protocols for seasons.
 - 1. Schedule training with Owner with at least seven days' advance notice.
- D. Cleanup: Collect used and leftover educational materials and remove from Project site. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

END OF SECTION

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SECTION 01 80 00 – WEATHER DELAYS

PART 1 - GENERAL

1.1 EXTENSION OF CONTRACT TIME

- A. In the event that progress of the Work is delayed by adverse weather conditions, Contractor shall notify Owner at the end of each month in which delay occurs. When the number of weather days exceeds the number of days listed as the Standard Baseline, Contractor may submit a claim for extension of Contract Time.
- B. Contractor's sole relief for delay due to weather days will be a time extension.

1.2 STANDARD BASELINE FOR AVERAGE CLIMATIC RANGE

- A. Standard Baseline represents the normal and anticipated number of calendar days for each month during which construction activity is expected to be prevented and suspended by cause of adverse weather. Suspension of construction activity for the number of days each month as listed in the Standard Baseline is included in the Work and is not eligible for extension of Contract Time.
- B. Standard Baseline:
 - 1. Jan (4), Feb (5), Mar (5), Apr (5), May (6), Jun (4), Jul (3), Aug (4), Sep (4), Oct (4), Nov (5), Dec (5)

1.3 ADVERSE WEATHER AND WEATHER DELAY DAYS

- A. Adverse Weather is defined as the occurrence of one or more of the following conditions which prevent exterior construction activity or access to the site:
 - 1. Precipitation (rain, snow or ice) measured in excess of one-tenth inch (0.2").
 - 2. Temperatures which do not rise above 32 degrees F by 10:00am.
 - 3. Standing snow in excess of one inch (1.00").
- B. Adverse Weather may include, if appropriate, "dry-out" or "mud" days when the following conditions are met:
 - 1. There is a hindrance to site access; masonry or roofing work on the envelope of the building; site work such as excavation, backfill and footings; or site improvements such as paving.
 - 2. At a rate no greater than one make-up day for each day or consecutive days of rain beyond the standard baseline that total 1.0 inch or more.
- C. A Weather Delay Day may be counted if adverse weather prevents work on the Project for fifty percent or more of Contractor's scheduled workday.

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1.4 DOCUMENTATION AND SUBMITTALS

- A. Maintain, and submit at the appropriate time, daily job site work logs showing which construction activities have been affected by weather. Indicate the extent these construction activities have been affected.
- B. Submit actual weather data to support claim for time extension. Obtain from nearest NOAA weather station or other independently verified source approved by Owner at beginning of Project.
- C. Use Standard Baseline data provided in this Section when documenting actual delays due to weather in excess of the average climatic range.
- D. Organize claim and documentation to facilitate evaluation on a basis of calendar month periods, and submit in accordance with the procedures for claims established in the General Conditions.
- E. If an extension of the Contract Time is approved it shall be processed as a Change Order in accordance with the General Conditions. All extensions of time shall be given in calendar days.
- F. In no event will an extension of time be granted for delays that merely extend the duration of non-critical activities, or which consume only float without delaying the project completion date.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Note Used)

END OF SECTION

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SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data, concrete mix designs and submittals required by ACI 301.
- B. Ready-Mixed Concrete Producer Qualifications: ASTM C 94/C 94M.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Comply with ACI 301, "Specification for Structural Concrete," and with ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

2.2 MATERIALS

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- B. Plain Steel Wire: ASTM A 82/A 82M, as drawn.
- C. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, as drawn, flat sheet.
- D. Portland Cement: ASTM C 150, Type I.
- E. Fly Ash: ASTM C 618, Class C or F.
- F. Fine Aggregate - All Fine Aggregate shall consist of natural fresh water sand to conform to ASTM Designation C33. Fine aggregate for concrete shall be graded uniformly to conform to Paragraph 4, ASTM Designation C33.
- G. Coarse Aggregate - All Coarse Aggregate shall conform to the requirements of ASTM C33, standard grading 1" to #4.
- H. Water - Water shall be clean, free from acids, alkalis or organic materials and shall conform to the requirements of ASTM C94/C94M.
- I. Air-Entraining Admixture: ASTM C 260.
- J. Chemical Admixtures: ASTM C 494, Admixtures will only be allowed to achieve proper slump. Do not use calcium chloride or admixtures containing calcium chloride.

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- K. Vapor Retarder: Reinforced sheet, ASTM E 1745, Class A.
- L. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- M. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.
- N. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
- O. Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber, or ASTM D 1752, cork or self-expanding cork.

2.3 CONCRETE MIXTURES

- A. Prepare design mixtures, proportioned according to ACI 301.
- B. Normal-Weight Concrete:
 - 1. Minimum Compressive Strength: 4000 psi at 28 days.
 - 2. Maximum Water-Cementitious Materials Ratio: 0.40.
 - 3. Slump Limit: 6 inches, plus or minus 1 inch.
 - 4. Air Content: Maintain within range permitted by ACI 301. Do not allow air content of floor slabs to receive troweled finishes to exceed 3 percent.
 - 5. Use fly ash as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.
 - 6. For exterior concrete, limit use of fly ash to 25 percent replacement of portland cement by weight.
- C. Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M.
 - 1. When air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 CONCRETING

- A. Construct formwork according to ACI 301 and maintain tolerances and surface irregularities within ACI 347R limits of Class A, 1/8 inch for concrete exposed to view and Class B, 1/4 inch for other concrete surfaces.
- B. Place vapor retarder on prepared subgrade, with joints lapped 6 inches and sealed.

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- C. Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
- D. Install construction, isolation, and contraction joints where indicated. Install full-depth joint-filler strips at isolation joints.
- E. Place concrete in a continuous operation and consolidate using mechanical vibrating equipment.
- F. Protect concrete from physical damage, premature drying, and reduced strength due to hot or cold weather during mixing, placing, and curing.
- G. Formed Surface Finish: Smooth-formed finish for concrete exposed to view, coated, or covered by waterproofing or other direct-applied material; rough-formed finish elsewhere.
- H. Slab Finishes: Comply with ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces. Provide the following finishes:
 - 1. Float finish for surfaces to receive waterproofing, roofing, or other direct-applied material.
 - 2. Troweled finish for floor surfaces and floors to receive floor coverings, paint, or other thin film-finish coatings.
 - 3. Nonslip-broom finish to exterior concrete.
- I. Cure formed surfaces by moisture curing for at least seven days.
- J. Begin curing concrete slabs after finishing. Apply membrane-forming curing and sealing compound to concrete.
- K. Owner will engage a testing agency to perform field tests and to submit test reports.
- L. Protect concrete from damage. Repair and patch defective areas.

END OF SECTION 03 30 00

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SECTION 04 20 00 - UNIT MASONRY

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. See Section 05 50 00 "Metal Fabrications" for furnishing steel lintels and shelf angles for unit masonry.
- B. Submittals:
 - 1. Samples for decorative concrete masonry units and colored mortar.
 - 2. Material Certificates: For each type of product indicated. Include statements of material properties indicating compliance with requirements.
- C. Sample Panels: Construct a sample wall panel approximately 48 inches long by 48 inches high to demonstrate aesthetic effects and set quality standards for materials and execution.

PART 2 - PRODUCTS

2.1 UNIT MASONRY

- A. Comply with TMS 602/ACI 530.1/ASCE 6.

2.2 MASONRY UNITS

- A. Integral Water Repellent: Where indicated, concrete units shall be made with liquid polymeric, integral water repellent.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. ACM Chemistries.
 - b. GCP Applied Technologies Inc.
 - c. Master Builders Solutions.

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- B. Concrete Masonry Units: ASTM C 90; Density Classification, Medium Weight.
 - 1. Integral water repellent.
 - 2. Special shapes for lintels, corners, jambs, sash, control joints, and other special conditions.
 - 3. Bullnose units for outside corners unless otherwise indicated.

- C. Decorative Concrete Masonry Units: ASTM C 90; Density Classification, Lightweight.
 - 1. Finish: Exposed faces with split-face finish.
 - 2. Integral water repellent.
 - 3. Special shapes for lintels, corners, jambs, sash, control joints, and other special conditions.

2.3 MORTAR AND GROUT

- A. Mortar: ASTM C 270, proportion specification.
 - 1. Use portland cement-lime or masonry cement mortar.
 - 2. Do not use calcium chloride in mortar.
 - 3. For masonry below grade or in contact with earth, use Type M.
 - 4. For all other masonry, use Type S.
 - 5. Colored Mortar: For decorative concrete masonry units, use colored cement or cement-lime mix of color selected.
 - 6. Water-Repellent Additive: For mortar used with concrete masonry units made with integral water repellent, use product recommended by manufacturer of units.

- B. Grout: ASTM C 476 with a slump of 8 to 11 inches.

- C. Refractory Mortar: Ground fireclay mortar or other refractory mortar that passes ASTM C 199 test and is acceptable to authorities having jurisdiction.

2.4 REINFORCEMENT, TIES, AND ANCHORS

- A. Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60.

- B. Joint Reinforcement: ASTM A 951/A 951M.
 - 1. Coating: Hot-dip galvanized at both interior and exterior walls.
 - 2. Wire Size for Side Rods: 0.187-inch diameter.
 - 3. Wire Size for Cross Rods: 0.187-inch diameter.
 - 4. Wire Size for Veneer Ties: 0.187-inch diameter.
 - 5. For single-wythe masonry, provide either ladder design or truss design.

- C. Veneer Anchors: Stainless-steel, two-piece adjustable masonry veneer anchors that allow vertical or horizontal adjustment but resist tension and compression forces

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perpendicular to plane of wall, for attachment over sheathing to studs, and acceptable to authorities having jurisdiction.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. FERO Corporation.
 - b. Heckmann Building Products, Inc.
 - c. Hohmann & Barnard, Inc.
 - d. Wire-Bond.

2.5 EMBEDDED FLASHING MATERIALS

- A. Sheet Metal Flashing: Stainless steel, 0.0156 inch thick.
- B. Elastomeric Thermoplastic Flashing: Composite flashing product consisting of a polyester-reinforced ethylene interpolymer alloy, 0.025 inch thick, with a 0.015-inch-thick coating of adhesive. Use only where flashing is fully concealed.
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. DuPont de Nemours, Inc.
 - b. Hohmann & Barnard, Inc.
 - c. Hyload, Inc.
 - d. Mortar Net Solutions.

2.6 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded strips complying with ASTM D 1056, Grade 2A1.
- B. Preformed Control-Joint Gaskets: Designed to fit standard sash block and to maintain lateral stability in masonry wall; made from styrene-butadiene rubber or PVC.
- C. Weep Holes: Cellular-plastic extrusion, full height and width of head joint.
- D. Cavity Drainage Material: Free-draining polymer mesh, full depth of cavity with dovetail-shaped notches that prevent mortar clogging.
- E. Loose-Granular Perlite Insulation: ASTM C 549, Type II or IV.
- F. Proprietary Acidic Masonry Cleaner: Product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units.

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1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Diedrich Technologies, Inc.; a Hohmann & Barnard company.
 - b. EaCo Chem, Inc.
 - c. PROSOCO, Inc.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Cut masonry units with saw. Install with cut surfaces and, where possible, cut edges concealed.
- B. Mix units for exposed unit masonry from several pallets or cubes as they are placed to produce uniform blend of colors and textures.
- C. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.
- D. Stopping and Resuming Work: Step back units; do not tooth.
- E. Fill cores in hollow concrete masonry units with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.
- F. Build nonload-bearing interior partitions full height and install compressible filler in joint between top of partition and underside of structure above.
- G. Tool exposed joints slightly concave when thumbprint hard unless otherwise indicated.
- H. Keep cavities clean of mortar droppings and other materials during construction.
- I. Set firebox brick in full bed of refractory mortar with full head joints. Make joints approximately 1/8 inch wide and tool smooth.
- J. Set clay flue liners in full beds of refractory mortar to comply with ASTM C 1283.

3.2 LINTELS

- A. Install lintels where indicated.
- B. Minimum bearing of 8 inches at each jamb unless otherwise indicated.

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3.3 FLASHING AND WEEP HOLES

- A. Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to the downward flow of water in the wall, and where indicated.
- B. Place through-wall flashing on sloping bed of mortar and cover with mortar. Seal penetrations in flashing before covering with mortar.
 - 1. Extend flashing 4 inches into masonry at each end and turn up 2 inches to form a pan.
- C. Trim wicking material used in weep holes flush with outside face of wall after mortar has set.

3.4 PARGING

- A. Parge masonry walls, where indicated, in two uniform coats with a steel-trowel finish. Form a wash at top of parging and a cove at bottom. Damp cure parging for at least 24 hours.

3.5 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections required by authorities having jurisdiction.
 - 1. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.

3.6 CLEANING

- A. Clean masonry as work progresses. Remove mortar fins and smears before tooling joints.
- B. Final Cleaning: After mortar is thoroughly cured, clean exposed masonry.
 - 1. Wet wall surfaces with water before applying acidic cleaner, then remove cleaner promptly by rinsing thoroughly with clear water.
 - 2. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.

END OF SECTION 04 20 00

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SECTION 05 12 00 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Shop Drawings, Welding Procedure Specifications (WPSs) and mill test reports.
- B. Comply with applicable provisions of the following:
 - 1. AISC 303.
 - 2. AISC 341 and AISC 341s1.
 - 3. AISC 360.
 - 4. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Connections: Provide details of connections required by the Contract Documents to be selected or completed by structural-steel fabricator.

2.2 STRUCTURAL STEEL

- A. W-Shapes: ASTM A 992/A 992M.
- B. Channels, Angles, M, S-Shapes: ASTM A 36/A 36M.
- C. Plate and Bar: ASTM A 36/A 36M.
- D. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B, structural tubing.
- E. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.

2.3 ACCESSORIES

- A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers.

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- B. Anchor Rods: ASTM F 1554, Grade 36.
 - 1. Configuration: Hooked.
 - 2. Nuts: ASTM A 563 heavy-hex carbon steel.
 - 3. Plate Washers: ASTM A 36/A 36M carbon steel.
 - 4. Washers: ASTM F 436, Type 1, hardened carbon steel.
- C. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.
- D. Grout: ASTM C 1107, nonmetallic, shrinkage resistant, factory packaged.

2.4 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC 303 and AISC 360.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
- C. Shop Priming: Prepare surfaces according to SSPC-SP 2 or SSPC-SP 3. Shop prime steel to a dry film thickness of at least 1.5 mils. Do not prime surfaces to be embedded in concrete or mortar or to be field welded.

PART 3 - EXECUTION

3.1 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
- B. Baseplates Bearing Plates and Leveling Plates: Clean concrete and masonry surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
 - 1. Set plates for structural members on wedges, shims, or setting nuts as required.
 - 2. Weld plate washers to top of base plate.
 - 3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
 - 4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure.

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- C. Align and adjust various members forming part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
- D. Do not use thermal cutting during erection unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M.
- E. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: Snug tightened.
- F. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

END OF SECTION 05 12 00

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SECTION 06 10 00 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: ICC-ES evaluation reports for wood-preservative treated wood engineered wood products and metal framing anchors.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: Provide dressed lumber, S4S, marked with grade stamp of inspection agency.
- B. Engineered Wood Products: Acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.
 - 1. Allowable Design Stresses: Engineered wood products shall have allowable design stresses, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be demonstrated by comprehensive testing.

2.2 TREATED MATERIALS

- A. Preservative-Treated Materials: AWWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.
 - 1. Use treatment containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
 - 2. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent.
 - 3. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- B. Provide preservative-treated materials for items indicated on Drawings, and the following:
 - 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.

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2. Wood sills, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
3. Wood framing members that are less than 18 inches above the ground.
4. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 FRAMING

A. Dimension Lumber:

1. Maximum Moisture Content: 15 percent for 2-inch nominal thickness or less, 19 percent for more than 2-inch nominal thickness.
2. Non-Load-Bearing Interior Partitions: Construction or No. 2: Mixed southern pine: SPIB;
3. Framing Other Than Non-Load-Bearing Interior Partitions: No. 2: Southern pine: SPIB or Spruce-pine-fir (south): NeLMA, WCLIB, or WWPA.
4. Exposed Framing: Provide material hand-selected for uniformity of appearance and freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot-holes, shake, splits, torn grain, and wane.
 - a. Species: As specified for framing other than non-load-bearing interior partitions.
 - b. Grade: No. 1.

2.4 MISCELLANEOUS LUMBER

- A. Miscellaneous Dimension Lumber: Construction, or No. 2 grade with 15 percent maximum moisture content of any species. Provide for nailers, blocking, and similar members.
- B. Concealed Boards: Mixed southern pine, No. 2: SPIB; with 15 percent maximum moisture content.

2.5 PLYWOOD BACKING PANELS

- A. Equipment Backing Panels: Plywood, Exterior, AC, fire-retardant treated, not less than 3/4-inch nominal thickness.

2.6 MISCELLANEOUS PRODUCTS

- A. Fasteners: Size and type indicated. Where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

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1. Power-Driven Fasteners: CABO NER-272.
 2. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.
- B. Metal Framing Anchors: Structural capacity, type, and size indicated.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. MiTek Industries, Inc.
 - b. Phoenix Metal Products, Inc.
 - c. Simpson Strong-Tie Co., Inc.
 - d. Tamlyn.
 2. Use anchors made from hot-dip galvanized steel complying with ASTM A 653/A 653M, G60 coating designation for interior locations where stainless steel is not indicated.
 3. Use anchors made from stainless steel complying with ASTM A 666, Type 304 for exterior locations and where indicated.
- C. Sill Sealer: Closed-cell neoprene foam, 1/4 inch thick.
- D. Flexible Flashing: Self-adhesive product consisting of a butyl rubber or rubberized-asphalt compound, bonded to a backing sheet to produce an overall thickness of not less than 0.025 inch.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- B. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- C. Do not splice structural members between supports unless otherwise indicated.
- D. Securely attach rough carpentry to substrates, complying with the following:
 1. CABO NER-272 for power-driven fasteners.
 2. Published requirements of metal framing anchor manufacturer.

END OF SECTION 06 10 00

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SECTION 06 16 00 - SHEATHING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: ICC-ES evaluation reports for preservative-treated plywood.

PART 2 - PRODUCTS

2.1 WOOD PANEL PRODUCTS, GENERAL

- A. Plywood: DOC PS 1.
- B. Oriented Strand Board: DOC PS 2.

2.2 TREATED PLYWOOD

- A. Preservative-Treated Plywood: AWPA U1; Use Category UC2.
 - 1. Use treatment containing no arsenic or chromium.
 - 2. Kiln-dry plywood after treatment to a maximum moisture content of 15 percent.
- B. Provide preservative-treated plywood for items indicated on Drawings and plywood in contact with masonry or concrete or used with roofing, flashing, vapor barriers, and waterproofing.

2.3 WALL SHEATHING

- A. Plywood Wall Sheathing: Exposure 1 sheathing.
- B. Oriented-Strand-Board Wall Sheathing: Exposure 1 sheathing.

2.4 ROOF SHEATHING

- A. Plywood Roof Sheathing: Exterior, Structural I sheathing.
- B. Oriented-Strand-Board Roof Sheathing: Exposure 1, Structural I sheathing.

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2.5 MISCELLANEOUS PRODUCTS

- A. Fasteners: Size and type indicated.
 - 1. For roof and wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
 - 2. Power-Driven Fasteners: CABO NER-272.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Securely attach to substrates, complying with the following:
 - 1. CABO NER-272 for power-driven fasteners.
- B. Fastening Methods:
 - 1. Wall and Roof Sheathing:
 - a. Nail to wood framing.
 - b. Screw to cold-formed metal framing.

END OF SECTION 06 16 00

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SECTION 06 17 53 - SHOP-FABRICATED WOOD TRUSSES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data, Shop Drawings, structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation, and ICC-ES evaluation reports for metal plate connectors and metal truss accessories.
- B. Fabricator Qualifications: Shop that participates in a recognized quality-assurance program that complies with quality-control procedures in TPI 1 and that involves third-party inspection by an independent testing and inspecting agency acceptable to Architect and authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide metal-plate-connected wood trusses capable of withstanding design loads indicated without exceeding TPI 1 deflection limits.
- B. Comply with applicable requirements and recommendations of the following publications:
 - 1. TPI 1, "National Design Standard for Metal Plate Connected Wood Truss Construction."
 - 2. TPI DSB, "Recommended Design Specification for Temporary Bracing of Metal Plate Connected Wood Trusses."
 - 3. TPI BCSI, "Guide to Good Practice for Handling, Installing, Restraining & Bracing Metal Plate Connected Wood Trusses."
- C. Wood Structural Design Standard: Comply with applicable requirements in AF&PA's "National Design Specifications for Wood Construction" and its "Supplement."

2.2 MATERIALS

- A. Lumber: DOC PS 20 and applicable rules of lumber grading agencies certified by the American Lumber Standards Committee Board of Review, any species, graded visually or mechanically.
 - 1. Provide dry lumber with 19 percent maximum moisture content at time of dressing.

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- B. Minimum Chord Size for Roof Trusses: 2 by 6 inches nominal for both top and bottom chords.
- C. Minimum Specific Gravity for Top Chords: 0.50.
- D. Fasteners: Where trusses are exposed to weather or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- E. Metal Framing Anchors: Provide framing anchors made from hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.

2.3 FABRICATION

- A. Assemble trusses using jigs or other means to ensure uniformity and accuracy of assembly with joints closely fitted. Fabricate wood trusses within manufacturing tolerances in TPI 1.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install and brace trusses according to TPI recommendations and as indicated. Install trusses plumb, square, and true to line and securely fasten to supporting construction.
- B. Anchor trusses securely at bearing points; use metal truss tie-downs or floor truss hangers as applicable. Install fasteners through each fastener hole in metal framing anchor.
- C. Securely connect each truss ply required for forming built-up girder trusses. Anchor trusses to girder trusses.
- D. Install and fasten permanent bracing during truss erection and before construction loads are applied. Anchor ends of permanent bracing where terminating at walls or beams.
 - 1. Install bracing to comply with Section 06 10 00 "Rough Carpentry."
 - 2. Install and fasten strongback bracing vertically against vertical web of parallel-chord floor trusses at centers indicated.
- E. Install wood trusses within installation tolerances in TPI 1.
- F. Do not alter trusses in field.
- G. Remove wood trusses that are damaged or do not meet requirements and replace with trusses that do meet requirements.

END OF SECTION 06 17 53

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SECTION 06 41 16 - PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Shop Drawings Samples showing the full range of colors available for each type of finish.
- B. Installer Qualifications: Fabricator of products.
- C. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is completed, and HVAC system is operating.

PART 2 - PRODUCTS

2.1 ARCHITECTURAL CABINETS

- A. Quality Standard: AWI, AWMAC, and WI's "Architectural Woodwork Standards."
- B. Plastic-Laminate Cabinets: Custom grade.
 - 1. Type of Construction: Frameless.
 - 2. Cabinet Door and Drawer Style: Flush overlay.
 - 3. Laminate Cladding: Horizontal surfaces other than tops, Grade HGS; postformed surfaces, Grade HGP; vertical surfaces, Grade HGS; edges, Grade HGS PVC edge banding, 0.12 inch thick; semiexposed surfaces, Grade VGS.
 - 4. Drawer Sides and Backs: Thermoset decorative panels.
 - 5. Drawer Bottoms: Thermoset decorative panels.

2.2 MATERIALS

- A. Wood Moisture Content: 5 to 10 percent.
- B. Medium-Density Fiberboard: ANSI A208.2, Grade 130, made with binder containing no urea formaldehyde.
- C. Particleboard: ANSI A208.1, Grade M-2, made with binder containing no urea formaldehyde.
- D. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1, made with adhesive containing no urea formaldehyde.

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- E. High-Pressure Decorative Laminate: NEMA LD 3.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Formica Corporation.
 - b. Wilsonart LLC.

2.3 CABINET HARDWARE AND ACCESSORY MATERIALS

- A. Butt Hinges: 2-3/4-inch, five-knuckle steel hinges made from 0.095-inch-thick metal, and as follows:
 - 1. Semiconcealed Hinges for Flush Doors: BHMA A156.9, B01361.
 - 2. Semiconcealed Hinges for Overlay Doors: BHMA A156.9, B01521.
- B. Wire Pulls: Back mounted, solid metal, 4 inches long, 5/16 inch in diameter.
- C. Catches: Magnetic catches, BHMA A156.9, B03141.
- D. Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf rests, B04081.
- E. Drawer Slides: BHMA A156.9, B05091.
 - 1. Box Drawer Slides: Grade 1HD-100.
 - 2. File Drawer Slides: Grade 1HD-100.
 - 3. Pencil Drawer Slides: Grade 1.
 - 4. Keyboard Slides: Grade 1.
 - 5. Trash Bin Slides: Grade 1HD-100.
- F. Drawer Locks: BHMA A156.11, E07041.
- G. Exposed Hardware Finishes: Comply with BHMA A156.18 for BHMA code number indicated.
 - 1. Finish: Satin Chrome: BHMA 626 or BHMA 652.
- H. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to 15 percent moisture content.

2.4 FABRICATION

- A. Complete fabrication to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

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PART 3 - EXECUTION

3.1 INSTALLATION

- A. Before installation, condition cabinets to average prevailing humidity conditions in installation areas.
- B. Install cabinets to comply with referenced quality standard for grade specified.
- C. Install cabinets level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches.
- D. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Anchor cabinets to anchors or blocking built into or directly attached to substrates. Fasten with countersunk concealed fasteners and blind nailing.
- F. Cabinets: Install so doors and drawers are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation.
 - 1. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches o.c. with No. 10 wafer-head screws sized for 1-inch penetration into wood framing, blocking, or hanging strips.

END OF SECTION 06 41 16

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SECTION 07 21 00 - THERMAL INSULATION

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data and ICC-ES evaluation reports for foam-plastic insulation.
- B. Surface-Burning Characteristics: According to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

PART 2 - PRODUCTS

2.1 INSULATION PRODUCTS

- A. Closed-Cell Polyurethane Foam Insulation: ASTM C 1029, Type II, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, and minimum density of 1.5 lb/cu. ft..
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Accella Polyurethane Systems.
 - b. BASF Corporation.
 - c. Dow Chemical Company (The).
 - d. Gaco Western LLC.
 - e. Henry Company.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install insulation in areas and in thicknesses indicated or required to produce R-values indicated. Cut and fit tightly around obstructions and fill voids with insulation.
- B. Spray-Applied Insulation: Apply insulation according to manufacturer's written instructions. Do not apply insulation until installation of pipes, ducts, conduits, wiring, and electrical outlets in walls is completed and items not indicated to receive insulation are masked. After insulation is applied, make flush with face of studs.

END OF SECTION 07 21 00

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SECTION 07 41 13 - METAL ROOF PANELS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Summary: Factory-formed metal roof and soffit panels, fascia, and trim.
- B. Submittals: Product Data, Shop Drawings, and color Samples.
- C. Warranties: Manufacturer's standard written warranty, signed by manufacturer agreeing to promptly repair or replace products that fail to remain weathertight for the period of 20 years.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Energy Performance of Roof Panels: Three-year, aged, solar reflectance not less than 0.55 and emissivity not less than 0.75, or aged, Solar Reflectance Index of not less than 64.
- B. Solar Reflectance Index: Not less than 29 when calculated according to ASTM E 1980.
- C. Wind-Uplift Resistance of Roof Assemblies: UL 580, Class 90.

2.2 METAL ROOF PANELS

- A. Roof Panel Type: standing-seam metal roof panels.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Advanced Architectural Products.
 - b. Architectural Building Components.
 - c. Architectural Metal Systems.
 - d. Butler Manufacturing Company; a division of BlueScope Buildings North America, Inc.
 - e. MBCI; a division on NCI Group, Inc.
 - f. McElroy Metal, Inc.
 - g. Or approved equal

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- B. **Metallic-Coated Steel Roof Panels:** Fabricated from galvanized steel sheet, ASTM A 653/A 653M, G90, or aluminum-zinc alloy-coated steel sheet, ASTM A 792/A 792M, Class AZ50.
1. Nominal Metal Thickness: 0.028 inch.
 2. Finish: Manufacturer's standard three-coat fluoropolymer system with color coat and clear coat containing not less than 70 percent PVDF resin by weight.

2.3 ACCESSORIES

- A. Provide components required for a complete roof panel assembly, including trim, fasciae, clips, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
- B. **Flashing and Trim:** Formed from 0.025-inch nominal thickness, zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet. Provide flashing and trim as required to seal against weather and to provide finished appearance. Finish flashing and trim with same finish system as adjacent metal roof panels.
- C. **Self-Adhering Sheet Underlayment, High Temperature:** Butyl or SBS-modified asphalt; slip-resisting-polyethylene surfaced; with release-paper backing; cold applied. Stable after testing at 240 deg F and passes after testing at minus 20 deg F; ASTM D 1970.
1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
 - a. Carlisle Coatings & Waterproofing Inc.
 - b. Drexel Metals.
 - c. Henry Company.
 - d. Owens Corning.
 - e. Or approved equal
- D. **Slip Sheet:** Manufacturer's recommended slip sheet, of type required for application.
- E. **Thermal Spacer Blocks:** Fabricated from extruded polystyrene, 1 inch thick.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Apply self-adhering sheet underlayment at eaves and rakes from edges of roof to at least 36 inches inside exterior wall line.
- B. Apply self-adhering sheet underlayment at valleys extending 18 inches on each side.

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- C. Install felt underlayment on roof deck not covered by self-adhering sheet underlayment.
- D. Apply slip sheet over underlayment before installing metal roof panels.
- E. Install flashings to cover underlayment to comply with requirements specified in Section 07 62 00 "Sheet Metal Flashing and Trim."
- F. Rigidly fasten metal roof panels to structure at one and only one location for each panel. Allow remainder of panel to move freely for thermal expansion and contraction. Pre-drill panels for fasteners.
 - 1. Steel Roof Panels: Use stainless-steel fasteners for surfaces exposed to the exterior and galvanized-steel fasteners for surfaces exposed to the interior.
 - 2. Aluminum Roof Panels: Use aluminum or stainless-steel fasteners for surfaces exposed to the exterior and aluminum or galvanized-steel fasteners for surfaces exposed to the interior.
 - 3. Provide metal closures at rake edges rake walls and each side of ridge and hip caps.
 - 4. Flash and seal metal roof panels with weather closures at eaves, rakes, and perimeter of all openings.
 - 5. Install ridge and hip caps as metal roof panel work proceeds.
- G. Install gaskets, joint fillers, and sealants where required for weatherproof performance of metal roof panel assemblies. Provide types of gaskets, fillers, and sealants recommended by metal roof panel manufacturer.
- H. Separate dissimilar metals with a bituminous coating or self-adhering sheet underlayment.
- I. Coat back side of aluminum panels with bituminous coating where they will contact wood, ferrous metal, or cementitious construction.

END OF SECTION 07 41 13

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SECTION 26 05 48.16 - SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data: For each type of product.
- B. Shop Drawings: Include design calculations and details for selecting seismic restraints complying with performance requirements, design criteria, and analysis data signed and sealed by the qualified professional engineer.
 - 1. Tabulate types and sizes of seismic restraints, complete with report numbers and rated strength in tension and shear as evaluated by an agency acceptable to authorities having jurisdiction.
 - 2. Design Calculations: Calculate static and dynamic loading caused by equipment weight, operation, and seismic and wind forces required to select seismic and wind restraints and for designing vibration isolation bases.
 - 3. Design Analysis: To support selection and arrangement of seismic and wind restraints.
 - 4. Indicate fabrication and arrangement.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Wind-Restraint Loading:
 - 1. Building Classification Category: II.
 - 2. Minimum 10 lb/sq. ft. multiplied by maximum area of HVAC component projected on vertical plane normal to wind direction and 45 degrees either side of normal.
- B. Seismic-Restraint Loading:
 - 1. Site Class as Defined in the IBC: D.
 - 2. Assigned Seismic Use Group or Building Category as Defined in the IBC: II.
 - a. Component Importance Factor: 1.5.
 - b. Component Response Modification Factor: 3.5.
 - c. Component Amplification Factor: 2.5.
 - 3. Design Spectral Response Acceleration at Short Periods (0.2 Second): .
 - 4. Design Spectral Response Acceleration at 1.0-Second Period: .

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- C. Comply with NFPA 70.

2.2 RESTRAINT CHANNEL BRACINGS

- A. Description: MFMA-4, shop- or field-fabricated bracing assembly made of slotted steel channels with accessories for attachment to braced component at one end and to building structure at the other end, with other matching components, and with corrosion-resistant coating; rated in tension, compression, and torsion forces.

2.3 RESTRAINT CABLES

- A. Restraint Cables: ASTM A 603, galvanized-steel cables. End connections made of steel assemblies with thimbles, brackets, swivel, and bolts designed for restraining cable service; with a minimum of two clamping bolts for cable engagement.

2.4 SEISMIC-RESTRAINT ACCESSORIES

- A. Hanger-Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections to hanger rod.
- B. 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.
- C. 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.
- D. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.

2.5 MECHANICAL ANCHOR BOLTS

- A. Mechanical Anchor Bolts: 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 required for anchor and as tested according to ASTM E 488.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Examine areas and equipment to receive seismic-control devices for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

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- B. Install seismic-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction providing required submittals for component.
- C. Where not indicated, select sizes of components so strength will be adequate to carry present and future static and seismic loads within specified loading limits.
- D. Coordinate the location of embedded connection hardware with supported equipment attachment and mounting points and with requirements for concrete reinforcement and formwork specified in Section 03 30 00 "Cast-in-Place Concrete."
- E. Install cables so they do not bend across edges of adjacent equipment or building structure.
- F. 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.
- G. 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.
- H. 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.
- I. Seismic controls will be considered defective if they do not pass tests and inspections.
- J. Prepare test and inspection reports.

END OF SECTION 26 05 48.16

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SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data, Shop Drawings, and color Samples.
- B. Coordinate installation of sheet metal flashing and trim with adjoining roofing and wall materials, joints, and seams to provide a leakproof, secure, and noncorrosive installation.
- C. Fabricator Qualifications: For copings and low-slope roof edge flashings that are SPRI ES-1 tested and FM Approvals approved, shop shall be listed as able to fabricate required details as tested and approved.
- D. Warranty on Finishes: Manufacturer agrees to repair or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within 20 years.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless otherwise indicated. Conform to dimensions and profiles shown unless more stringent requirements are indicated.
- B. FM Approvals' Listing: Manufacture and install copings that are listed in FM Approvals' "RoofNav" and approved for windstorm classification, Class 1-90. Identify materials with name of fabricator and design approved by FM Approvals.

2.2 SHEET METAL

- A. Aluminum Sheet: ASTM B 209, alloy as standard with manufacturer for finish required, not less than 0.032 inch thick; finished as follows:
 - 1. Finish: Manufacturer's standard three-coat fluoropolymer system with color coat and clear coat containing not less than 70 percent PVDF resin by weight.
 - 2. Concealed Finish: Manufacturer's standard white or light-colored acrylic or polyester backer finish.

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- B. **Metallic-Coated Steel Sheet:** Galvanized steel sheet, ASTM A 653/A 653M, G90, or aluminum-zinc alloy-coated steel sheet, ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40; 0.028-inch nominal thickness.
 - 1. **Finish:** Manufacturer's standard three-coat fluoropolymer system with color coat and clear coat containing not less than 70 percent PVDF resin by weight.
 - 2. **Concealed Finish:** Manufacturer's standard white or light-colored acrylic or polyester backer finish.

2.3 ACCESSORIES

- A. **Self-Adhering, High-Temperature Sheet Underlayment:** Butyl or SBS-modified asphalt; slip-resisting-polyethylene surfaced; with release paper backing; cold applied. Stable after testing at 240 deg F and passes after testing at minus 20 deg F; ASTM D 1970.
- B. **Slip Sheet:** Rosin-sized building paper, 3-lb/100 sq. ft. minimum.
- C. **Fasteners:** Wood screws, annular-threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners.
 - 1. **Exposed Fasteners:** Heads matching color of sheet metal roofing using plastic caps or factory-applied coating.
 - 2. **Spikes and Ferrules:** Same material as gutter; with spike with ferrule matching internal gutter width.
 - 3. **Fasteners for Aluminum Sheet:** Aluminum or Series 300 stainless steel.
 - 4. **Fasteners for Metallic-Coated Steel Sheet:** Hot-dip galvanized steel or Series 300 stainless steel.
- D. **Butyl Sealant:** ASTM C 1311, solvent-release butyl rubber sealant.
- E. **Bituminous Coating:** Cold-applied asphalt emulsion complying with ASTM D 1187.

2.4 FABRICATION

- A. **Fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to the design, dimensions, geometry, metal thickness, and other characteristics of item indicated.**
- B. **Expansion Provisions:** Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
- C. **Fabrication Tolerances:** Fabricate sheet metal flashing and trim that are capable of installation to tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

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PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with cited sheet metal standards. Allow for thermal expansion; set true to line and level. Install Work with laps, joints, and seams permanently watertight and weatherproof; conceal fasteners where possible.
- B. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.
- C. Seams: Fabricate nonmoving seams with flat-lock seams. For aluminum, form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
- D. Metal Protection: Where dissimilar metals contact each other, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating.
 - 1. Coat concealed side of aluminum with bituminous coating where it contacts wood, ferrous metal, or cementitious construction.

END OF SECTION 07 62 00

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SECTION 07 71 00 - ROOF SPECIALTIES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data, Shop Drawings, and color Samples.
- B. Warranties: Provide manufacturer's standard written warranty, without monetary limitation, signed by manufacturer agreeing to promptly repair or replace roof specialties that show evidence of deterioration of factory-applied finishes for the period of 20 years.

PART 2 - PRODUCTS

2.1 ROOF SPECIALTIES

- A. Gutters and Downspouts:
 - 1. Gutters: Manufactured in uniform section lengths, with matching corner units, ends, outlet tubes, and other accessories. Elevate back edge at least 1 inch above front edge. Furnish expansion joints and expansion-joint covers.
 - a. Gutter Style: Rectangular.
 - b. Prepainted, Zinc-Coated Steel: 0.034 inch thick.
 - c. Gutter Supports: Gutter brackets with finish matching the gutters.
 - 2. Downspouts: Plain rectangular with mitered elbows. Furnish wall brackets of same material and finish as downspouts, with anchors.
 - a. Prepainted, Zinc-Coated Steel: 0.034 inch thick.

2.2 MATERIALS

- A. Prepainted, Zinc-Coated Steel Sheet: ASTM A 653/A 653M, G90 coating designation. Prepare, pretreat, and apply coating to comply with ASTM A 755/A 755M.
 - 1. Finish: Manufacturer's standard three-coat fluoropolymer system with color coat and clear coat containing not less than 70 percent PVDF resin by weight; complying with AAMA 621.
- B. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to meet performance requirements.

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1. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Series 300 stainless steel or hot-dip zinc-coated steel.
- C. Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install roof specialties according to manufacturer's written instructions. Anchor roof specialties securely in place, with provisions for thermal and structural movement.
- B. Separate dissimilar metals with a bituminous coating or polymer-modified, bituminous sheet underlayment.
- C. Space movement joints at a maximum of 12 feet with no joints within 18 inches of corners or intersections unless indicated.
- D. Fastener Sizes: Use fasteners of sizes that will penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.
- E. Gutters: Join and seal gutter lengths. Allow for thermal expansion. Attach gutters to firmly anchored gutter supports spaced not more than 24 inches apart. Attach ends with rivets and seal with sealant to make watertight. Slope to downspouts.
- F. Downspouts: Join sections with manufacturer's standard telescoping joints. Provide hangers with fasteners designed to hold downspouts securely to walls and 1 inch away from walls; locate fasteners at top and bottom and at approximately [60 inches] o.c.

END OF SECTION 07 71 00

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SECTION 07 72 53 - SNOW GUARDS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data, Shop Drawings, and Samples.

PART 2 - PRODUCTS

2.1 RAIL-TYPE SNOW GUARDS

- A. Seam-Mounted, Rail-Type Snow Guards:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Alpine SnowGuards, a division of Vermont Slate & Copper Services, Inc.
 - b. LMCurbs.
 - c. S-5! Metal Roof Innovations, Ltd.
 - d. Snow Management Systems.
 - e. TRA Snow and Sun, Inc.
 - f. Or approved equal
 2. Description: Brackets with one rail.
 3. Material and Finish: Aluminum; clear anodized.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Attachment for Standing-Seam Metal Roofing:
1. Do not use fasteners that penetrate metal roofing.
 2. Seam-Mounted, Rail-Type Snow Guards: Stainless-steel clamps attached to vertical ribs of standing-seam metal roof panels.

END OF SECTION 07 72 53

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SECTION 07 92 00 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data and color Samples.
- B. Environmental Limitations: Do not proceed with installation of joint sealants when ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS

- A. Compatibility: Provide joint sealants, joint fillers, and other related materials that are compatible with one another and with joint substrates under service and application conditions.
- B. Sealant for Use in Building Expansion Joints, One of the Following:
 - 1. Single-component, neutral-curing silicone sealant, ASTM C 920, Type S; Grade NS; Class 50; for Use NT.
 - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1) GE Construction Sealants; Momentive Performance Materials Inc.
 - 2) Sika Corporation; Joint Sealants.
 - 3) The Dow Chemical Company.
 - 2. Single-component, neutral-curing silicone sealant, ASTM C 920, Type S; Grade NS; Class 100/50; for Use NT.
 - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1) GE Construction Sealants; Momentive Performance Materials Inc.

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- C. Sealant for General Exterior Use Where Another Type Is Not Specified, One of the Following:
1. Single-component, nonsag urethane sealant, ASTM C 920, Type S; Grade NS; Class 25; and for Use NT.
 - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1) BASF Corporation.
 - 2) Bostik, Inc.
 - 3) Polymeric Systems, Inc.
 - 4) Sherwin-Williams Company (The).
 - 5) Sika Corporation; Joint Sealants.
 - 6) Tremco Incorporated.
 2. Single-component, nonsag polysulfide sealant, ASTM C 920, Type S; Grade NS; Class 25; for Use NT.
 - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1) W.R. Meadows, Inc.
 3. Single-component, pourable urethane sealant, ASTM C 920, Type S; Grade P; Class 25; for Use T.
 - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1) BASF Corporation.
 - 2) Permthane®/Acryl-R®; ITW Polymers Sealants North America.
 - 3) Polymeric Systems, Inc.
 - 4) Sherwin-Williams Company (The).
- D. Sealant for Use in Interior Joints in Ceramic Tile and Other Hard Surfaces in Kitchens and Toilet Rooms and around Plumbing Fixtures:
1. Single-component, mildew-resistant silicone sealant, ASTM C 920, Type S; Grade NS; Class 25; for Use NT; formulated with fungicide.
 - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

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- 1) Adfast.
- 2) The Dow Chemical Company.
- 3) Tremco Incorporated.

E. Sealant for Interior Use at Perimeters of Door and Window Frames:

1. Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.
 - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1) Pecora Corporation.
 - 2) Sherwin-Williams Company (The).
 - 3) Tremco Incorporated.

F. Acoustical Sealant:

1. Nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 that effectively reduces airborne sound transmission as demonstrated by testing according to ASTM E 90.
 - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1) GE Construction Sealants; Momentive Performance Materials Inc.
 - 2) Hilti, Inc.
 - 3) Pecora Corporation.
 - 4) Specified Technologies, Inc.
 - 5) Tremco Incorporated.
 - 6) USG Corporation.

2.2 MISCELLANEOUS MATERIALS

- A. Provide sealant backings of materials that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

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- D. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with ASTM C 1193.
- B. Install sealant backings to support sealants during application and to produce cross-sectional shapes and depths of installed sealants that allow optimum sealant movement capability.
- C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- D. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, seal perimeters, control joints, openings, and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions. Comply with ASTM C 919.

END OF SECTION 07 92 00

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SECTION 08 11 13 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data and Shop Drawings.

PART 2 - PRODUCTS

2.1 HOLLOW METAL DOORS AND FRAMES

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
1. Amweld International, LLC.
 2. Ceco Door; ASSA ABLOY.
 3. Curries Company; ASSA ABLOY.
 4. Pioneer Industries.
 5. Steelcraft; an Allegion brand.
 6. Windsor Door.
- B. Doors: Complying with SDI A250.8 for level and model and SDI A250.4 for physical-endurance level indicated, 1-3/4 inches thick unless otherwise indicated.
1. Interior Doors: Level 2 and Physical Performance Level B (Heavy Duty), Model 1 (Full Flush).
 2. Exterior Doors: Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 1 (Full Flush), metallic-coated steel sheet faces.
 - a. Thermal-Rated (Insulated) Doors: Where indicated, provide doors with thermal-resistance value (R-value) of not less than 2.1 deg F x h x sq. ft./Btu when tested according to ASTM C 1363.
 3. Hardware Reinforcement: Fabricate according to SDI A250.6 with reinforcement plates from same material as door face sheets.
- C. Frames: ANSI A250.8; conceal fastenings unless otherwise indicated.
1. Steel Sheet for Interior Frames: 0.053-inch-minimum thickness.
 2. Steel Sheet for Exterior Frames: 0.067-inch-minimum thickness, metallic coated.
 3. Interior Frame Construction: Full profile welded.

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4. Exterior Frame Construction: Full profile welded.
 5. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as frames.
 6. Frame Anchors: Not less than 0.042 inch thick.
- D. Glazing Stops: Nonremovable stops on outside of exterior doors and on secure side of interior doors; screw-applied, removable, glazing stops on inside, fabricated from same material as door face sheet in which they are installed.
- E. Door Silencers: Three on strike jambs of single-door frames and two on heads of double-door frames.
- F. Grout Guards: Provide where mortar might obstruct hardware operation.
- G. Prepare doors and frames to receive mortised and concealed hardware according to SDI A250.6 and BHMA A156.115.
- H. Reinforce doors and frames to receive surface-applied hardware.
- I. Prime Finish: Manufacturer's standard, factory-applied coat of lead- and chromate-free primer complying with SDI A250.10 acceptance criteria.

2.2 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, free of scale, pitting, or surface defects.
- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, G60 or A60.
- D. Frame Anchors: ASTM A 879/A 879M, 4Z coating designation; mill phosphatized.
 1. For anchors built into exterior walls, sheet steel complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.
- E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

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PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install hollow metal frames to comply with SDI A250.11.
 - 1. Fire-Rated Frames: Install according to NFPA 80.
- B. Install doors to provide clearances between doors and frames as indicated in SDI A250.11.
- C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying rust-inhibitive primer. Use galvanizing repair paint for metallic coated surfaces.

END OF SECTION 08 11 13

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SECTION 08 14 16 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data and Shop Drawings.

PART 2 - PRODUCTS

2.1 FLUSH WOOD DOORS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. ABS- American Building Supply- Doormerica.
2. Graham Wood Doors; ASSA ABLOY Group company.
3. Haley Brothers, Inc.
4. Mohawk Flush Doors, Inc.
5. Oregon Door.
6. Poncraft Door Company.

2.2 DOOR CONSTRUCTION, GENERAL

- A. Quality Standard: WDMA I.S.1-A.
- B. Low-Emitting Materials: Provide doors made with adhesives and composite wood products that do not contain urea formaldehyde.
- C. WDMA I.S.1-A Performance Grade:
 1. Heavy duty unless otherwise indicated.
- D. Particleboard-Core Doors: Provide blocking in particleboard cores or provide structural composite lumber cores instead of particleboard cores for doors with exit devices or protection plates.
- E. Mineral-Core Doors: Provide the following:
 1. Composite blocking where required to eliminate through-bolting hardware.
 2. Laminated-edge construction.
 3. Formed-steel edges and astragals for pairs of doors.

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2.3 FLUSH WOOD DOORS

- A. Veneer-Faced Doors for Transparent Finish:
 - 1. Interior Solid-Core Doors: Custom grade, seven-ply, particleboard cores.
 - a. Faces: Grade A rotary-cut select white birch.
 - b. Veneer Matching: Pleasing match.
 - c. Pair matching and set matching.
 - d. Continuous matching for doors with transoms.

2.4 LIGHT FRAMES

- A. Light Frames: primed steel frames.

2.5 FABRICATION AND FINISHING

- A. Factory-fit doors to suit frame-opening sizes indicated and to comply with clearances specified.
- B. Factory-machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3.
- C. Cut and trim openings to comply with referenced standards.
 - 1. Trim light openings with moldings indicated.
 - 2. Factory-install glazing in doors indicated to be factory finished.
 - 3. Factory-install louvers in prepared openings.
- D. Factory-finish doors indicated for transparent finish with stain and manufacturer's standard finish complying with WDMA TR-6, catalyzed polyurethane for grade specified for doors.
 - 1. Sheen: Satin.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install doors to comply with manufacturer's written instructions and WDMA I.S.1-A, and as indicated.
- B. Align and fit doors in frames with uniform clearances and bevels. Machine doors for hardware. Seal cut surfaces after fitting and machining.

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C. Clearances: As follows unless otherwise indicated:

1. 1/8 inch at heads, jambs, and between pairs of doors.
2. 1/8 inch from bottom of door to top of decorative floor finish or covering.
3. 1/4 inch from bottom of door to top of threshold.
4. Comply with NFPA 80 for fire-rated doors.

END OF SECTION 08 14 16

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SECTION 08 33 23 - OVERHEAD COILING DOORS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data, Shop Drawings, manufacturer's color charts, and maintenance data.

PART 2 - PRODUCTS

2.1 DOOR ASSEMBLY

- A. Manufacturers: One of the following:
1. ACME Rolling Doors.
 2. ASTA Door Corporation.
 3. Cookson Company, Inc. (The).
 4. McKeon Door Company.
 5. Metro Door, Inc.
 6. Overhead Door Corporation.
 7. QMI Security Solutions.
 8. Raynor.
 9. Southwestern Rolling Steel Doors; a division of Hollywood Overhead Door Company of Dallas, Inc.
 10. Wayne-Dalton Corp.
- B. Description: Insulated service door.
1. Operation Cycles: Not less than 50,000.
- C. Structural Performance, Exterior Doors: Capable of withstanding 20 lbf/sq. ft. design wind load.
- D. Windborne-Debris Impact Resistance: Provide glazed and impact-protective overhead coiling doors that pass missile-impact and cyclic-pressure tests according to ASTM E 1996 for Wind Zone 4.
- E. Curtain Material and Finish: Galvanized steel with baked-enamel or powder-coated finish; color as selected by Architect from manufacturer's full range.

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- F. Curtain Slats: Flat-profile, insulated slats with solid surface.
 - 1. Insulated-Slat Interior Facing: Metal.
- G. Hood: Match curtain material and finish.
- H. Manual Door Operator: Chain-hoist operator.
- I. Electric Door Operator: Heavy-duty operator with control station interior mounted and keyed push button control on the exterior.
 - 1. Safety: Listed according to UL 325 by a qualified testing agency for commercial or industrial use; moving parts of operator enclosed or guarded if exposed and mounted at 8 feet or lower.
 - 2. Emergency Manual Operation: Chain hoist.
 - 3. Obstruction Detection Device: Automatic electric sensor edge on bottom bar.
- J. Guide Tracks, Supports, and Hardware: Manufacturer's standard.
- K. Curtain Accessories: Equip door with weatherseals automatic closing device.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install door, track, and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports.
- B. Accessibility: Install doors, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.
- C. Install fire-rated doors according to NFPA 80.
- D. Power-Operated Doors: Install automatic garage door openers according to UL 325.
- E. Test and adjust controls and safeties.

END OF SECTION 08 33 23

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SECTION 08 51 13 - ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data, Shop Drawings, and color Samples.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. All Seasons Window & Door Mfg.; All Seasons Commercial Division, Inc.
 2. EFCO Corporation.
 3. Graham Architectural Products Corporation.
 4. Kawneer North America, an Arconic company.
 5. Quaker Windows Products Co.
 6. Thermal Windows, Inc.
 7. TRACO.
 8. Winco Manufacturing Co.
 9. YKK AP America Inc.

2.2 PERFORMANCE REQUIREMENTS

- A. Product Standard: AAMA/WDMA/CSA 101/I.S.2/A440.
1. Window Certification: AMMA certified with label attached to each window.
 2. Performance Class: LC.
 3. Performance Grade: 30.
- B. Thermal Transmittance: NFRC 100 maximum whole-window U-factor of 0.35 Btu/sq. ft. x h x deg F.
- C. Solar Heat-Gain Coefficient (SHGC): NFRC 200 maximum whole-window SHGC of 0.35.
- D. Windborne-Debris Resistance: Windows pass basic-protection testing requirements in ASTM E 1996 for Wind Zone 4 when tested according to ASTM E 1886.

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2.3 ALUMINUM WINDOWS

- A. Window Types: As indicated on Drawings.
- B. Construction: Provide units with a concealed, thermal break.
- C. Finish: Baked-enamel finish, complying with AAMA 2603.
- D. Trim: Provide indicated trim, matching material and finish of frame members.
- E. Equip units with vinyl-coated, glass-fiber mesh insect screens at operable sashes.
- F. Glaze units with tinted, low-E-coated, argon-filled, sealed insulating glass, complying with Section 08 80 00 "Glazing."

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Set units level, plumb, and true to line, without warp or rack of frames and panels. Provide proper support and anchor securely in place.
- B. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E 2112.
- C. Set sill members in bed of sealant or with gaskets, as indicated, to provide weathertight construction.
- D. Adjust operating panels, screens, and hardware to provide a tight fit at contact points and weather stripping for smooth operation and weathertight closure. Lubricate hardware and moving parts.
- E. Clean glass and aluminum surfaces immediately after installing windows. Remove nonpermanent labels from glass surfaces.

END OF SECTION 08 51 13

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SECTION 08 71 00 - DOOR HARDWARE

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Hardware schedule and keying schedule.

PART 2 - PRODUCTS

2.1 HARDWARE

A. Hinges:

1. Stainless-steel hinges with stainless-steel pins for exterior.
2. Nonremovable hinge pins for exterior and public interior exposure.
3. Ball-bearing hinges.
4. Three hinges for 1-3/4-inch-thick doors 90 inches or less in height; four hinges for doors more than 90 inches in height.

B. Locksets and Latchsets:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Schlage; an Allegion brand.
 - b. Or approved equal.
2. BHMA A156.2, Series 4000, Grade 1 for bored locks and latches.
3. BHMA A156.3, Grade 1 for exit devices.
4. BHMA A156.5, Grade 1 for auxiliary locks.
5. BHMA A156.12, Series 5000, Grade 1 for interconnected locks and latches.
6. BHMA A156.13, Series 1000, Grade 1 for mortise locks and latches.
7. Lever handles on locksets and latchsets, Schlage Saturn Series.
8. Provide trim on exit devices matching locksets.

C. Key locks to Owner's new master-key system.

1. Cylinders with six-pin tumblers.
2. Provide cylinders for overhead doors, storefront doors, and other locking doors that do not require other hardware.
3. Provide construction keying.
4. Provide key control system, including cabinet.

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D. Closers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Arrow USA; an ASSA ABLOY Group company.
 - b. Falcon; an Allegion Brand.
 - c. LCN; an Allegion brand.
 - d. Norton Door Controls; an ASSA ABLOY Group company.
 - e. Rixson Specialty Door Controls; an ASSA ABLOY Group company.
 - f. SARGENT Manufacturing Company; ASSA ABLOY.
 - g. Yale Security Inc; an ASSA ABLOY Group company.
2. Mount closers on interior side (room side) of door opening. Provide regular-arm, parallel-arm, or top-jamb-mounted closers as necessary.
3. Adjustable delayed opening (accessible to people with disabilities) feature on closers.

E. Provide wall stops or floor stops for doors without closers.

F. Hardware Finishes:

1. Hinges: Matching finish of lockset/latchset.
2. Locksets, Latchsets, and Exit Devices: Satin chrome plated;.
3. Closers: Matching finish of lockset/latchset.
4. Other Hardware: Matching finish of lockset/latchset.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Mount hardware in locations required to comply with governing regulations and according to SDI A250.8 and DHI WDHS.3.
- B. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet.
- C. Deliver keys to Owner.

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3.2 HARDWARE SCHEDULE

- A. Hardware Set No. 1:
 - 1. Hinges.
 - 2. Entry lock.
 - 3. Closer.
 - 4. Threshold and weather stripping.

- B. Hardware Set No. 2:
 - 1. Hinges.
 - 2. Passage set.
 - 3. Closer.

- C. Hardware Set No. 3:
 - 1. Hinges.
 - 2. Privacy set.

- D. Hardware Set No. 4:
 - 1. Hinges.
 - 2. Entry lock.

- E. Hardware Set No. 5:
 - 1. Cylinder

END OF SECTION 08 71 00

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SECTION 08 80 00 - GLAZING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data and Samples.

PART 2 - PRODUCTS

2.1 GLASS, GENERAL

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.
 - 1. GANA Publications: "Laminated Glazing Reference Manual" and "Glazing Manual."
 - 2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR A7, "Sloped Glazing Guidelines."
 - 3. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Guidelines for Sloped Glazing."
 - 4. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
- B. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.
- C. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- D. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.
- E. Windborne-Debris-Impact Resistance: Exterior glazing shall comply with basic-protection testing requirements in ASTM E 1996 for Wind Zone 4 when tested according to ASTM E 1886. Test specimens shall be no smaller in width and length than glazing indicated for use on Project and shall be installed in same manner as glazing indicated for use on Project.

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1. Large-Missile Test: For glazing located within 30 feet of grade.
2. Small-Missile Test: For glazing located more than 30 feet above grade.

2.2 GLASS PRODUCTS

- A. Annealed Float Glass: ASTM C 1036, Type I, Quality-Q3.
- B. Fully Tempered Float Glass: ASTM C 1048, Kind FT; Type I; Quality-Q3.
- C. Heat-Strengthened Float Glass: ASTM C 1048, Kind HS; Type I; Quality-Q3.
- D. Reflective-Coated Glass: ASTM C 1376, coated by pyrolytic process.
- E. Patterned Glass: ASTM C 1036, Type II, Form 3; Quality-Q6.
- F. Tempered Patterned Glass: ASTM C 1048, Kind FT, Type II, Form 3; Quality-Q6.
- G. Laminated Glass: ASTM C 1172, and complying with testing requirements in 16 CFR 1201 for Category II materials.
- H. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190.

2.3 GLAZING SEALANTS

- A. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use NT.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Bostik, Inc.
 - b. GE Construction Sealants; Momentive Performance Materials Inc.
 - c. Polymeric Systems, Inc.
 - d. Sika Corporation.
 - e. The Dow Chemical Company.
 - f. Tremco Incorporated.
- B. Low-Emitting Materials: Sealants shall have a VOC content of not more than 250 g/L.
- C. Low-Emitting Materials: Sealants shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

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PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with combined recommendations of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are contained in GANA's "Glazing Manual."
- B. For fire-protection-rated glazing, use methods approved by testing agencies that listed and labeled products.
- C. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- D. Remove nonpermanent labels, and clean surfaces immediately after installation.

3.2 MONOLITHIC-GLASS TYPES

- A. Glass Type: Clear fully tempered float glass.
 - 1. Thickness: 1/4".
 - 2. Safety glazing required.

3.3 INSULATING-GLASS TYPES

- A. Glass Type: Low-E-coated, clear insulating glass.
 - 1. Overall Unit Thickness: 1 inch.
 - 2. Thickness of Each Glass Lite: 1/4".
 - 3. Outdoor Lite: Fully tempered float glass.
 - 4. Interspace Content: Argon.
 - 5. Indoor Lite: Fully tempered float glass.
 - 6. Safety glazing required.

END OF SECTION 08 80 00

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SECTION 09 22 26 – DRYWALL GRID SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes: Metal suspension system for the support of gypsum drywall in ceiling, a soffit installation for interior and exterior finishes.

1.2 SUBMITTALS

- A. Product Data:
 - 1. Submit manufacturer's technical data for each type of Metal Framing system required.
- B. Samples:
 - 1. Metal Framing System, including main runner and 4 foot cross tees.
- C. Shop Drawings:
 - 1. Layout and details of Metal Framing System. Show locations of items which are to be coordinated with, or supported by the metal suspension system.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project.
- B. Pre-installation Meetings: Conduct pre-installation meeting to verify project requirements, substrate conditions, and manufacturer's installation instructions.
- C. Fire Resistance Characteristics: For fire-resistance-rated assemblies that incorporate Metal framing systems provide materials and construction identical to those tested in fire resistance assembly as indicated in the construction documents and or architectural plans in accordance with ASTM E119.

1.4 PRODUCT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

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1.5 WARRANTY

- A. Acoustical Panel: Submit a written warranty executed by the manufacturer, agreeing to repair or replace panels that fail within the warranty period. Failures include, but are not limited to the following:
 - 1. Acoustical Panels: Sagging and warping
 - 2. Grid System: Rusting and manufacturer's defects
- B. Warranty Period:
 - 1. Grid: One (1) year from date of substantial completion
- C. The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Suspension Systems
 - 1. Armstrong World Industries, Inc.
 - 2. Or approved equal
- B. Aluminum Custom Perimeter Trim Extruded
 - 1. Armstrong World Industries, Inc.
 - 2. Or approved equal
- C. Perimeter Systems
 - 1. Armstrong World Industries, Inc.
 - 2. Or approved equal

2.2 DRYWALL SUSPENSION SYSTEMS

- A. Armstrong Drywall Suspension Systems all main beams and cross tees shall be commercial quality hot-dipped galvanized steel
 - 1. Tee: manufactured main beam- 1-1/2" knurled face with ScrewStop™ reverse hem by 1-11/16 inches high. Drywall Main Beams are factory punched with crosstee routs and hanger wire holes and SuperLock™ main beam clip for a strong secure connection and fast accurate alignment. Both ShortSpan and Drywall Main Beams are Heavy-duty performance per ASTM C635.

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2. Cross Tees: manufactured main beam- 1-1/2" knurled face with ScrewStop™ reverse hem by 1-1/2 inches high with factory punched cross tee routs and hanger wire holes and XL stake on clip for a strong secure connection.
3. Wall Molding: 12ft reverse angle molding.
4. Hanger wire: a Class 1 zinc coating, soft temper, pre-stretched, with a yield stress load of at least time three times the design load, but not less than 12-gauge.
5. Material Ingredient Transparency: Health Product Declaration (HPD); Declare Label
6. Life Cycle Assessment: Third Party Certified Environmental Product Declaration (EPD)

2.3 [SYSTEM] [ASSEMBLY] DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. <Insert name> [Compliance] [Standard]: Fabricate and label <Insert product> to comply with <Insert code, regulation, or standard>.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Prior to installation, inspect previous work of all other trades. Verify that all work is complete and accurate to the point where this installation may properly proceed in strict accordance with framing shop drawings.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Installation: In accordance with all approved plans, details, and manufacturer's installation guidelines located in the Armstrong Drywall Grid Systems and ShortSpan Installation Guides.
 1. Install seismic components for seismic class D.

END OF SECTION

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SECTION 09 29 00 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: Provide materials and construction identical to those tested in assemblies per ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
- B. STC-Rated Assemblies: Provide materials and construction identical to those tested in assemblies per ASTM E 90 and classified per ASTM E 413 by a qualified independent testing and inspecting agency.

2.2 PANEL PRODUCTS

- A. Provide in maximum lengths available to minimize end-to-end butt joints.
- B. Interior Gypsum Board: ASTM C 1396/C 1396M, in thickness indicated, with manufacturer's standard edges. Regular type unless otherwise indicated.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. American Gypsum.
 - b. CertainTeed Gypsum.
 - c. Georgia-Pacific Gypsum LLC.
 - d. National Gypsum Company.
 - e. USG Corporation.
- C. Water-Resistant Gypsum Backing Board: ASTM C 1396/C 1396M, in thickness indicated. Regular type unless otherwise indicated.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. American Gypsum.

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- b. CertainTeed Gypsum.
- c. Georgia-Pacific Gypsum LLC.
- d. National Gypsum Company.
- e. USG Corporation.

2.3 ACCESSORIES

- A. Trim Accessories: ASTM C 1047, formed from galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet. For exterior trim, use accessories formed from hot-dip galvanized-steel sheet, plastic, or rolled zinc.
 - 1. Provide bullnose cornerbead at outside corners unless otherwise indicated.
 - 2. Provide LC-bead (J-bead) at exposed panel edges.
 - 3. Provide control joints where indicated.
- B. Aluminum Accessories: Extruded-aluminum accessories indicated with manufacturer's standard corrosion-resistant primer.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. ClarkDietrich.
 - b. Fry Reglet Corporation.
 - c. Gordon, Inc.
 - d. Pittcon Industries.
 - e. Tamlyn.
- C. Joint-Treatment Materials: ASTM C 475/C 475M.
 - 1. Joint Tape: Paper unless otherwise recommended by panel manufacturer.
 - 2. Joint Compounds: Setting-type compounds.
 - 3. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound.
- D. Acoustical Sealant for Exposed and Concealed Joints: Nonsag, paintable, nonstaining latex sealant complying with ASTM C 834.
- E. Sound-Attenuation Blankets: ASTM C 665, Type I (unfaced).
- F. Textured Finish: Acoustical finish where indicated. Acoustical orange peel.

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PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install gypsum board to comply with ASTM C 840.
 - 1. Isolate gypsum board assemblies from abutting structural and masonry work. Provide edge trim and acoustical sealant.
 - 2. Single-Layer Fastening Methods: Fasten gypsum panels to supports with screws.

- B. Finishing Gypsum Board: ASTM C 840.
 - 1. At concealed areas, unless a higher level of finish is required for fire-resistance-rated assemblies, provide Level 1 finish: Embed tape at joints.
 - 2. At substrates for tile, provide Level 2 finish: Embed tape and apply separate first coat of joint compound to tape, fasteners, and trim flanges.
 - 3. Unless otherwise indicated, provide Level 4 finish: Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges.
 - 4. Provide Level 5 finish: Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges. Apply skim coat to entire surface.

- C. Texture Finish Application: Mix and apply finish using powered spray equipment, to produce a uniform texture free of starved spots or other evidence of thin application or of application patterns.

END OF SECTION 09 29 00

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SECTION 09 51 13 - ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data and Samples.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Standard: Acoustical panel ceiling shall withstand the effects of earthquake motions determined according to ASCE/SEI 7 for seismic class D.
- B. Fire-Resistance-Rated Assemblies: Provide materials and construction identical to those tested in assemblies per ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

2.2 MANUFACTURERS

- A. Ceiling Panels
 - 1. Armstrong World Industries, Inc.
 - 2. Certainteed Corp.
 - 3. Or approved equal.
- B. Suspension System
 - 1. Armstrong World Industries, Inc.
 - 2. Certainteed Corp.
 - 3. Or approved equal.
- C. Perimeter Systems
 - 1. Armstrong World Industries, Inc.
 - 2. Certainteed Corp.
 - 3. Or approved equal.

2.3 ACOUSTICAL PANELS

- A. Acoustical Ceiling Panels Type AP

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1. Surface Texture: Medium
2. Composition: Mineral Fiber
3. Color: White
4. Size: 24IN x 24IN
5. Edge Profile: Angled Tegular 15/16IN for interface with Prelude XL 15/16" Exposed Tee grid.
6. Noise Reduction Coefficient(NRC): ASTM C 423; Classified with UL label on product carton 0.55.
7. Ceiling Attenuation Class (CAC) : ASTM C 1414; Classified with UL label on product carton 33.
8. Flame Spread: ASTM E 1264; Class A (UL)
9. Light Reflectance White Panel: ASTM E 1477; 0.82
10. Dimensional Stability: Standard
11. Recycle Content: Post-Consumer - 1% - 8% Pre-Consumer Waste - 22% - 40%.
12. Acceptable Product: Cortega Lay-In, 704 as manufactured by Armstrong World Industries.

2.4 METAL SUSPENSION SYSTEMS

- A. Components: Main beams and cross tees, base metal and end detail, fabricated from commercial quality hot dipped galvanized steel complying with ASTM A 653. Main beams and cross tees are double-web steel construction with exposed flange design. Exposed surfaces chemically cleansed, capping prefinished galvanized steel in baked polyester paint. Main beams and cross tees shall have rotary stitching.
 1. Structural Classification: ASTM C 635 Intermediate Duty
 2. Color: White and match the actual color of the selected ceiling tile, unless noted otherwise.
 3. Acceptable Product: Prelude XL 15/16" Exposed Tee as manufactured by Armstrong World Industries
- B. Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.
- C. Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft annealed, with a yield stress load of at least time three design load, but not less than 12 gauge.
- D. Edge Moldings and Trim:
 1. 7800 - 12ft Wall Molding

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PART 3 - EXECUTION

3.1 EXAMINATION

- A. Do not proceed with installation until all wet work such as concrete, terrazzo, plastering and painting has been completed and thoroughly dried out, unless expressly permitted by manufacturer's printed recommendations. (Exception: HumiGuard Max Ceilings)

3.2 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less than half width units at borders, and comply with reflected ceiling plans. Coordinate panel layout with mechanical and electrical fixtures.

3.3 INSTALLATION

- A. Install acoustical ceilings to comply with ASTM C 636/C 636M and seismic design requirements indicated, according to manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
- B. Suspend main beam from overhead construction with hanger wires spaced 4'-0" on center along the length of the main runner. Install hanger wires plumb and straight.
- C. Install wall moldings at intersection of suspended ceiling and vertical surfaces. Miter corners where wall moldings intersect or install corner caps.
- D. For reveal edge panels: Cut and reveal or rabbet edges of ceiling panels at border areas and vertical surfaces.
- E. Install acoustical panels in coordination with suspended system, with edges resting on flanges of main runner and cross tees. Cut and fit panels neatly against abutting surfaces. Support edges by wall moldings.
- F. Install acoustical panels with undamaged edges and fit accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.

3.4 ADJUSTING AND CLEANING

- A. Replace damaged and broken panels.
- B. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch

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up of minor finish damage. Remove any ceiling products that cannot be successfully cleaned and or repaired. Replace with attic stock or new product to eliminate evidence of damage.

- C. Before disposing of ceilings, contact the Armstrong Recycling Center at 877-276-7876, select option #1 then #8 to review with a consultant the condition and location of building where the ceilings will be removed. The consultant will verify the condition of the material and that it meets the Armstrong requirements for recycling. The Armstrong consultant will provide assistance to facilitate the recycle of the ceiling.

END OF SECTION 09 51 13

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SECTION 09 65 13 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product data and Samples.
- B. Extra Materials: Deliver to Owner at least one box of each type and color of resilient wall base installed.

PART 2 - PRODUCTS

2.1 RESILIENT BASE

- A. Vinyl Base: ASTM F 1861, Type TV (vinyl, thermoplastic), Group I (solid, homogeneous).
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Armstrong World Industries, Inc.
 - b. Johnsonite; a Tarkett company.
 - c. Roppe Corporation, USA.
- B. Style: Cove (base with toe).
- C. Minimum Thickness: 0.125 inch.
- D. Height: 4 inches.
- E. Lengths: Cut lengths 48 inches long or coils in manufacturer's standard lengths.
- F. Outside Corners: preformed.
- G. Inside Corners: preformed.

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2.2 RESILIENT MOLDING ACCESSORY

- A. Vinyl Molding Accessories.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Armstrong World Industries, Inc.
 - b. Johnsonite; a Tarkett company.
 - c. Roppe Corporation, USA.
- B. Description: Nosing for resilient flooring, Reducer strip for resilient flooring, and Transition strips.

2.3 INSTALLATION ACCESSORIES

- A. Stair-Tread-Nose Filler: Two-part epoxy compound recommended by resilient tread manufacturer to fill nosing substrates that do not conform to tread contours.
- B. Adhesives: Water-resistant type recommended by manufacturer to suit floor covering and substrate conditions indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Prepare horizontal surfaces according to ASTM F 710. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
- B. Adhesively install resilient wall base and accessories.
- C. Install wall base in maximum lengths possible. Apply to walls, columns, pilasters, casework, and other permanent fixtures in rooms or areas where base is required.
- D. Install stair-tread-nose filler to nosing substrates that do not conform to tread contours.
- E. Install reducer strips at edges of floor coverings that would otherwise be exposed.

END OF SECTION 09 65 13

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SECTION 09 65 19 - RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product data and Samples.
 - 1. Submit shop drawings, seaming plan, coving details, and manufacturer's technical data, installation and maintenance instructions for flooring and accessories.
 - 2. Submit the manufacturer's standard samples showing the required colors for flooring and applicable accessories.
- B. Extra Materials: Deliver to Owner one box of each type and color of resilient floor tile installed.

1.2 QUALITY ASSURANCE

- A. Single-Source Responsibility: provide types of flooring and accessories supplied by one manufacturer, including moisture mitigation systems, primers, leveling and patching compounds, and adhesives.
- B. Select an installer who is experienced and competent in the installation of resilient solid vinyl tile flooring and the use of subfloor preparation products.

1.3 WARRANTY

- A. Resilient Flooring: Submit a written warranty executed by the manufacturer, agreeing to repair or replace resilient flooring that fails within the warranty period.
- B. Warranty Period: 20 years.
- C. The Limited Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

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PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Armstrong Flooring Inc.
- B. Approved equal

2.2 RESILIENT TILE FLOORING MATERIALS

- A. Luxury Solid Vinyl Tile
 - 1. Description: A layered construction consisting of a tough, clear, vinyl wear layer protecting a high-fidelity print layer on a solid vinyl backing. Protected by a UV-cured polyurethane finish, the wear surface is embossed with different textures to enhance each of the printed visuals. Colors are insoluble in water and resistant to cleaning agents and light.
 - 2. Luxury Solid Vinyl Tile shall conform to the requirements of ASTM F 1700, "Standard Specification for Solid Vinyl Tile", Class III, Type B – Embossed Surface.
 - 3. Pattern and Color: Color to be selected from manufacturer's standard colors.
 - 4. Size: 48 in. x 6 in.
 - 5. Wear layer thickness: 0.020 (0.5 mm)
 - 6. Thickness: 1/8"/0.125 in. (3.2mm).

2.3 ADHESIVES

- A. Provide manufacturer's recommended adhesives.

2.4 ACCESSORIES

- A. For sealing joints between the top of wall base or integral cove cap and irregular wall surfaces such as masonry, provide plastic filler applied according to the manufacturer's recommendations.
- B. Provide transition/reducing strips tapered to meet abutting materials.
- C. Provide threshold of thickness and width as shown on the drawings.
- D. Provide resilient edge strips of width shown on the drawings, of equal gauge to the flooring, homogeneous vinyl or rubber composition, tapered or bullnose edge, with color to match or contrast with the flooring, or as selected by the Architect from standard colors available.

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- E. Provide metal edge strips of width shown on the drawings and of required thickness to protect exposed edges of the flooring. Provide units of maximum available length to minimize the number of joints. Use butt-type metal edge strips for concealed anchorage, or overlap-type metal edge strips for exposed anchorage. Unless otherwise shown, provide strips made of extruded aluminum with a mill finish.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

- A. Comply with manufacturer's product data, including technical bulletins, product catalog, installation instructions, and product carton instructions for installation and maintenance procedures as needed.

3.2 EXAMINATION

- A. Verify substrate conditions are acceptable for product installation in accordance with manufacturer's instructions (i.e. moisture tests, bond test, pH test, etc.).
- B. Visually inspect flooring materials, adhesives and accessories prior to installation. Flooring material with visual defects shall not be installed and shall not be considered as a legitimate claim.
- C. Examine subfloors prior to installation to determine that surfaces are smooth and free from cracks, holes, ridges, and other defects that might prevent adhesive bond or impair durability or appearance of the flooring material.
- D. Inspect subfloors prior to installation to determine that surfaces are free from curing, sealing, parting and hardening compounds; residual adhesives; adhesive removers; and other foreign materials that might prevent adhesive bond. Visually inspect for evidence of moisture, alkaline salts, carbonation, dusting, mold, or mildew.
- E. Report conditions contrary to contract requirements that would prevent a proper installation. Do not proceed with the installation until unsatisfactory conditions have been corrected.
- F. Failure to call attention to defects or imperfections will be construed as acceptance and approval of the subfloor. Installation indicates acceptance of substrates with regard to conditions existing at the time of installation.

3.3 PREPARATION

- A. Smooth concrete surfaces, removing rough areas, projections, ridges, and bumps, and filling low spots, control or construction joints, and other defects.

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- B. The surface shall be free of dust, solvents, varnish, paint, wax, oil, grease, sealers, release agents, curing compounds, residual adhesive, adhesive removers and other foreign materials that might affect the adhesion of resilient flooring to the concrete or cause a discoloration of the flooring from below. Remove residual adhesives as recommended by the flooring manufacturer. Remove curing and hardening compounds not compatible with the adhesives used, as indicated by a bond test or by the compound manufacturer's recommendations for flooring. Avoid organic solvents. Spray paints, permanent markers and other indelible ink markers must not be used to write on the back of the flooring material or used to mark the concrete slab as they could bleed through, telegraphing up to the surface and permanently staining the flooring material. If these contaminants are present on the substrate they must be mechanically removed prior to the installation of the flooring material.
- C. Perform pH tests on concrete floors regardless of their age or grade level. All test results shall be documented and retained.

3.4 INSTALLATION

- A. Install floor in strict accordance of the manufacturer's instructions. Failure to comply may result in voiding the manufacturer's warranty.
- B. Scribe, cut, and fit to permanent fixtures, columns, walls, partitions, pipes, outlets, and built-in furniture and cabinets.
- C. Roll with a 100-pound (45.36 kilogram) roller in the field areas. Refer to specific rolling instructions of the flooring manufacturer
- D. Install flooring with adhesives, tools, and procedures in strict accordance with the manufacturer's written instructions. Observe the recommended adhesive trowel notching, open times, and working times.

3.5 CLEANING

- A. Perform initial and on-going maintenance according to manufacturer's recommendations.

3.6 PROTECTION

- A. A.Protect installed flooring as recommended by the flooring manufacturer against damage from rolling loads, other trades, or the placement of fixtures and furnishings.

END OF SECTION 09 65 19

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SECTION 09 91 13 - EXTERIOR PAINTING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals:
 - 1. Product Data: Include printout of MPI's "MPI Approved Products List" with product highlighted.
 - 2. Samples.

- B. Extra Materials: Deliver to Owner 1 gal. of each color and type of finish-coat paint used on Project, in containers, properly labeled and sealed.

PART 2 - PRODUCTS

2.1 PAINT

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Benjamin Moore & Co.
 - 2. Farrell-Calhoun.
 - 3. PPG Paints.
 - 4. Sherwin-Williams Company (The).

- B. MPI Standards: Provide materials that comply with MPI standards indicated and listed in its "MPI Approved Products List."
 - 1. Block Filler, Latex: MPI #4.
 - 2. Primer, Alkali Resistant, Water Based: MPI #3.
 - 3. Primer, Bonding, Water Based: MPI #17.
 - 4. Primer, Bonding, Solvent Based: MPI #69.
 - 5. Primer, Alkyd, Anticorrosive: MPI #79.
 - 6. Primer, Galvanized, Water Based: MPI #134.
 - 7. Primer, Quick Dry, for Aluminum: MPI #95.
 - 8. Primer, Latex: MPI #6.
 - 9. Primer, Alkyd: MPI #5.
 - 10. Latex, Exterior Flat (Gloss Level 1): MPI #10.
 - 11. Latex, Exterior Low Sheen (Gloss Level 3-4): MPI #15.
 - 12. Latex, Exterior Semigloss (Gloss Level 5): MPI #11.
 - 13. Latex, Exterior, Gloss (Gloss Level 6): MPI #119.

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14. Light Industrial Coating, Exterior, Water Based (Gloss Level 3): MPI #161.
 15. Light Industrial Coating, Exterior, Water Based, Semigloss (Gloss Level 5): MPI #163.
 16. Light Industrial Coating, Exterior, Water Based, Gloss (Gloss Level 6): MPI #164.
 17. Alkyd, Exterior Flat (Gloss Level 1): MPI #8.
 18. Alkyd, Exterior, Semigloss (Gloss Level 5): MPI #94.
 19. Alkyd, Exterior Gloss (Gloss Level 6): MPI #9.
 20. Alkyd, Quick Dry, Semigloss (Gloss Level 5): MPI #81.
 21. Alkyd, Quick Dry, Gloss (Gloss Level 7): MPI #96.
 22. Floor Paint, Latex, Low Gloss (Maximum Gloss Level 3): MPI #60.
 23. Floor Enamel, Alkyd, Gloss (Gloss Level 6): MPI #27.
- C. Material Compatibility: Provide materials that are compatible with one another and with substrates.
1. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- D. Colors: As selected.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Comply with recommendations in MPI's "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
- B. Remove hardware, lighting fixtures, and similar items that are not to be painted. Mask items that cannot be removed. Reinstall items in each area after painting is complete.
- C. Clean and prepare surfaces in an area before beginning painting in that area. Schedule painting so cleaning operations will not damage newly painted surfaces.

3.2 APPLICATION

- A. Comply with recommendations in MPI's "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
- B. Paint exposed surfaces unless otherwise indicated.
 1. Do not paint prefinished items, items with an integral finish, operating parts, and labels unless otherwise indicated.
- C. Apply paints according to manufacturer's written instructions.

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1. Use brushes only where the use of other applicators is not practical.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
1. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

3.3 EXTERIOR PAINT APPLICATION SCHEDULE

A. Steel:

1. Semigloss, Alkyd Quick-Dry: Two coats over alkyd anticorrosive primer: MPI EXT 5.1A.

B. Galvanized Metal:

1. Semigloss, Alkyd: Two coats over primer recommended by topcoat manufacturer for exterior use on galvanized-metal.

END OF SECTION 09 91 13

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SECTION 09 91 23 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals:
1. Product Data: Include printout of MPI's "MPI Approved Products List" with product highlighted.
 2. Samples.
- B. Mockups: Full-coat finish Sample of each type of coating, color, and substrate, applied where directed.
- C. Extra Materials: Deliver to Owner 1 gal. of each color and type of finish-coat paint used on Project, in containers, properly labeled and sealed.

PART 2 - PRODUCTS

2.1 PAINT

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Benjamin Moore & Co.
 2. Farrell-Calhoun.
 3. PPG Paints.
 4. Sherwin-Williams Company (The).
- B. MPI Standards: Provide materials that comply with MPI standards indicated and listed in its "MPI Approved Products List."
1. Block Filler, Latex: MPI #4.
 2. Primer Sealer, Latex: MPI #50.
 3. Primer, Alkali Resistant, Water Based: MPI #3.
 4. Primer Sealer, Institutional Low Odor/VOC: MPI #149.
 5. Primer, Latex, for Interior Wood: MPI #39.
 6. Primer Sealer, Alkyd, Interior: MPI #45.
 7. Primer, Bonding, Water Based: MPI #17.
 8. Primer, Bonding, Solvent Based: MPI #69.
 9. Primer, Alkyd, Anticorrosive: MPI #79.
 10. Primer, Galvanized, Water Based: MPI #134.

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11. Primer, Quick Dry, for Aluminum: MPI #95.
 12. Latex, Interior, Flat, (Gloss Level 1): MPI #53.
 13. Latex, Interior, (Gloss Level 2): MPI #44.
 14. Latex, Interior, (Gloss Level 4): MPI #43.
 15. Latex, Interior, Semigloss, (Gloss Level 5): MPI #54.
 16. Latex, Interior, Gloss, (Gloss Level 6, except Minimum Gloss of 65 Units at 60 Degrees): MPI #114.
 17. Latex, Institutional Low Odor/VOC, Flat (Gloss Level 1): MPI #143.
 18. Latex, Institutional Low Odor/VOC, (Gloss Level 2): MPI #144.
 19. Latex, Institutional Low Odor/VOC, Semigloss (Gloss Level 5): MPI #147.
 20. Latex, High-Performance Architectural, (Gloss Level 2): MPI #138.
 21. Latex, High-Performance Architectural, Semigloss (Gloss Level 5): MPI #141.
 22. Alkyd, Interior, Flat (Gloss Level 1): MPI #49.
 23. Alkyd, Interior, Semigloss (Gloss Level 5): MPI #47.
 24. Alkyd, Interior, Gloss (Gloss Level 6): MPI #48.
 25. Alkyd, Quick Dry, Semigloss (Gloss Level 5): MPI #81.
 26. Alkyd, Quick Dry, Gloss (Gloss Level 7): MPI #96.
 27. Floor Paint, Latex, Low Gloss (Maximum Gloss Level 3): MPI #60.
 28. Floor Enamel, Alkyd, Gloss (Gloss Level 6): MPI #27.
- C. Material Compatibility: Provide materials that are compatible with one another and with substrates.
1. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- D. Colors: As selected.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Comply with recommendations in MPI's "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
- B. Remove hardware, lighting fixtures, and similar items that are not to be painted. Mask items that cannot be removed. Reinstall items in each area after painting is complete.
- C. Clean and prepare surfaces in an area before beginning painting in that area. Schedule painting so cleaning operations will not damage newly painted surfaces.

3.2 APPLICATION

- A. Comply with recommendations in MPI's "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

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- B. Paint exposed surfaces, new and existing, unless otherwise indicated.
 - 1. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces.
 - 2. Paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 - 3. Paint the back side of access panels.
 - 4. Color-code mechanical piping in accessible ceiling spaces.
 - 5. Do not paint prefinished items, items with an integral finish, operating parts, and labels unless otherwise indicated.

- C. Apply paints according to manufacturer's written instructions.
 - 1. Use brushes only where the use of other applicators is not practical.
 - 2. Use rollers for finish coat on interior walls and ceilings.

- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
 - 1. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

3.3 INTERIOR PAINT APPLICATION SCHEDULE

- A. Steel:
 - 1. Semigloss, Alkyd Enamel: Two coats over quick-drying alkyd primer: MPI INT 5.1E.

- B. Galvanized Metal:
 - 1. Gloss Level 2 Latex: Two coats over waterborne galvanized-metal primer: MPI INT 5.3J.

- C. Wood: Including wood trim
 - 1. Semigloss Latex: Two coats over latex primer for wood: MPI INT 6.3T.

- D. Gypsum Board:
 - 1. Gloss Level 4 Latex: Two coats over latex primer/sealer: MPI INT 9.2A.

END OF SECTION 09 91 23

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SECTION 10 28 00 - TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data.

PART 2 - PRODUCTS

2.1 TOILET AND BATH ACCESSORIES

- A. Toilet Tissue Dispenser:
1. Basis-of-Design Product: Bobrick B-2890.
 2. Mounting: Surface mounted with concealed wall mount.
 3. Material: Satin finish Stainless Steel.
- B. Hand Dryer:
1. Basis-of-Design Product: Xlerator XL-SP-ECO.
 2. Mounting: Surface.
 3. Material: Brushed Stainless Steel.
- C. Soap Dispenser:
1. Basis-of-Design Product: Bobrick B-5050.
 2. Mounting: Surface mounted with concealed wall mount and locking device.
 3. Material: Impact resistant polymer.
- D. Grab Bar:
1. Basis-of-Design Product: Bobrick B-6806 series see plans for locations and sizes.
 2. Material: Stainless steel, 0.050 inch thick.
 3. Mounting: Concealed.
 4. Gripping Surfaces: Slip-resistant texture.
 5. Outside Diameter: 1-1/2 inches for heavy-duty applications.
- E. Mirror Unit:
1. Basis-of-Design Product: Bobrick B-1556.

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2.2 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, No. 4 finish (satin), 0.031-inch minimum nominal thickness unless otherwise indicated.
- B. Brass: ASTM B 19, ASTM B 16/B 16M, or ASTM B 30.
- C. Sheet Steel: ASTM A 1008/A 1008M, 0.036-inch minimum nominal thickness.
- D. Galvanized-Steel Sheet: ASTM A 653/A 653M, G60.
- E. Chromium Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).
- F. Baked-Enamel Finish: Factory-applied, gloss-white, baked-acrylic-enamel coating.
- G. Mirrors: ASTM C 1503, mirror glazing quality, clear-glass mirrors, nominal 6.0 mm thick.
- H. Galvanized-Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
- I. Fasteners: Screws, bolts, and other devices of same material as accessory unit, tamper and theft resistant when exposed, and of galvanized steel when concealed.
- J. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of [six] <Insert number> keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install accessories using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
 - 1. Install grab bars to withstand a downward load of at least 250 lbf, when tested according to method in ASTM F 446.
- B. Adjust accessories for unencumbered, smooth operation, and verify that mechanisms function properly. Replace damaged or defective items. Remove temporary labels and protective coatings.

END OF SECTION 10 28 00

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SECTION 10 44 00 - FIRE PROTECTION SPECIALTIES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data.

PART 2 - PRODUCTS

2.1 FIRE-PROTECTION CABINETS

- A. Fire-Protection Cabinets: Enameled-steel, semirecessed cabinets for fire extinguisher.
1. JL Industries, Inc.; a division of Activar Construction Products Group.
 1. Cabinet Style: Semi-recessed.
 2. Components:
 - a. Tub: Cold-rolled steel.
 - 1) Finish: Factory-applied powder coat paint finish.
 - a) Standard Color: White.
 - b. Door and Trim Construction: Cold-rolled steel; flush doors with 5/8 inch door stop attached by continuous hinge and equipped with zinc-plated handle with roller catch.
 - 1) Finish: Factory-applied powder coat paint finish.
 - a) Standard Color: White.
 - c. Trim Style and Depth:
 - 1) Semi-Recessed Cabinet:
 - a) Rolled Edge: 2-1/2 inch (63.50 mm).
 3. Fire-Rating: Non-rated.

2.2 CABINET DOOR STYLES, GLAZING TYPES, AND ADDITIONAL OPTIONS

- A. Door Style:
1. Style F: Full glazing; with pull handle.
- B. Door Glazing:

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1. Type 10: Clear acrylic.

2.3 FIRE EXTINGUISHERS AND BRACKETS

- A. Portable Fire Extinguishers: NFPA 10, listed and labeled for the type, rating, and classification of extinguisher.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Guardian Fire Equipment, Inc.
 - b. JL Industries, Inc.; a division of the Activar Construction Products Group.
 - c. Pem All Fire Extinguisher Corp.; Pem Systems, Inc.
 - d. Pyro-Chem; Tyco Fire Suppression & Building Products.
 2. Multipurpose Dry-Chemical Type: UL-rated 2-A:10-B:C, 5-lb nominal capacity, in enameled-steel container.
- B. Mounting Brackets: Manufacturer's standard steel, designed to secure fire extinguisher to wall or structure, of sizes required for fire extinguishers indicated, with plated or baked-enamel finish.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install cabinets at heights acceptable to authorities having jurisdiction.
- B. Identification: Apply vinyl lettering to cabinets at locations indicated.
- C. Install mounting brackets in locations indicated at heights acceptable to authorities having jurisdiction.
- D. Install fire extinguishers in mounting brackets and cabinets where indicated.

END OF SECTION 10 44 00

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SECTION 12 21 13 - HORIZONTAL LOUVER BLINDS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product data and Samples.

PART 2 - PRODUCTS

2.1 HORIZONTAL LOUVER BLINDS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Comfortex Window Fashions.
 - 2. Hunter Douglas Contract.
 - 3. Levolor.
 - 4. Springs Window Fashions; SWFcontract.
- B. Provide blinds passing flame-resistance testing according to NFPA 701.
- C. Fabrication: Comply with WCMA A 100.1 unless otherwise indicated.
 - 1. Provide color-coated finish on exposed metal parts unless otherwise indicated.
 - 2. Fabricate concealed components from noncorrodible or corrosion-resistant-coated materials.
 - 3. Provide permanently lubricated moving parts.
- D. Slats: Extruded PVC (vinyl), UV stabilized and integrally colored.
- E. Slat Width: 2 inches.
- F. Headrail: Formed steel or extruded aluminum; long edges returned or rolled; fully enclosing operating mechanisms on three sides and ends.
- G. Tilt Operation: Manual with cord.
- H. Valance: Manufacturer's standard.
- I. Mounting: End.
- J. Colors, Textures, Patterns, and Gloss: As selected from manufacturer's full range.

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1. Provide reflective finish on outside-facing surface of slat to enhance reflection of solar energy.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install blinds level, plumb, and located not closer than 1 inch to interior face of glass.
 1. Flush Mounted: Install blinds with louver edges flush with finish face of opening when blinds are open.
- B. Adjust window blinds to operate smoothly and easily throughout entire operational range.

END OF SECTION 12 21 13

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SECTION 12 36 23.13 - PLASTIC-LAMINATE-CLAD COUNTERTOPS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Shop Drawings Samples and AWI Quality Certification Program certificates.
- B. Fabricator Qualifications: Certified participant in AWI's Quality Certification Program.
- C. Installer Qualifications: Fabricator of products.
- D. Environmental Limitations: Do not deliver or install countertops until building is enclosed, wet work is completed, and HVAC system is operating.

PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE COUNTERTOPS

- A. Quality Standard: AWI, AWMAC, and WI's "Architectural Woodwork Standards."
- B. Plastic-Laminate Countertops: Custom grade.
 - 1. Laminate Grade: HGS for flat countertops, HGP for post-formed countertops.
 - 2. Grain Direction: Parallel to cabinet fronts.
 - 3. Edge Treatment: Same as laminate cladding on horizontal surfaces.

2.2 MATERIALS

- A. Wood Moisture Content: 5 to 10 percent.
- B. Medium-Density Fiberboard: ANSI A208.2, Grade 130, made with binder containing no urea formaldehyde.
- C. Particleboard: ANSI A208.1, Grade M-2, made with binder containing no urea formaldehyde.
- D. Softwood Plywood: DOC PS 1.
- E. High-Pressure Decorative Laminate: NEMA LD 3.

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1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Formica Corporation.
 - b. Wilsonart LLC.

- F. Grommets for Cable Passage through Countertops: 2-inch OD, molded-plastic grommets and matching plastic caps with slot for wire passage.
 1. Product: "OG series" by Doug Mockett & Company, Inc.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install countertops to comply with referenced quality standard for grade specified.
- B. Install countertops level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
- C. Scribe and cut countertops to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- D. Anchor countertops securely to base units. Seal space between backsplash and wall.

END OF SECTION 12 36 23.13

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SECTION 12 36 61.16 - SOLID SURFACING COUNTERTOPS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product data, Shop Drawings, and material Samples.

PART 2 - PRODUCTS

2.1 SOLID-SURFACE-MATERIAL COUNTERTOPS

- A. Countertops: 1/2-inch-thick, solid-surface material.
1. Edges: Built up with solid-surface material.
 2. Front: Straight, slightly eased at top.
- B. Solid-Surface Material: Homogeneous, filled plastic resin complying with ICPA SS-1.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Affinity Surfaces; a brand of Domain Industries, Inc.
 - b. E. I. du Pont de Nemours and Company.
 - c. Formica Corporation.
 - d. LG Chemical, Ltd.
 - e. Transolid Div of Trumbull Industries.
 - f. Wilsonart LLC.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install according to manufacturer's written directions. Fasten to substrates with adhesive. Align adjacent surfaces. Seal seams and perimeter with mildew-resistant silicone sealant.
1. Seal edges of cutouts in particleboard subtops by saturating with varnish.
- B. Install level and plumb to a tolerance of 1/8 inch in 8 feet.

END OF SECTION 12 36 61.16

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SECTION 22 05 23 - GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. ASME Compliance:

1. ASME B1.20.1 for threads for threaded end valves.
2. ASME B16.1 for flanges on iron valves.
3. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
4. ASME B16.18 for solder-joint connections.

B. NSF Compliance: NSF 61 and NSF 372 for valve materials for potable-water service.

2.2 GENERAL-DUTY VALVES

A. Valve Sizes: Same as upstream piping unless otherwise indicated.

B. Valves in Insulated Piping: With 2-inch stem extensions.

C. One-Piece, Brass Ball Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. American Valve, Inc.
- b. KITZ Corporation.
- c. NIBCO INC.

2. Description:

- a. Standard: MSS SP-110.
- b. CWP Rating: 400 psig.

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- c. Body Design: One piece.
- d. Body Material: Forged brass or bronze.
- e. Ends: Threaded and soldered.
- f. Seats: PTFE.
- g. Stem: Brass or stainless steel.
- h. Ball: Chrome-plated brass or stainless steel.
- i. Port: Reduced.

D. Class 125, Bronze Swing Check Valves with Bronze Disc:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. American Valve, Inc.
 - b. KITZ Corporation.
 - c. NIBCO INC.
- 2. Description:
 - a. Standard: MSS SP-80, Type 3.
 - b. CWP Rating: 200 psig.
 - c. Body Design: Horizontal flow.
 - d. Body Material: ASTM B 62, bronze.
 - e. Ends: Threaded or soldered. See valve schedule articles.
 - f. Disc: Bronze.

E. Class 125, NRS, Bronze Gate Valves:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. American Valve, Inc.
 - b. KITZ Corporation.
 - c. NIBCO INC.
- 2. Description:
 - a. Standard: MSS SP-80, Type 1.
 - b. CWP Rating: 200 psig.
 - c. Body Material: Bronze with integral seat and screw-in bonnet.
 - d. Ends: Threaded or solder joint.
 - e. Stem: Bronze.
 - f. Disc: Solid wedge; bronze.
 - g. Packing: Asbestos free.
 - h. Handwheel: Malleable iron, bronze, or aluminum.

F. Class 125, RS, Bronze Gate Valves:

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1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. American Valve, Inc.
 - b. KITZ Corporation.
 - c. NIBCO INC.

2. Description:
 - a. Standard: MSS SP-80, Type 2.
 - b. CWP Rating: 200 psig.
 - c. Body Material: Bronze with integral seat and screw-in bonnet.
 - d. Ends: Threaded or solder joint.
 - e. Stem: Bronze.
 - f. Disc: Solid wedge; bronze.
 - g. Packing: Asbestos free.
 - h. Handwheel: Malleable iron, bronze, or aluminum.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Use gate and ball valves for shutoff duty; globe and ball for throttling duty.
- B. Locate valves for easy access and provide separate support where necessary.
- C. Install valves for each fixture and item of equipment.
- D. Install three-valve bypass around each pressure-reducing valve using throttling-type valves.
- E. Install valves in horizontal piping with stem at or above center of pipe.
- F. Install valves in a position to allow full stem movement.
- G. Install check valves for proper direction of flow in horizontal position with hinge pin level.

END OF SECTION 22 05 23

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SECTION 22 05 29 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Product Data: For each type of product.
2. Hangers and Supports:
 - a. Shop Drawings: Signed and sealed by a qualified professional engineer.
 - b. Welding certificates.
 - c. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - d. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Hangers and supports shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.
1. Design supports for multiple pipes capable of supporting combined weight of supported systems, and system contents.
 2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
 3. Design seismic-restraint hangers and supports for piping and equipment and obtain approval from authorities having jurisdiction.

2.2 HANGERS AND SUPPORTS FOR PLUMBING PIPING EQUIPMENT

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
3. Nonmetallic Coatings: Plastic coating, jacket, or liner.

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4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
 5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.
- B. Copper Pipe Hangers:
1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
 2. Hanger Rods: Continuous-thread rod, nuts, and washer made of copper-coated steel.
- C. Fastener Systems:
1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
 2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
- D. Miscellaneous Materials:
1. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.
 2. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.
 - a. Properties: Nonstaining, noncorrosive, and nongaseous.
 - b. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 GENERAL PIPING INSTALLATIONS

- A. Install piping free of sags and bends.
- B. Install fittings for changes in direction and branch connections.

3.2 HANGERS AND SUPPORTS

- A. Comply with MSS SP-69 and MSS SP-89. Install building attachments within concrete or to structural steel.
- B. Install hangers and supports to allow controlled thermal and seismic movement of piping systems.

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- C. Install powder-actuated fasteners and mechanical-expansion anchors in concrete after concrete is cured. Do not use in lightweight concrete or in slabs less than 4 inches thick.
- D. Load Distribution: Install hangers and supports so piping live and dead loading and stresses from movement will not be transmitted to connected equipment.
- E. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
 - 1. Adjustable Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated stationary pipes, NPS 1/2 to NPS 30.
 - 2. Pipe Hangers (MSS Type 5): For suspension of pipes, NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
 - 3. Adjustable Steel Band Hangers (MSS Type 7): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8.
 - 4. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8.
 - 5. Adjustable Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 2.
- F. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
 - 1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers, NPS 3/4 to NPS 20.
 - 2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers, NPS 3/4 to NPS 20, if longer ends are required for riser clamps.

END OF SECTION 22 05 29

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SECTION 22 05 48 - VIBRATION AND SEISMIC CONTROLS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals:
1. Product Data: For each product indicated, include rated load, rated deflection, and overload capacity for each vibration isolation device.
 2. Delegated-Design Submittal: For vibration isolation calculations and details indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 3. Welding certificates.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent.
- B. Seismic-Restraint Loading:
1. Site Class as Defined in the IBC: D.
 2. Assigned Seismic Use Group or Building Category as Defined in the IBC: II.
 - a. Component Importance Factor: 1.5.
 - b. Component Response Modification Factor: 3.5.
 - c. Component Amplification Factor: 2.5.
 3. Design Spectral Response Acceleration at Short Periods (0.2 Second): .
 4. Design Spectral Response Acceleration at 1-Second Period: .
 5. Rated strengths, features, and applications shall be as defined in reports by an agency acceptable to authorities having jurisdiction.
 - a. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they are subjected.

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2.2 VIBRATION CONTROLS

A. Elastomeric Isolation Pads:

1. Fabrication: Single or multiple layers of sufficient durometer stiffness for uniform loading over pad area.
2. Size: Factory or field cut to match requirements of supported equipment.
3. Pad Material: Oil and water resistant with elastomeric properties infused nonwoven cotton or synthetic fibers.
4. Surface Pattern: Smooth pattern.
5. Load-bearing metal plates adhered to pads.

B. Double-Deflection, Elastomeric Isolation Mounts:

1. Mounting Plates:
 - a. Top Plate: Encapsulated steel load transfer top plates, factory drilled and threaded with threaded studs or bolts.
 - b. Baseplate: Encapsulated steel bottom plates with holes provided for anchoring to support structure.
2. Elastomeric Material: Molded, oil-resistant rubber, neoprene, or other elastomeric material.

C. Restrained Elastomeric Isolation Mounts:

1. Description: All-directional isolator with seismic restraints containing two separate and opposing elastomeric elements that prevent central threaded element and attachment hardware from contacting the housing during normal operation.
 - a. Housing: Cast-ductile iron or welded steel.
 - b. Elastomeric Material: Molded, oil-resistant rubber, neoprene, or other elastomeric material.

D. Freestanding, Laterally Stable, Open-Spring Isolators:

1. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
2. Minimum Additional Travel: 50 percent of the required deflection at rated load.
3. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
4. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
5. Baseplates: Factory-drilled steel plate for bolting to structure with an elastomeric isolator pad attached to the underside. Baseplates shall limit floor load to 500 psig.
6. Top Plate and Adjustment Bolt: Threaded top plate with adjustment bolt and cap screw to fasten and level equipment.

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- E. Freestanding, Laterally Stable, Open-Spring Isolators with Vertical-Limit Stop Restraint:
1. Housing: Steel housing with vertical-limit stops to prevent spring extension due to weight being removed.
 - a. Base with holes for bolting to structure with an elastomeric isolator pad attached to the underside. Bases shall limit floor load to 500 psig.
 - b. Top plate with elastomeric pad.
 - c. Internal leveling bolt that acts as blocking during installation.
 2. Restraint: Limit stop as required for equipment and authorities having jurisdiction.
 3. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 4. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 5. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 6. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
- F. Elastomeric Mount in a Steel Frame with Upper and Lower Steel Hanger Rods:
1. Frame: Steel, fabricated with a connection for an upper threaded hanger rod and an opening on the underside to allow for a maximum of 30 degrees of angular lower hanger-rod misalignment without binding or reducing isolation efficiency.
 2. Dampening Element: Molded, oil-resistant rubber, neoprene, or other elastomeric material with a projecting bushing for the underside opening preventing steel-to-steel contact.
- G. Combination Coil-Spring and Elastomeric-Insert Hanger with Spring and Insert in Compression:
1. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.
 2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
 6. Elastomeric Element: Molded, oil-resistant rubber or neoprene. Steel-washer-reinforced cup to support spring and bushing projecting through bottom of frame.
 7. Self-centering hanger-rod cap to ensure concentricity between hanger rod and support spring coil.

2.3 SEISMIC-RESTRAINT DEVICES

A. Restraint Channel Bracings

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1. Description: MFMA-4, shop- or field-fabricated bracing assembly made of slotted steel channels with 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. Restraint Cables
1. Restraint Cables: ASTM A 492 stainless-steel cables. End connections made of steel assemblies with thimbles, brackets, swivel, and bolts designed for restraining cable service; with a minimum of two clamping bolts for cable engagement.
- C. Seismic-Restraint Accessories
1. 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.
 2. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.

2.4 Mechanical Anchor Bolts

- A. Mechanical Anchor Bolts: 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 required for anchor and as tested according to ASTM E 488. Minimum length of eight times diameter.

PART 3 - EXECUTION

3.1 VIBRATION-CONTROL AND SEISMIC-RESTRAINT DEVICE INSTALLATION

- A. Equipment Restraints:
1. Install resilient bolt isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inches.
 2. Install seismic-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction providing required submittals for component.
- B. Piping Restraints:
1. Comply with requirements in MSS SP-127.

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- C. Install cables so they do not bend across edges of adjacent equipment or building structure.
- D. Install seismic-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction providing required submittals for component.
- E. Install bushing assemblies for anchor bolts for floor-mounted equipment, arranged to provide resilient media between anchor bolt and mounting hole in concrete base.
- F. 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.
- G. Drilled-in 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 the 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. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
 - 4. Set anchors to manufacturer's recommended torque, using a torque wrench.
 - 5. Install zinc-coated steel anchors for interior and stainless-steel anchors for exterior applications.

3.2 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Remove and replace malfunctioning units and retest as specified above.
- C. Prepare test and inspection reports.

3.3 ADJUSTING

- A. Adjust isolators after piping system is at operating weight.
- B. Adjust limit stops on restrained spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.
- C. Adjust active height of spring isolators.

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- D. Adjust restraints to permit free movement of equipment within normal mode of operation.

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SECTION 22 05 53 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Product Data: For each type of product.
 - a. Samples: For color, letter style, and graphic representation required for each identification material and device.

PART 2 - PRODUCTS

2.1 WARNING SIGNS AND LABELS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Brady Corporation.
 2. Carlton Industries, LP.
 3. Craftmark Pipe Markers.
 4. LEM Products Inc.
 5. Stranco, Inc.
- B. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
- C. Letter Color: Red.
- D. Background Color: White.
- E. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
- F. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
- G. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.
- H. Fasteners: Stainless-steel rivets or self-tapping screws.

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- I. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- J. Label Content: Include caution and warning information plus emergency notification instructions.

2.2 VALVE TAGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Brady Corporation.
 - 2. Carlton Industries, LP.
 - 3. Craftmark Pipe Markers.
 - 4. emedco.
 - 5. Seton Identification Products; a Brady Corporation company.
- B. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.
 - 1. Tag Material: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
 - 2. Fasteners: Brass beaded chain.
- C. Valve-tag schedule shall be included in operation and maintenance data.

2.3 WARNING TAGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Brady Corporation.
 - 2. Carlton Industries, LP.
 - 3. Craftmark Pipe Markers.
 - 4. emedco.
 - 5. Seton Identification Products; a Brady Corporation company.
- B. Description: Preprinted or partially preprinted accident-prevention tags of plasticized card stock with matte finish suitable for writing.
 - 1. Size: 3 by 5-1/4 inches minimum.
 - 2. Fasteners: Reinforced grommet and wire or string.
 - 3. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."
 - 4. Color: Safety yellow background with black lettering.

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PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 VALVE-TAG INSTALLATION

- A. Install tags on valves and control devices in piping systems, except check valves, valves within factory-fabricated equipment units, shutoff valves, faucets, convenience and lawn-watering hose connections, and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.
- B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:
 - 1. Valve-Tag Size and Shape:
 - a. Cold Water: 1-1/2 inches, round.
 - b. Hot Water: 1-1/2 inches, round.
 - 2. Valve-Tag Colors:
 - a. Cold Water: Natural.
 - b. Hot Water: Natural.
 - 3. Letter Colors:
 - a. Cold Water: White.
 - b. Hot Water: White.

3.3 WARNING-TAG INSTALLATION

- A. Write required message on, and attach warning tags to, equipment and other items where required.

END OF SECTION 22 05 53

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SECTION 22 07 00 - PLUMBING INSULATION

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals:
 - 1. Product Data: For each type of product.
 - 2. For adhesives and sealants, documentation including printed statement of VOC content and chemical components.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less according to ASTM E 84.
- B. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less according to ASTM E 84.

2.2 INSULATION MATERIALS

- A. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type I. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
- B. Mineral-Fiber, Preformed Pipe Insulation:
- C. Mineral-Fiber, Pipe and Tank Insulation: Mineral or glass fibers bonded with a thermosetting resin. Semirigid board material with factory-applied ASJ complying with ASTM C 1393, Type II or Type IIIA Category 2, or with properties similar to ASTM C 612, Type IB. Nominal density is 2.5 lb/cu. ft. or more. Thermal conductivity (k-value) at 100 deg F is 0.29 Btu x in./h x sq. ft. x deg F or less. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

2.3 ADHESIVES

- A. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
 - 1. For indoor applications, adhesive shall have a VOC content of 80 g/L or less.

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- B. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.
 - 1. For indoor applications, adhesive shall have a VOC content of 50 g/L or less.

2.4 MASTICS

- A. Vapor-Barrier Mastic: Water based; suitable for indoor use on below ambient services.
 - 1. For indoor applications, use mastics that have a VOC content of 50 g/L or less.
 - 2. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm at 43-mil dry film thickness.
 - 3. Service Temperature Range: Minus 20 to plus 180 deg F.
 - 4. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
 - 5. Color: White.
- B. Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services.
 - 1. Water-Vapor Permeance: ASTM F 1249, 1.8 perms at 0.0625-inch dry film thickness.
 - 2. Service Temperature Range: Minus 20 to plus 180 deg F.
 - 3. Solids Content: 60 percent by volume and 66 percent by weight.
 - 4. Color: White.

2.5 SEALANTS

- A. Joint Sealants for Cellular-Glass Products:
 - 1. Materials shall be compatible with insulation materials, jackets, and substrates.
 - 2. Permanently flexible, elastomeric sealant.
 - 3. Service Temperature Range: Minus 100 to plus 300 deg F.
 - 4. Color: White or gray.
 - 5. For indoor applications, sealants shall have a VOC content of 420 g/L or less.
- B. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing:
 - 1. Materials shall be compatible with insulation materials, jackets, and substrates.
 - 2. Fire- and water-resistant, flexible, elastomeric sealant.
 - 3. Service Temperature Range: Minus 40 to plus 250 deg F.
 - 4. Color: White.
 - 5. For indoor applications, sealants shall have a VOC content of 420 g/L or less.

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2.6 FACTORY-APPLIED JACKETS

- A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:
1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
 2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.

2.7 TAPES

- A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.
1. Width: 3 inches.
 2. Thickness: 11.5 mils.
 3. Adhesion: 90 ounces force/inch in width.
 4. Elongation: 2 percent.
 5. Tensile Strength: 40 lbf/inch in width.
 6. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

PART 3 - EXECUTION

3.1 PIPE INSULATION INSTALLATION

- A. Comply with requirements of the Midwest Insulation Contractors Association's "National Commercial & Industrial Insulation Standards" for insulation installation on pipes and equipment.
- B. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
- C. Mineral-Fiber Insulation Installation:
1. Insulation Installation on Straight Pipes and Tubes: Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
 2. For insulation with factory-applied jackets on above ambient surfaces, secure laps with outward clinched staples at 6 inches o.c.
 3. For insulation with factory-applied jackets on below ambient surfaces, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

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- D. Interior Piping System Applications: Insulate the following piping systems:
1. Domestic hot water.
 2. Recirculated domestic hot water.
 3. Roof drain bodies and horizontal rainwater leaders of storm water piping.
 4. Exposed water supplies and sanitary drains of fixtures for people with disabilities.
- E. Do not apply insulation to the following systems, materials, and equipment:
1. Flexible connectors.
 2. Sanitary drainage and vent piping.
 3. Drainage piping located in crawlspaces unless otherwise indicated.
 4. Chrome-plated pipes and fittings, except for plumbing fixtures for people with disabilities.
 5. Piping specialties, including air chambers, unions, strainers, check valves, plug valves, and flow regulators.

3.2 INDOOR PIPING INSULATION SCHEDULE

- A. Unless otherwise indicated, do not install insulation on the following:
1. Drainage piping located in crawlspaces.
 2. Underground piping.
 3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.
- B. Domestic Cold Water:
1. NPS 1 and Smaller: Insulation shall be the following:
 - a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1/2 inch thick.
- C. Domestic Hot and Recirculated Hot Water:
1. NPS 1-1/4 and Smaller: Insulation shall be the following:
 - a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
- D. Exposed Sanitary Drains, Domestic Water, Domestic Hot Water, and Stops for Plumbing Fixtures for People with Disabilities:
1. All Pipe Sizes: Insulation shall be the following:
 - a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.

END OF SECTION 22 07 00

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SECTION 22 11 16 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Product Data:

- a. For transition fittings and dielectric fittings.
- b. For solvent cements and adhesive primers, documentation including printed statement of VOC content.

PART 2 - PRODUCTS

2.1 PREFORMANCE REQUIREMENTS

- A. Potable-water piping and components shall comply with NSF 14 and NSF 61. Plastic piping components shall be marked with "NSF-pw."

2.2 PIPE AND FITTINGS

- A. Hard Copper Tubing: ASTM B 88, Types L and M, water tube, drawn temper with wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.

1. Copper Unions: Cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces and solder-joint or threaded ends.
2. Joining Materials: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder.

- B. Soft Copper Tubing: ASTM B 88, Types K and L, water tube, annealed temper with copper pressure fittings, cast-copper-alloy or wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.

1. Joining Materials: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder.

C. Special-Duty Valves:

1. Comply with requirements in Section 22 05 23 "General-Duty Valves for Plumbing Piping" for general-duty metal valves.

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2. Comply with requirements in Section 22 11 19 "Domestic Water Piping Specialties" for balancing valves, drain valves, backflow preventers, and vacuum breakers.
- D. Flexible Connectors: Stainless-steel, corrugated-metal tubing with wire-braid covering. Working-pressure rating a minimum of 200 psig.

2.3 PRESSURE GAGES AND TEST PLUGS

- A. Direct-Mounted, Plastic-Case, Dial-Type Pressure Gages:
1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Ametek U.S. Gauge.
 2. Standard: ASME B40.100.
 3. Case: Sealed type; plastic; 4-1/2-inch nominal diameter.
 4. Movement: Mechanical, with link to pressure element and connection to pointer.
 5. Dial: Nonreflective aluminum with permanently etched scale markings graduated in psi.
 6. Pointer: Dark-colored metal.
 7. Window: Plastic.
 8. Accuracy: Grade A, plus or minus 1 percent of middle half of scale range.
- B. Test Plug: Corrosion-resistant brass or stainless-steel body with two self-sealing rubber core inserts and gasketed and threaded cap, with extended stem for units to be installed in insulated piping. Minimum pressure and temperature rating 500 psig at 200 deg F.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install piping free of sags and bends.
- B. Install fittings for changes in direction and branch connections.
- C. Install unions at final connection to each piece of equipment.
- D. Install dielectric unions and flanges to connect piping materials of dissimilar metals in gas piping.
- E. Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals in water piping.

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- F. Soldered Joints: Comply with procedures in ASTM B 828 unless otherwise indicated.
- G. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve, inside the building at each domestic water service entrance. Comply with requirements in Section 22 11 19 "Domestic Water Piping Specialties" for drain valves and strainers.
- H. Install domestic water piping without pitch for horizontal piping and plumb for vertical piping.
- I. Rough-in domestic water piping for water-meter installation according to utility company's requirements.
- J. Comply with requirements in Section 22 05 29 "Hangers and Supports for Plumbing Piping and Equipment" for pipe hanger and support devices.
 - 1. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:
 - a. NPS 1-1/4 and Smaller: 84 inches with 3/8-inch rod.
 - b. NPS 1-1/2: 108 inches with 3/8-inch rod.
 - c. NPS 2: 10 feet with 3/8-inch rod.
 - d. NPS 2-1/2: 11 feet with 1/2-inch rod.
 - e. Support vertical piping at each floor.

3.2 INSPECTING AND CLEANING

- A. Inspect and test piping systems as follows:
 - 1. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
 - 2. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired.
- B. Clean and disinfect potable domestic water piping by filling system with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.

3.3 PIPING SCHEDULE

- A. Underground, Service Entrance Piping: Soft copper tubing.
- B. Aboveground Distribution Piping: Type L, hard copper tubing.

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3.4 VALVE SCHEDULE

- A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
 - 1. Shutoff Duty: Use bronze ball or gate valves for piping NPS 2 and smaller. Use cast-iron butterfly or gate valves with flanged ends for piping NPS 2-1/2 and larger.
 - 2. Drain Duty: Hose-end drain valves.
- B. Install gate valves close to main on each branch and riser serving two or more plumbing fixtures or equipment connections and where indicated.
- C. Install gate or ball valves on inlet to each plumbing equipment item, on each supply to each plumbing fixture not having stops on supplies, and elsewhere as indicated.

END OF SECTION 22 11 16

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SECTION 22 13 16 - SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Product Data: For each type of product.
2. For solvent cements and adhesive primers, documentation including printed statement of VOC content.
3. Seismic Qualification Certificates: For waste and vent piping, accessories, and components, from manufacturer.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:
1. Soil, Waste, and Vent Piping: 10-foot head of water.
 2. Waste, Force-Main Piping: 150 psig.
- B. Seismic Performance: Soil, waste, and vent piping and support and installation shall withstand the effects of earthquake motions determined according to current Arkansas Fire Prevention Code.
- C. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- D. Comply with NSF/ANSI 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components.

2.2 PIPES AND FITTINGS

- A. PVC Plastic, DWV Pipe and Fittings: ASTM D 2665, Schedule 40, plain ends with PVC socket-type, DWV pipe fittings.
1. Adhesive Primer: ASTM F 656.
 - a. Adhesive primer shall have a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

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2. Solvent Cement: ASTM D 2564.
 - a. PVC solvent cement shall have a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

- A. Comply with requirements in Section 22 11 13 "Facility Water Distribution Piping" for basic piping installation requirements.
- B. Install wall penetration system at each pipe penetration through foundation wall. Make installation watertight. Comply with requirements in Section 22 11 13 "Facility Water Distribution Piping" for wall penetration systems.
 1. Sleeves are not required for cast-iron soil piping passing through concrete slabs-on-grade if slab is without membrane waterproofing.
- C. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.
- D. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.
- E. Install soil and waste drainage and vent piping at the following minimum slopes, unless otherwise indicated:
 1. Building Sanitary Drain: 2 percent downward in direction of flow for piping NPS 3 and smaller; 1 percent downward in direction of flow for piping NPS 4 and larger.
 2. Horizontal Sanitary Drainage Piping: 2 percent downward in direction of flow.
 3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.
- F. Install PVC soil and waste drainage and vent piping according to ASTM D 2665.
- G. Install underground PVC soil and waste drainage piping according to ASTM D 2321.

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- H. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
- I. Comply with requirements in Section 22 11 13 "Facility Water Distribution Piping" for basic piping joint construction.
- J. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure unless otherwise indicated.
- K. Comply with requirements in Section 22 05 29 "Hangers and Supports for Plumbing Piping and Equipment" for pipe hanger and support devices.

3.2 PIPE SCHEDULE

- A. Aboveground Applications: PVC plastic, DWV pipe and fittings with solvent-cemented joints.
- B. Belowground Applications: PVC plastic, DWV pipe and drainage-pattern fittings with cemented joints.

END OF SECTION 22 13 16

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SECTION 23 05 17 - SLEEVES AND SLEEVE SEALS FOR HVAC PIPING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 SLEEVES

- A. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.
- B. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.
- C. Galvanized-Steel-Sheet Sleeves: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

2.2 STACK-SLEEVE FITTINGS

- A. Description: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring, bolts, and nuts for membrane flashing.
1. Underdeck Clamp: Clamping ring with setscrews.

2.3 SLEEVE-SEAL SYSTEMS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Advance Products & Systems, Inc.
 2. CALPICO, Inc.
 3. Metraflex Company (The).
 4. Pipeline Seal and Insulator, Inc.
 5. Proco Products, Inc.
- B. Description: Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.

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1. Sealing Elements: ethylene-propylene-diene-monomer-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
2. Pressure Plates: Carbon steel.
3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements.

2.4 GROUT

- A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement nonshrink grout; recommended for interior and exterior applications.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

- A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.
- B. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.
 1. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.
- C. Install stack-sleeve fittings in new slabs as slabs are constructed.
 1. Comply with requirements for flashing specified in Section 07 62 00 "Sheet Metal Flashing and Trim."
 2. Using grout, seal the space around outside of stack-sleeve fittings.
- D. Fire-Barrier Penetrations: Comply with requirements for firestopping specified in Section 07 84 13 "Penetration Firestopping."

3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

- A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building.
- B. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center piping in penetration, assemble sleeve-seal system components, and install in annular space

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between piping and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand, and make a watertight seal.

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SECTION 23 05 29 - HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Product Data: For each type of product indicated.
2. Hangers and Supports:
 - a. Shop Drawings: Signed and sealed by a qualified professional engineer.
 - b. Welding certificates.
 - c. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - d. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Hangers and Supports for Plumbing Piping Equipment:

1. Structural Performance: Hangers and supports shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.
 - a. Design supports for multiple pipes capable of supporting combined weight of supported systems and system contents.
 - b. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
 - c. Design seismic-restraint hangers and supports for piping and equipment, and obtain approval from authorities having jurisdiction.

2.2 HANGERS AND SUPPORTS FOR HVAC

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
3. Nonmetallic Coatings: Plastic coating, jacket, or liner.

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4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
 5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.
- B. Copper Pipe Hangers:
1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
 2. Hanger Rods: Continuous-thread rod, nuts, and washer made of copper-coated steel.
- C. Fastener Systems:
1. Verify suitability of fasteners in this article for use in lightweight concrete or concrete slabs less than 4 inches thick.
 2. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pullout, tension, and shear capacities appropriate for supported loads and building materials where used.
 3. Mechanical-Expansion Anchors: Insert-wedge-type, stainless-steel anchors, for use in hardened portland cement concrete; with pullout, tension, and shear capacities appropriate for supported loads and building materials where used.
- D. Miscellaneous Materials:
1. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.
 2. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.
 - a. Properties: Nonstaining, noncorrosive, and nongaseous.
 - b. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 GENERAL PIPING INSTALLATIONS

- A. Install piping free of sags and bends.
- B. Install fittings for changes in direction and branch connections.

3.2 HANGERS AND SUPPORTS

- A. Comply with MSS SP-69 and MSS SP-89. Install building attachments within concrete or to structural steel.

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- B. Install hangers and supports to allow controlled thermal and seismic movement of piping systems.
- C. Install powder-actuated fasteners and mechanical-expansion anchors in concrete after concrete is cured. Do not use in lightweight concrete or in slabs less than 4 inches thick.
- D. Load Distribution: Install hangers and supports so piping live and dead loading and stresses from movement will not be transmitted to connected equipment.
- E. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
 - 1. Adjustable Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated stationary pipes, NPS 1/2 to NPS 30.
 - 2. Pipe Hangers (MSS Type 5): For suspension of pipes, NPS 1/2 to NPS 4 to allow off-center closure for hanger installation before pipe erection.
 - 3. Adjustable Steel Band Hangers (MSS Type 7): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8.
 - 4. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8.
 - 5. Adjustable Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 2.
- F. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
 - 1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers, NPS 3/4 to NPS 20.
 - 2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers, NPS 3/4 to NPS 20, if longer ends are required for riser clamps.

END OF SECTION 23 05 29

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SECTION 23 05 48 - VIBRATION AND SEISMIC CONTROLS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals:
1. Product Data: For each product indicated.
 2. Delegated-Design Submittal: For vibration isolation and seismic-restraint calculations and details indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 3. Welding certificates.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent.
- B. Seismic-Restraint Loading:
1. Site Class as Defined in the IBC: D.
 2. Assigned Seismic Use Group or Building Category as Defined in the IBC: II.
 - a. Component Importance Factor: 1.5.
 - b. Component Response Modification Factor: 3.5.
 - c. Component Amplification Factor: 2.5.
 3. Design Spectral Response Acceleration at Short Periods (0.2 Second): .
 4. Design Spectral Response Acceleration at 1-Second Period: .
- C. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

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2.2 VIBRATION ISOLATORS

A. Elastomeric Isolation Pads:

1. Fabrication: Single or multiple layers of sufficient durometer stiffness for uniform loading over pad area.
2. Size: Factory- or field-cut to match requirements of supported equipment.
3. Pad Material: Oil and water resistant with elastomeric properties, infused, nonwoven cotton or synthetic fibers.
4. Surface Pattern: Smooth pattern.
5. Load-bearing metal plates adhered to pads.

B. Double-Deflection, Elastomeric Isolation Mounts:

1. Mounting Plates:
 - a. Top Plate: Encapsulated-steel, load-transfer top plates, factory drilled and threaded with threaded studs or bolts.
 - b. Baseplate: Encapsulated-steel bottom plates with holes provided for anchoring to support structure.
2. Elastomeric Material: Molded, oil-resistant rubber, neoprene, or other elastomeric material.

C. Restrained Elastomeric Isolation Mounts:

1. Description: All-directional isolator with seismic restraints containing two separate and opposing elastomeric elements that prevent central threaded element and attachment hardware from contacting the housing during normal operation.
 - a. Housing: Cast-ductile iron or welded steel.
 - b. Elastomeric Material: Molded, oil-resistant rubber, neoprene, or other elastomeric material.

D. Freestanding, Laterally Stable, Open-Spring Isolators:

1. Baseplates: Factory-drilled steel plate for bolting to structure with an elastomeric isolator pad attached to the underside. Baseplates shall limit floor load to 500 psig.
2. Top Plate and Adjustment Bolt: Threaded top plate with adjustment bolt and cap screw to fasten and level equipment.

E. Freestanding, Laterally Stable, Open-Spring Isolators with Vertical-Limit Stop Restraint:

1. Steel housing with vertical-limit stops to prevent spring extension due to weight being removed. Base with holes for bolting to structure with an elastomeric isolator pad attached to the underside. Bases shall limit floor load to 500 psig.

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Top plate with elastomeric pad. Limit stop restraint as required for equipment and authorities having jurisdiction.

F. Elastomeric Mount in a Steel Frame with Upper and Lower Steel Hanger Rods:

1. Steel fabricated with an upper threaded hanger rod and a maximum of 30 degrees of angular lower hanger-rod misalignment. Molded, oil-resistant rubber, neoprene, or other elastomeric material dampening element. Color-code or otherwise identify to indicate capacity range.

G. Combination Coil-Spring and Elastomeric-Insert Hanger with Spring and Insert in Compression:

1. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.
2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
6. Elastomeric Element: Molded, oil-resistant rubber or neoprene. Steel-washer-reinforced cup to support spring and bushing projecting through bottom of frame.
7. Self-centering hanger rod cap to ensure concentricity between hanger rod and support spring coil.

H. Pipe Riser Resilient Support: All-directional, acoustical pipe anchor consisting of two steel tubes separated by a minimum of 1/2-inch-thick neoprene. Include steel and neoprene vertical-limit stops arranged to prevent vertical travel in both directions. Design support for a maximum load on the isolation material of 500 psig and for equal resistance in all directions.

2.3 SEISMIC-RESTRAINT DEVICES

A. General Requirements for Restraint Components: Rated strengths, features, and applications shall be as defined in reports by an agency acceptable to authorities having jurisdiction.

1. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they will be subjected.

B. Channel Support System:

1. Description: MFMA-4, shop- or field-fabricated bracing assembly made of slotted steel channels with accessories for attachment to braced component at one end

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and to building structure at the other end, and other matching components, and with corrosion-resistant coating; rated in tension, compression, and torsion forces.

C. Restraint Cables:

1. Restraint Cables: ASTM A 603 galvanized-steel cables. End connections made of steel assemblies with thimbles, brackets, swivel, and bolts designed for restraining cable service; with a minimum of two clamping bolts for cable engagement.

2.4 SEISMIC-RESTRAINT ACCESSORIES

- A. 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.
- B. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.

2.5 MECHANICAL ANCHOR BOLTS

- 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 required for anchor and as tested according to ASTM E 488. Minimum length of eight times diameter.

PART 3 - EXECUTION

3.1 VIBRATION-CONTROL AND SEISMIC-RESTRAINT DEVICE INSTALLATION

- A. 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 devices using methods approved by an agency acceptable to authorities having jurisdiction providing required submittals for component.
- B. Piping Restraints:
 1. Comply with requirements in MSS SP-127.
- C. Install cables so they do not bend across edges of adjacent equipment or building structure.

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- D. Install bushing assemblies for anchor bolts for floor-mounted equipment, arranged to provide resilient media between anchor bolt and mounting hole in concrete base.
- E. 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.
- F. Drilled-in 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 the 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. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
 - 4. Set anchors to manufacturer's recommended torque, using a torque wrench.
 - 5. Install zinc-coated steel anchors for interior and stainless-steel anchors for exterior applications.

3.2 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Remove and replace malfunctioning units and retest as specified above.
- C. Prepare test and inspection reports.

3.3 ADJUSTING

- A. Adjust isolators after piping system is at operating weight.
- B. Adjust limit stops on restrained spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.
- C. Adjust active height of spring isolators.
- D. Adjust restraints to permit free movement of equipment within normal mode of operation.

END OF SECTION 23 05 48

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SECTION 23 05 93 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals:
 - 1. Certified TAB reports.
 - 2. Documentation of work performed per ASHRAE 62.1, Section 7.2.2 - "Air Balancing."
 - 3. Documentation of work performed per ASHRAE/IESNA 90.1, Section 6.7.2.3 - "System Balancing."
- B. TAB Firm Qualifications: AABC or TABB certified.
- C. TAB Report Forms: Standard TAB contractor's forms approved by Architect.
- D. Perform TAB after leakage and pressure tests on air distribution systems have been satisfactorily completed.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment.
- B. Examine the approved submittals for HVAC systems and equipment.
- C. Examine systems for installed balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are accessible.
- D. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.
- E. Examine HVAC equipment and filters and verify that bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.

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- F. Examine terminal units, such as variable-air-volume boxes, and verify that they are accessible and their controls are connected and functioning.
- G. Examine automatic temperature system components to verify the following:
 - 1. Dampers, valves, and other controlled devices are operated by the intended controller.
 - 2. Dampers and valves are in the position indicated by the controller.
 - 3. Integrity of dampers and valves for free and full operation and for tightness of fully closed and fully open positions. This includes dampers in multizone units, mixing boxes, and variable-air-volume terminals.
 - 4. Automatic modulating and shutoff valves, including two-way valves and three-way mixing and diverting valves, are properly connected.
 - 5. Thermostats and humidistats are located to avoid adverse effects of sunlight, drafts, and cold walls.
 - 6. Sensors are located to sense only the intended conditions.
 - 7. Sequence of operation for control modes is according to the Contract Documents.
 - 8. Controller set points are set at indicated values.
 - 9. Interlocked systems are operating.
 - 10. Changeover from heating to cooling mode occurs according to indicated values.
- H. Report deficiencies discovered before and during performance of test and balance procedures.

3.2 GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. Perform testing and balancing procedures on each system according to the procedures contained in ASHRAE 111 and in this Section.
- B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish.
- C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.
- D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.3 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

- A. Prepare schematic diagrams of systems' "as-built" duct layouts.

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- B. For variable-air-volume systems, develop a plan to simulate diversity.
- C. Determine the best locations in main and branch ducts for accurate duct airflow measurements.
- D. Verify that motor starters are equipped with properly sized thermal protection.
- E. Check for airflow blockages.
- F. Check condensate drains for proper connections and functioning.
- G. Check for proper sealing of air-handling unit components.
- H. Check for proper sealing of air duct system.

3.4 GENERAL PROCEDURES FOR HYDRONIC SYSTEMS

- A. Prepare test reports with pertinent design data; number in sequence starting at pump to end of system. Check the sum of branch-circuit flows against approved pump flow rate.
- B. Prepare schematic diagrams of systems' "as-built" piping layouts.
- C. Prepare hydronic systems for testing and balancing according to the following, in addition to the general preparation procedures specified above:
 - 1. Open all manual valves for maximum flow.
 - 2. Check liquid level in expansion tank.
 - 3. Check makeup-water-station pressure gage for adequate pressure for highest vent.
 - 4. Set system controls so automatic valves are wide open to heat exchangers.
 - 5. Check pump-motor load. If motor is overloaded, throttle main flow-balancing device so motor nameplate rating is not exceeded.

3.5 TOLERANCES

- A. Set HVAC system airflow and water flow rates within the following tolerances:
 - 1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 10 percent.
 - 2. Air Outlets and Inlets: Plus or minus 10 percent.
 - 3. Heating-Water Flow Rate: Plus or minus 10 percent.
 - 4. Cooling-Water Flow Rate: Plus or minus 10 percent.

END OF SECTION 23 05 93

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SECTION 23 07 00 - HVAC INSULATION

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals:
 - 1. Product Data: For each type of product indicated.
 - 2. For adhesives and sealants, documentation including printed statement of VOC content.

- B. Quality Assurance: Labeled with maximum flame-spread index of 25 and maximum smoke-developed index of 50 according to ASTM E 84.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics:
 - 1. Indoor Insulation and Related Materials: To be factory-labeled designating maximum flame-spread index of 25 or less and smoke-developed index of 50 or less according to ASTM E 84.
 - 2. Outdoor Insulation and Related Materials: To be factory labeled designating maximum flame-spread index of 75 or less and smoke-developed index of 150 or less according to ASTM E 84.

2.2 INSULATION MATERIALS

- A. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

- B. Flexible Elastomeric: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Aeroflex USA.
 - b. Armacell LLC.
 - c. K-Flex USA.

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- C. Mineral-Fiber Blanket Insulation: Comply with ASTM C 553, Type II and ASTM C 1290, Type I.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. CertainTeed Corporation; Saint-Gobain North America.
 - b. Johns Manville; a Berkshire Hathaway company.
 - c. Manson Insulation Inc.
 - d. Owens Corning.
- D. Mineral-Fiber Board Insulation: Comply with ASTM C 612, Type IA or Type IB. For duct and plenum applications, provide insulation with factory-applied ASJ.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. CertainTeed Corporation; Saint-Gobain North America.
 - b. Johns Manville; a Berkshire Hathaway company.
 - c. Manson Insulation Inc.
 - d. Owens Corning.
- E. Mineral-Fiber, Preformed Pipe Insulation: Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Fibrex Insulations Inc.
 - b. Johns Manville; a Berkshire Hathaway company.
 - c. Manson Insulation Inc.
 - d. Owens Corning.
- F. Mineral-Fiber Pipe and Tank Insulation: Complying with ASTM C 1393, Type II or Type IIIA, Category 2, or with properties similar to ASTM C 612, Type IB; having factory-applied ASJ jacket. Nominal density is 2.5 lb/cu. ft. or more. Thermal conductivity (k-value) at 100 deg F is 0.29 Btu x in./h x sq. ft. x deg F or less.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. CertainTeed Corporation; Saint-Gobain North America.
 - b. Johns Manville; a Berkshire Hathaway company.
 - c. Manson Insulation Inc.
 - d. Owens Corning.

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- G. Polyolefin Insulation: Unicellular, polyethylene thermal plastic insulation. Comply with ASTM C 534 or ASTM C 1427, Type I, Grade 1 for tubular materials and Type II, Grade 1 for sheet materials.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Armacell LLC.
 - b. Nomaco.
- H. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Aeroflex USA.
 - b. Armacell LLC.
 - c. K-Flex USA.
 2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- I. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Childers Brand; H. B. Fuller Construction Products.
 - b. Eagle Bridges - Marathon Industries.
 - c. Foster Brand; H. B. Fuller Construction Products.
 - d. Mon-Eco Industries, Inc.
 2. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- J. Vapor-Barrier Mastic: Water based; suitable for indoor and outdoor use on below ambient services.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Foster Brand; H. B. Fuller Construction Products.
 - b. Vimasco Corporation.
 2. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm at 43-mil dry film thickness.
 3. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.

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- K. Factory-Applied Jackets: When factory-applied jackets are indicated, comply with the following:
1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
 2. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.
- L. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Avery Dennison Corporation, Specialty Tapes Division.
 - b. Compac Corporation.
 - c. Ideal Tape Co., Inc., an American Biltrite Company.
 - d. Venture Tape.
- M. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Avery Dennison Corporation, Specialty Tapes Division.
 - b. Compac Corporation.
 - c. Ideal Tape Co., Inc., an American Biltrite Company.
 - d. Venture Tape.

PART 3 - EXECUTION

3.1 INSULATION INSTALLATION

- A. Comply with requirements of the Midwest Insulation Contractors Association's "National Commercial & Industrial Insulation Standards" for insulation installation on pipes and equipment.
- B. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
- C. Insulation Installation at Fire-Rated Wall, Partition, and Floor Penetrations: Install insulation continuously through penetrations. Seal penetrations. Comply with requirements in Section 07 84 13 "Penetration Firestopping."
- D. Flexible Elastomeric Insulation Installation:

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1. Seal longitudinal seams and end joints with adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
 2. Insulation Installation on Pipe Fittings and Elbows: Install mitered sections of pipe insulation. Secure insulation materials and seal seams with adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- E. Mineral-Fiber Insulation Installation:
1. Insulation Installation on Straight Pipes and Tubes: Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
 2. For insulation with factory-applied jackets on above ambient surfaces, secure laps with outward clinched staples at 6 inches o.c.
 3. For insulation with factory-applied jackets on below ambient surfaces, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.
 4. Blanket and Board Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.
 5. For ducts and plenums with surface temperatures below ambient, install a continuous, unbroken vapor barrier.
- F. Polyolefin Insulation Installation:
1. Seal split-tube longitudinal seams and end joints with adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
 2. Insulation Installation on Pipe Fittings and Elbows: Install mitered sections of polyolefin pipe insulation. Secure insulation materials and seal seams with adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- G. Plenums and Ducts Requiring Insulation:
1. Concealed and exposed supply and outdoor air.
 2. Concealed and exposed return air located in nonconditioned space.
 3. Concealed and exposed exhaust between isolation damper and penetration of building exterior.
- H. Plenums and Ducts Not Insulated:
1. Metal ducts with duct liner.
 2. Factory-insulated plenums and casings.
 3. Flexible connectors.
 4. Vibration-control devices.
 5. Factory-insulated access panels and doors.
- I. Piping Not Insulated: Unless otherwise indicated, do not install insulation on the following:

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1. Drainage piping located in crawlspaces.
2. Underground piping.
3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.2 DUCT AND PLENUM INSULATION SCHEDULE

- A. Concealed duct insulation shall be one of the following:
1. Flexible Elastomeric: 1 inch thick.
 2. Mineral-Fiber Blanket: 1-1/2 inches thick and 0.75-lb/cu. ft. nominal density.
 3. Mineral-Fiber Board: 1-1/2 inches thick and 2-lb/cu. ft. nominal density.
 4. Polyolefin: 1 inch thick.
- B. Exposed duct insulation shall be one of the following:
1. Flexible Elastomeric: 1 inch <Insert dimension> thick.
 2. Mineral-Fiber Blanket: 1-1/2 inches thick and 0.75-lb/cu. ft. nominal density.
 3. Mineral-Fiber Board: 1-1/2 inches thick and 2-lb/cu. ft. nominal density.
 4. Polyolefin: 1 inch thick.

3.3 HVAC PIPING INSULATION SCHEDULE

- A. Refrigerant Suction and Hot-Gas Piping: Insulation shall be one of the following:
1. Flexible Elastomeric: 1 inch thick.
 2. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
 3. Polyolefin: 1 inch thick.
- B. Refrigerant Suction and Hot-Gas Flexible Tubing: Insulation shall be one of the following:
1. Flexible Elastomeric: 1 inch thick.
 2. Polyolefin: 1 inch thick.
- C. Dual-Service Heating and Cooling: Mineral-Fiber, Preformed Pipe, Type I: 1 inch thick.

END OF SECTION 23 07 00

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SECTION 23 23 00 - REFRIGERANT PIPING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Product Data: For each type of valve and refrigerant piping specialty indicated. Include pressure drop based on manufacturer's test data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Line-Test Pressure for Refrigerant R-410A:

1. Suction Lines for Air-Conditioning Applications: 300 psig.
2. Suction Lines for Heat-Pump Applications: 535 psig.
3. Hot-Gas and Liquid Lines: 535 psig.

B. Comply with ASME B31.5, "Refrigerant Piping," and with ASHRAE 15, "Safety Code for Mechanical Refrigeration."

2.2 TUBES AND FITTINGS

A. Copper Tube: ASTM B 88, Types K and L and ASTM B 280, Type ACR.

B. Wrought-Copper Fittings and Unions: ASME B16.22.

C. Solder Filler Metals: ASTM B 32. Use 95-5 tin antimony or alloy HB solder to join copper socket fittings on copper pipe.

D. Brazing Filler Metals: AWS A5.8/A5.8M.

2.3 VALVES AND SPECIALTIES

A. Thermostatic Expansion Valve: Comply with ARI 750.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

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- a. Danfoss Inc.
 - b. Emerson Climate Technologies.
 - c. Heldon Products; Henry Technologies.
2. Forged brass or steel body, stainless-steel internal parts, copper tubing filled with refrigerant charge for 40 deg F suction temperature; 700-psig working pressure, and 240 deg F operating temperature.
- B. Solenoid Valves: Comply with AHRI 760 and UL 429; listed and labeled by a Nationally Recognized Testing Laboratory.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Danfoss Inc.
 - b. Emerson Climate Technologies.
 - c. Heldon Products; Henry Technologies.
 2. Plated steel body and bonnet, 240 deg F temperature rating, 400-psig working pressure, 240 deg F operating temperature; and 24-V, normally closed holding coil.
- C. Straight-Type Strainers:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Danfoss Inc.
 - b. Heldon Products; Henry Technologies.
 2. Welded steel with corrosion-resistant coating and 100-mesh, stainless-steel screen with socket ends; 500-psig working pressure and 275 deg F working temperature.
- D. Moisture/Liquid Indicators:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Danfoss Inc.
 - b. Emerson Climate Technologies.
 - c. Heldon Products; Henry Technologies.
 2. Forged brass body, 500-psig operating pressure, 240 deg F operating temperature; with replaceable, polished, optical viewing window and color-coded moisture indicator.
- E. Replaceable-Core Filter Dryers: Comply with AHRI 730.

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1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Danfoss Inc.
 - b. Emerson Climate Technologies.
 - c. Heldon Products; Henry Technologies.
 2. Steel shell with ductile-iron cover; 500-psig operating pressure; 240 deg F operating temperature.
- F. Permanent Filter Dryers: Comply with AHRI 730.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Danfoss Inc.
 - b. Emerson Climate Technologies.
 - c. Heldon Products; Henry Technologies.
 2. Steel shell with ductile-iron cover; 500-psig operating pressure; 240 deg F operating temperature.
- G. Mufflers:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Danfoss Inc.
 - b. Emerson Climate Technologies.
- H. Welded steel with corrosion-resistant coating and socket ends; 500-psig operating pressure; 240 deg F operating temperature.

2.4 REFRIGERANTS

- A. ASHRAE 34, R-410A: Pentafluoroethane/Difluoromethane.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Arkema Inc.
 - b. DuPont Fluorochemicals Div.
 - c. Genetron Refrigerants; Honeywell International Inc.

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PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install wall penetration system at each pipe penetration through foundation wall. Make installation watertight.
- B. Install refrigerant piping and charge with refrigerant according to ASHRAE 15.
- C. Belowground, install copper tubing in PVC conduit. Vent conduit outdoors.
- D. Insulate suction lines to comply with Section 23 07 00 "HVAC Insulation."
- E. Slope refrigerant piping as follows:
 - 1. Install horizontal hot-gas discharge piping with a uniform slope downward away from compressor.
 - 2. Install horizontal suction lines with a uniform slope downward to compressor.
 - 3. Install traps and double risers to entrain oil in vertical runs.
 - 4. Liquid lines may be installed level.
- F. Install solenoid valves upstream from each thermostatic expansion valve. Install solenoid valves in horizontal lines with coil at top.
- G. Install thermostatic expansion valves as close as possible to distributors on evaporator coils.
- H. Install moisture/liquid indicators in liquid line at the inlet of the thermostatic expansion valve or at the inlet of the evaporator coil capillary tube.
- I. Install strainers upstream from and adjacent to solenoid valves, thermostatic expansion valves, and compressors unless they are furnished as an integral assembly for device being protected.
- J. Install piping as short and direct as possible, with a minimum number of joints, elbows, and fittings.

3.2 PIPING SCHEDULE FOR REFRIGERANT R-134A.

3.3 PIPING APPLICATIONS FOR REFRIGERANT R-410A

- A. Suction Lines: Copper, Type ACR, annealed- or drawn-temper tubing and wrought-copper fittings with soldered joints.
- B. Hot-Gas and Liquid Lines: Copper, Type ACR, annealed- or drawn-temper tubing and wrought-copper fittings with soldered joints.

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SECTION 23 31 00 - HVAC DUCTS AND CASINGS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals:
1. Product Data: For each type of product indicated.
 2. Documentation indicating that duct systems and accessories comply with ASHRAE 62.1, Section 5 - "Systems and Equipment."
 3. Documentation indicating that duct systems comply with ASHRAE/IESNA 90.1, Section 6 - "Heating, Ventilating, and Air Conditioning" and Section 6.4.4 - "HVAC System Construction and Insulation."
 4. Documentation of work performed for compliance with ASHRAE 62.1, Section 7.2.4 - "Ventilation System Start-up."
 5. For adhesives and sealants, documentation including printed statement of VOC content.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- B. Structural Performance: Duct hangers and supports and seismic restraints shall withstand the effects of gravity and seismic loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and SMACNA's "Seismic Restraint Manual: Guidelines for Mechanical Systems."
- C. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
- D. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and System Start-up."
- E. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.4.4 - "HVAC System Construction and Insulation."
- F. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems" and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

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- G. Comply with NFPA 96 for ducts connected to commercial kitchen hoods.
- H. Comply with UL 181 for ducts and closures.

2.2 DUCTS

- A. Galvanized-Steel Sheet: ASTM A 653/A 653M, with G60 hot-dip galvanized coating.
 - 1. Galvanized Coating Designation: G60.
 - 2. Finishes for Surfaces Exposed to View: Mill phosphatized.
- B. Joint and Seam Tape, and Sealant: Comply with UL 181A.
- C. Rectangular Metal Duct Fabrication: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- D. Fibrous-Glass Liner: Comply with NFPA 90A or NFPA 90B and with NAIMA AH124.
 - 1. Thickness: 1/2 inch.
 - 2. Airstream surface coated with an antimicrobial erosion-resistant coating.
 - 3. Liner Adhesive: Comply with NFPA 90A or NFPA 90B and with ASTM C 916.
 - 4. Mechanical Fasteners: Galvanized steel suitable for adhesive attachment, mechanical attachment, or welding attachment.

2.3 ACCESSORIES

- A. Volume Dampers and Control Dampers: Single-blade and multiple opposed-blade dampers, standard leakage rating, and suitable for horizontal or vertical applications; factory fabricated and complete with required hardware and accessories.
- B. Flexible Connectors: Flame-retarded or noncombustible fabrics, coatings, and adhesives complying with UL 181, Class 1.
- C. Flexible Ducts: Factory-fabricated, insulated, round duct, with an outer jacket enclosing 1-inch-thick, glass-fiber insulation around a continuous inner liner complying with UL 181, Class 1.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.

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- B. Seal ducts to the following seal classes according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible":
 - 1. Outdoor, Supply-Air Ducts: Seal Class A.
 - 2. Outdoor, Exhaust Ducts: Seal Class C.
 - 3. Outdoor, Return-Air Ducts: Seal Class C.
 - 4. Unconditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class B.
 - 5. Unconditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class A.
 - 6. Unconditioned Space, Exhaust Ducts: Seal Class C.
 - 7. Unconditioned Space, Return-Air Ducts: Seal Class B.
 - 8. Conditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class C.
 - 9. Conditioned Space, Supply-Air Ducts in Pressure Classes Higher than 2-Inch wg: Seal Class B.
 - 10. Conditioned Space, Exhaust Ducts: Seal Class B.
 - 11. Conditioned Space, Return-Air Ducts: Seal Class C.
- C. Conceal ducts from view in finished and occupied spaces.
- D. Avoid passing through electrical equipment spaces and enclosures.
- E. Support ducts to comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Ch. 4, "Hangers and Supports."
- F. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.
- G. Install volume and control dampers in lined duct with methods to avoid damage to liner and erosion of duct liner.
- H. Clean new duct system(s) before testing, adjusting, and balancing.

3.2 TESTING, ADJUSTING, AND BALANCING

- A. Balance airflow within distribution systems, including submains, branches, and terminals, to indicated quantities.

END OF SECTION 23 31 00

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SECTION 23 37 13 - DIFFUSERS, REGISTERS, AND GRILLES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Product Data: For each type of product indicated, including color charts for factory finishes.

PART 2 - PRODUCTS

2.1 DIFFUSERS

A. Rectangular and Square Ceiling Diffuser:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Titus, a division of Air System Components; Johnson Controls, Inc.
 - 1) Model: TSM
2. Material: Steel.
3. Size: 24 inches by 24 inches
4. Finish: Baked enamel, white.
5. Mounting: Lay-in.

B. Perforated Diffuser:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Titus, a division of Air System Components; Johnson Controls, Inc.
 - 1) Model: Par
2. Material: Steel.
3. Size: 24 inches by 24 inches.
4. Finish: Baked enamel, white.
5. Mounting: Lay-in .

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PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install diffusers, registers, and grilles level and plumb.
- B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel unless otherwise indicated. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.
- C. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION 23 37 13

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SECTION 26 05 19 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Comply with NFPA 70.

2.2 COPPER BUILDING WIRE

- A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. American Bare Conductor.
 - 2. Belden Inc.
 - 3. Cerro Wire LLC.
 - 4. General Cable Technologies Corporation.
 - 5. Southwire Company.
 - 6. WESCO.
- C. Conductors: Copper, complying with ASTM B 3 for bare annealed copper and with ASTM B 8 for stranded conductors.
- D. Conductor Insulation:
 - 1. Type NM: Comply with UL 83 and UL 719.
 - 2. Type RHH and Type RHW-2: Comply with UL 44.
 - 3. Type USE-2 and Type SE: Comply with UL 854.
 - 4. Type TC-ER: Comply with NEMA WC 70/ICEA S-95-658 and UL 1277.
 - 5. Type THHN and Type THWN-2: Comply with UL 83.
 - 6. Type THW and Type THW-2: Comply with NEMA WC-70/ICEA S-95-658 and UL 83.
 - 7. Type UF: Comply with UL 83 and UL 493.
 - 8. Type XHHW-2: Comply with UL 44.

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2.3 CONNECTORS AND SPLICES

- A. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

PART 3 - EXECUTION

3.1 WIRING METHODS

- A. Feeders and Branch Circuits: Copper; solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- B. Service Entrance: Type THHN/THWN, single conductors in raceway.
- C. Exposed Feeders, Branch Circuits, and Class 1 Control Circuits, Including in Crawlspace: Type THHN/THWN, single conductors in raceway.
- D. Feeders and Branch Circuits Concealed in Ceilings, Walls, Partitions, and Crawlspace: Type THHN/THWN, single conductors in raceway.
- E. Feeders and Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN/THWN, single conductors in raceway.
- F. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, and strain-relief device at terminations to suit application.
- G. Class 2 Control Circuits: Type THHN/THWN, in raceway.

3.2 INSTALLATION OF CONDUCTORS AND CABLES

- A. Complete raceway installation between conductor and cable termination points according to Section 26 05 33 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.
- B. Support cables according to Section 26 05 29 "Hangers and Supports for Electrical Systems."
- C. Complete cable tray systems installation according to Section 26 05 36 "Cable Trays for Electrical Systems" prior to installing conductors and cables.
- D. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 26 05 44 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

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- E. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Section 07 84 13 "Penetration Firestopping."
- F. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- G. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway. Use manufacturer-approved pulling compound or lubricant where necessary.
- H. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.
- I. Make splices, terminations, and taps that are compatible with conductor material. Install conductor at each outlet, with at least 6 inches of slack.
- J. Identify conductors and cables according to Section 26 05 53 "Identification for Electrical Systems."

3.3 FIELD QUALITY CONTROL

- A. Contractor will engage a qualified testing agency to perform tests and inspections with the assistance of a factory-authorized service representative.
 - 1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors and conductors feeding all critical equipment and services for compliance with requirements.
 - 2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters. Cables will be considered defective if they do not pass tests and inspections.
- B. Test and Inspection Reports: Prepare a written report showing procedures used, results complying with requirements, and corrective action taken to achieve compliance.

END OF SECTION 26 05 19

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SECTION 26 05 26 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data for each type of product indicated.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

2.2 GROUNDING MATERIALS

- A. Conductors: Solid for No. 8 AWG and smaller; stranded for No. 6 AWG and larger unless otherwise indicated.
 - 1. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable code or authorities having jurisdiction.
 - 2. Bare, Solid-Copper Conductors: Comply with ASTM B 3.
 - 3. Bare, Stranded-Copper Conductors: Comply with ASTM B 8.
- B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy.
- C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.
- D. Ground Rods: Copper-clad steel, sectional type; 3/4 inch by 10 feet.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Underground Grounding Conductors: Install bare copper conductor, No. 2/0 AWG minimum. Bury at least 24 inches below grade.

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- B. Pipe and Equipment Grounding-Conductor Terminations: Bolted.
- C. Underground Connections: Welded.
- D. Connections to Structural Steel: Bolted.
- E. Install grounding conductors routed along shortest and straightest paths possible unless otherwise indicated or required by code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- F. Install ground rods driven into ground until tops are 2 inches below final grade or 4 inches above finished floor slab unless otherwise indicated.
- G. Protect ground rods passing through concrete floor with a double wrapping of pressure-sensitive insulating tape.
- H. Make connections without exposing steel or damaging coating if any.
- I. Install bonding straps and jumpers in locations accessible for inspection and maintenance, except where routed through short lengths of conduit.
- J. Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
- K. Bond to equipment mounted on vibration isolation hangers and supports so vibration is not transmitted to rigidly mounted equipment.
- L. Grounding and Bonding for Piping:
 - 1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes using a bolted clamp connector or by bolting a lug-type connector to a pipe flange, using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding-conductor conduit or sleeve to conductor at each end.
 - 2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
 - 3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.
- M. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at ground test wells.
 - 1. Measure ground resistance not less than two full days after last trace of precipitation and without soil being moistened by any means other than natural

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drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.

2. Perform tests by fall-of-potential method according to IEEE 81.
3. Report measured ground resistances that exceed [10] <Insert value> ohms.
4. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION 26 05 26

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SECTION 26 05 29 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals:
 - 1. Product Data for steel and nonmetallic slotted support systems.
 - 2. Shop Drawings signed and sealed by a qualified professional engineer.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design supports for multiple raceways, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
 - 1. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents. The rated strength of supports are to be adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five times the applied force.
- B. Comply with NFPA 70.

2.2 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.
- B. Nonmetallic Slotted Support Systems: Structural-grade, factory-formed, glass-fiber-resin channels and angles with 9/16-inch-diameter holes at a maximum of 8 inches o.c., in at least one surface.
- C. Raceway and Cable Supports: As described in NECA 1 and NECA 101.
- D. Conduit and Cable Support Devices: Steel and malleable-iron hangers, clamps, and associated fittings.
- E. Mounting, Anchoring, and Attachment Components:

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1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
2. Mechanical-Expansion Anchors: Insert-wedge type, [zinc-coated] [stainless] steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
6. Toggle Bolts: All-steel springhead type.
7. Hanger Rods: Threaded steel.

PART 3 - EXECUTION

3.1 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.
- B. Separate dissimilar metals and metal products from contact with wood or cementitious materials by painting each metal surface in area of contact with a bituminous coating or by other permanent separation.
- C. Raceway Support Methods: In addition to methods described in NECA 1, EMT IMC and RMC may be supported by openings through structure members, as permitted in NFPA 70.
- D. Multiple Raceways or Cables: Install on trapeze-type supports fabricated with steel slotted channel.
- E. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.
- F. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
 1. To Wood: Fasten with lag screws or through bolts.
 2. To New Concrete: Bolt to concrete inserts.

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3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
 4. To Existing Concrete: Expansion anchor fasteners.
 5. To Steel: Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69.
 6. To Light Steel: Sheet metal screws.
 7. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount on slotted-channel racks attached to substrate.
- G. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.2 CONCRETE BASES

- A. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit, so anchors will be a minimum of 10 bolt diameters from edge of the base.
- B. Anchor equipment to concrete base.
1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 2. Install anchor bolts to elevations required for proper attachment to supported equipment.
 3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

END OF SECTION 26 05 29

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SECTION 26 05 33 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data and Shop Drawings for custom enclosures and cabinets.
- B. Seismic qualification certificates for enclosures, cabinets, conduit racks, and mounting provisions.

PART 2 - PRODUCTS

2.1 METAL CONDUITS AND FITTINGS

- A. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Galvanized Rigid Conduit (GRC): Comply with ANSI C80.1 and UL 6.
- C. Intermediate Metal Conduit (IMC): Comply with ANSI C80.6 and UL 1242.
- D. Electrical Metallic Tubing (EMT): Comply with ANSI C80.3 and UL 797.
- E. Raceway Fittings: Specifically designed for raceway type used in Project.

2.2 METAL WIREWAYS AND AUXILIARY GUTTERS

- A. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1 unless otherwise indicated, and sized according to NFPA 70.
 - 1. Fittings: Specifically designed for raceway type used in Project.
 - 2. Covers: Hinged type unless otherwise indicated.
 - 3. Finish: Manufacturer's standard enamel finish.

2.3 BOXES, ENCLOSURES, AND CABINETS

- A. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.
- B. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.

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C. Metal Floor Boxes:

1. Material: Cast metal.
2. Type: Fully adjustable.
3. Shape: Rectangular.
4. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.4 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING

A. Polymer-Concrete Handholes and Boxes with Polymer-Concrete Cover: Molded of sand and aggregate, bound together with polymer resin, and reinforced with steel, fiberglass, or a combination of the two.

1. Standard: Comply with SCTE 77.
2. Configuration: Designed for flush burial with open bottom unless otherwise indicated.
3. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural-load rating consistent with enclosure and handhole location.
4. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
5. Cover Legend: Molded lettering, "ELECTRIC."

PART 3 - EXECUTION

3.1 INSTALLATION

A. Outdoor Raceways Applications:

1. Exposed or Concealed: GRC.
2. Underground, Single Run: RNC.
3. Connection to Vibrating Equipment: LFMC.
4. Boxes and Enclosures: Metallic, NEMA 250, Type 3R or Type 4.

B. Indoor Raceways Applications:

1. Exposed or Concealed: EMT.
2. Underslab: RNC.
3. Connection to Vibrating Equipment: FMC; in wet or damp locations, use LFMC.
4. Damp or Wet Locations: IMC.
5. Boxes and Enclosures: Metallic, NEMA 250, Type 1, unless otherwise indicated.

C. Conceal raceways and cables, unless otherwise indicated, within finished walls, ceilings, and floors.

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- D. Install raceways and cables at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Locate horizontal raceway runs above water and steam piping.
- E. Install raceways embedded in slabs in middle third of slab thickness where practical, and leave at least 1-inch-thick concrete cover.
 - 1. Secure raceways to reinforcing rods to prevent sagging or shifting during concrete placement.
 - 2. Space raceways laterally to prevent voids in concrete.
 - 3. Install conduit larger than 1-inch trade size, parallel to or at right angles to main reinforcement. Where conduit is at right angles to reinforcement, place conduit close to slab support.
 - 4. Transition from RNC to Schedule 80 [GRC] [EMT] [IMC] before rising above floor.
- F. Raceways Embedded in Slabs:
 - 1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
 - 2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
- G. Install pull wires in empty raceways.
- H. Connect motors and equipment subject to vibration, noise transmission, or movement with a 72-inch maximum length of flexible conduit.
- I. Install raceways and cables concealed within finished walls, ceilings, and floors unless otherwise indicated.
- J. Install raceways and cables at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Locate horizontal raceway runs above water and steam piping.
- K. Installation of Hangers and Supports:
 - 1. Comply with NECA 1 and NECA 101 for installation requirements, except as specified in this article.
 - 2. Separate dissimilar metals and metal products from contact with wood or cementitious materials by painting each metal surface in area of contact with a bituminous coating or by other permanent separation.
 - 3. Raceway Support Methods: In addition to methods described in NECA 1, EMT IMC and RMC may be supported by openings through structure members, as permitted in NFPA 70.
 - 4. Multiple Raceways or Cables: Install on trapeze-type supports fabricated with steel slotted channel.

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5. Strength of Support[**and Seismic-Restraint**] Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static[**and seismic**] loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.
6. 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 or required 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. To Steel: Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69.
 - f. To Light Steel: Sheet metal screws.
 - g. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount on slotted-channel racks attached to substrate.
7. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.2 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 26 05 44 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

END OF SECTION 26 05 33

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SECTION 26 05 44 - SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING

PART 1 - GENERAL

1.1 ACTION SUBMITTALS

- A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 SLEEVES

- A. Wall Sleeves:
1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, plain ends.
 2. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.
- B. Sleeves for Rectangular Openings: Galvanized sheet steel.

2.2 SLEEVE-SEAL SYSTEMS

- A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
1. Sealing Elements: Nitrile (Buna N) rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
 2. Pressure Plates: Carbon steel.
 3. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating, of length required to secure pressure plates to sealing elements.

2.3 GROUT

- A. Description: Shrink-resistant; ASTM C 1107/C 1107M, factory-packaged, nonmetallic aggregate grout; noncorrosive, nonstaining.

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PART 3 - EXECUTION

3.1 SLEEVE AND SLEEVE-SEALS INSTALLATION

- A. Comply with NECA 1.
- B. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and cable unless sleeve seal is to be installed or unless seismic criteria require different clearance.
- C. Seal space outside of sleeves with grout for penetrations of concrete and masonry and with approved joint compound for gypsum board assemblies.
- D. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
 - 1. Cut sleeves to length for mounting flush with both wall surfaces.
 - 2. Extend sleeves installed in floors 2 inches above finished floor level.
- E. Interior Penetrations of Non-fire-rated Walls and Floors: Seal annular space between sleeve and cable using joint sealant appropriate for size, depth, and location of joint according to Section 07 92 00 "Joint Sealants."
- F. Roof-Penetration Sleeves: Seal penetration of individual cables with flexible boot-type flashing units applied in coordination with roofing work.
- G. Aboveground Exterior-Wall Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Size sleeves to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- H. Underground Exterior-Wall Penetrations: Install cast-iron "wall pipes" for sleeves. Size sleeves to allow for 1-inch annular clear space between cable and sleeve for installing mechanical sleeve seals.

END OF SECTION 26 05 44

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SECTION 26 24 16 - PANELBOARDS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NEMA PB 1.
- C. Seismic Performance: Panelboards shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

2.2 GENERAL REQUIREMENTS FOR PANELBOARDS

- A. Seismic-Restraint Loading: Fabricate and test panelboards according to IEEE 344 to withstand seismic forces defined in Section 26 05 48.16 "Seismic Controls for Electrical Systems."
- B. Enclosures: Surface-mounted cabinets; NEMA 250, Type 1 and 3R.
- C. Service Equipment Label: Nationally Recognized Testing Laboratory (NRTL) labeled for use as service equipment for panelboards with one or more main service disconnecting and overcurrent protective devices.
- D. Future Devices: Mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.
- E. Panelboard Short-Circuit Current Rating: Rated for series-connected system with integral or remote upstream overcurrent protective devices and labeled by an NRTL. Include size and type of allowable upstream and branch devices; listed and labeled for series-connected short-circuit rating by an NRTL.
- F. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals.

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2.3 DISTRIBUTION PANELBOARDS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 1. Square D; Schneider Electric USA.
- B. Panelboards: NEMA PB 1, distribution type.
- C. Doors: Secured with vault-type latch with tumbler lock; keyed alike.
- D. Mains: Lugs only.
- E. Branch Overcurrent Protective Devices: Plug-in circuit breakers.

2.4 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 1. Square D; Schneider Electric USA.
- B. Molded-Case Circuit Breaker: Comply with UL 489, with interrupting capacity to meet available fault currents.
 - 1. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge (HID) lighting circuits.
 - 2. Ground-Fault Circuit-Interrupter Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).
- C. Fused Switch: NEMA KS 1, Type HID; clips to accommodate specified fuses; lockable handle.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Receive, inspect, handle, store, and install panelboards and accessories according to NECA 407.
- B. Comply with mounting and anchoring requirements specified in Section 26 05 48.16 "Seismic Controls for Electrical Systems."
- C. Mount top of trim 90 inches above finished floor unless otherwise indicated.

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- D. Arrange conductors into groups; bundle and wrap with wire ties.
- E. Create a directory to indicate installed circuit loads and incorporating Owner's final room designations. Obtain approval before installing.

END OF SECTION 26 24 16

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SECTION 26 27 26 - WIRING DEVICES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.

2.2 COMMERCIAL-GRADE DEVICES

- A. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:
 - 1. Connectors shall comply with UL 2459 and shall be made with stranding building wire.
 - 2. Devices shall comply with the requirements in this Section.
- B. Device Color:
 - 1. Wiring Devices Connected to Normal Power System: White unless otherwise indicated or required by NFPA 70 or device listing.
 - 2. Wiring Devices Connected to Emergency Power System: Red.
- C. Duplex Convenience Receptacles: 125 V, 20 A; comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, and UL 498.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Arrow Hart, Wiring Devices; Eaton, Electrical Sector.
 - b. Leviton Manufacturing Co., Inc.
 - c. Pass & Seymour; Legrand North America, LLC.
 - d. Wiring Device-Kellems; Hubbell Incorporated, Commercial and Industrial.

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- D. Duplex Ground-Fault Circuit-Interrupter (GFCI) Convenience Receptacles: 125-V, 20-A, straight blade, feed-through type. NEMA WD 1, NEMA WD 6, UL 498, and UL 943, Class A, and include indicator light that is lighted when device is tripped.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Arrow Hart, Wiring Devices; Eaton, Electrical Sector.
 - b. Leviton Manufacturing Co., Inc.
 - c. Pass & Seymour; Legrand North America, LLC.
 - d. Wiring Device-Kellems; Hubbell Incorporated, Commercial and Industrial.

- E. Single Pole Toggle Switches: 120/277 V, 20 A. Comply with NEMA WD 1 and UL 20.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Arrow Hart, Wiring Devices; Eaton, Electrical Sector.
 - b. Leviton Manufacturing Co., Inc.
 - c. Pass & Seymour; Legrand North America, LLC.
 - d. Wiring Device-Kellems; Hubbell Incorporated, Commercial and Industrial.

2.3 WALL PLATES

- A. Wall Plates, Finished Areas: Smooth, high-impact thermoplastic, fastened with metal screws having heads matching plate color.
- B. Wall Plates, Unfinished Areas: Smooth, high-impact thermoplastic with metal screws.
- C. Wall Plates, Damp Locations: Thermoplastic with spring-loaded lift cover, and listed and labeled for use in wet locations.

2.4 FLOOR SERVICE FITTINGS

- A. Modular, flush-type, dual-service units suitable for wiring method used.
- B. Compartments: Barrier separates power from voice and data communication cabling.
- C. Service Plate: Rectangular, die-cast aluminum with satin finish.
- D. Power Receptacle: NEMA WD 6, Configuration 5-20R, gray finish, unless otherwise indicated.
- E. Data Communication Outlet: Two modular, keyed, color-coded, RJ-45 jacks for balanced twisted-pair cable.

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PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with NECA 1, including the mounting heights listed in that standard, unless otherwise noted.
- B. Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.
- C. Select device colors and wall plates as follows:
 - 1. For plastic covers, match device color.
- D. Install unshared neutral conductors on line and load side of dimmers.
- E. Mount devices flush, with long dimension vertical, and grounding terminal of receptacles on top unless otherwise indicated. Group adjacent devices under single, multigang wall plates.

END OF SECTION 26 27 26

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SECTION 26 28 16 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 FUSIBLE AND NONFUSIBLE SWITCHES

- A. Fusible Switches, 600 A and Smaller: UL 98 and NEMA KS 1, Type HD, that accommodate specified fuses, and with lockable handle interlocked with cover in closed position.

- 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Square D; Schneider Electric USA.
- 2. Single throw.
- 3. Three pole.
- 4. 240-V ac.
- 5. 200 A and smaller.
- 6. UL 98 and NEMA KS 1, horsepower rated.

- B. Nonfusible Switches, 600 A and Smaller: UL 98 and NEMA KS 1, Type HD, with lockable handle interlocked with cover in closed position.

- 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Square D; Schneider Electric USA.
- 2. Single throw.
- 3. Three pole.

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4. 240-V ac.
 5. 200 A and smaller.
 6. UL 98 and NEMA KS 1, horsepower rated.
- C. Shunt-Trip Switches: Comply with ASME A17.1, UL 50, and UL 98, with Class J fuse block and 200-kA interrupting and short-circuit current rating.
1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Square D; Schneider Electric USA.

2.3 MOLDED-CASE CIRCUIT BREAKERS

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Square D; Schneider Electric USA.
- B. Description: Comply with UL 489 and NEMA AB 3, with interrupting capacity to meet available fault currents.
1. Thermal-Magnetic Circuit Breakers: Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
 2. Electronic Trip Circuit Breakers: Field-replaceable rating plug, rms sensing, with field-adjustable instantaneous trip settings.
 3. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller and let-through ratings less than NEMA FU 1, RK-5.
 4. GFCI Circuit Breakers: Single- and two-pole configurations with 5-mA trip sensitivity.
 5. GFEP Circuit Breakers: Single- and two-pole configurations with 5-mA trip sensitivity.
- C. Features and Accessories:
1. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge (HID) lighting circuits.
 2. Shunt Trip: Trip coil energized from separate circuit, with coil-clearing contact.

2.4 ENCLOSURES

- A. UL 489, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.
1. Outdoor Locations: NEMA 250, Type 3R.

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2.5 SUPPORT AND ANCHORAGE COMPONENTS

- A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly, and provide finish suitable for the environment in which installed.
 - 1. Channel Dimensions: Selected for structural loading and applicable seismic forces.
- B. Raceway and Cable Supports: As described in NECA 1.
- C. Conduit and Cable Support Devices: Steel and malleable-iron hangers, clamps, and fittings.
- D. Mounting, Anchoring, and Attachment Components:
 - 1. Powder-Actuated Fasteners: Threaded-steel stud.
 - 2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete.
 - 3. Concrete Inserts: Steel or malleable-iron, slotted-support-system units similar to MSS Type 18; complying with MFMA-3 or MSS SP-58.
 - 4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
 - 5. Through Bolts: Structural type, hex head, high strength; complying with ASTM A 325.
 - 6. Toggle Bolts: All-steel springhead type.
 - 7. Hanger Rods: Threaded steel.
 - 8. Bushings for Floor-Mounted Equipment Anchors: Neoprene units designed for seismically rated rigid equipment mountings and matched to type and size of anchor bolts and studs used.
 - 9. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for seismically rated rigid equipment mountings and matched to type and size of attachment devices used.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with NECA 1.
- B. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.
- C. Install electrical equipment to allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.

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- D. Install electrical equipment to provide for ease of disconnecting the equipment with minimum interference to other installations.
- E. Install electrical equipment to allow right of way for piping and conduit installed at required slope.
- F. Install electrical equipment to ensure that connecting raceways, cables, wireways, cable trays, and busways are clear of obstructions and of the working and access space of other equipment.
- G. Install required supporting devices in cast-in-place concrete, masonry walls, and other structural components as they are constructed.
- H. Install fuses in fusible devices.

3.2 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections, and prepare test reports:
 - 1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

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SECTION 26 32 00 - PACKAGED GENERATOR ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes packaged engine-generator sets for emergency power supply with the following features:
1. Diesel Engine.
 2. Unit-mounted cooling system.
 3. Unit-mounted control and monitoring.
 4. Performance requirements for sensitive loads.
 5. Outdoor enclosure.

1.2 SUBMITTALS

- A. Product Data: For each type of packaged engine generator indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. In addition, include the following:
1. Thermal damage curve for generator.
 2. Time-current characteristic curves for generator protective device.
 3. Sound test data, based on a free field requirement.
- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, and location and size of each field connection.
1. Dimensioned outline plan and elevation drawings of engine-generator set and other components specified.
 2. Wiring Diagrams: Control interconnection, Customer connections.
- C. Certifications:
1. Submit statement of compliance which states the proposed product is certified to the emissions standards required by the location for EPA, stationary emergency application.
 2. Submit statement of compliance which states the proposed product is seismically certified in compliance with local requirements signed and sealed by a qualified professional engineer.
- D. Manufacturer Seismic Qualification Certification: Submit certification that the 24 Hours fuel tank, the Weather enclosure, engine-generator set, and components will withstand seismic

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forces defined in Division 26 Section "Vibration and Seismic Controls for Electrical Systems." Include the following:

1. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 2. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- E. Source quality-control test reports.
1. Certified summary of prototype-unit test report. See requirements in Part 2 "Source Quality Control" Article Part A. Include statement indicating torsional compatibility of components.
 2. Certified Test Report: Provide certified test report documenting factory test per the requirements of this specification, as well as certified factory test of generator set sensors per NFPA110 level 1.
 3. List of factory tests to be performed on units to be shipped for this Project.
 4. Report of exhaust emissions and compliance statement certifying compliance with applicable regulations.
- F. Closeout Documents
1. Operation and Maintenance Data: For packaged engine generators to include in emergency, operation, and maintenance manuals.
- G. Warranty:
1. Submit manufacturer's warranty statement to be provided for this Project.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Manufacturer Qualifications: A qualified manufacturer. Maintain, within 50 of Project site, a service center capable of providing training, parts, and emergency maintenance repairs.
- C. Source Limitations: Obtain packaged generator sets and auxiliary components through one source from a single manufacturer.
- D. Comply with NFPA 37 (Standard For the Installation and Use of Stationary Combustion Engines and Gas Turbines).
- E. Comply with NFPA 70 (National Electrical Code. Equipment shall be suitable for use in systems in compliance to Article 700, 701, and 702).
- F. Comply with NFPA 110 (Emergency and Standby Power Systems) requirements for Level 1 emergency power supply system.

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G. Comply with UL 2200.

1.4 PROJECT CONDITIONS

A. Environmental Conditions: Engine-generator system shall withstand the following environmental conditions without mechanical or electrical damage or degradation of performance capability:

1. Ambient Temperature: 20.0 deg F to 104.0 deg F.
2. Relative Humidity: 0 to 95 percent.
3. Altitude: Sea level to 400.0 feet.

1.5 WARRANTY

A. Base Warranty: Manufacturer shall provide base warranty coverage on the material and workmanship of the generator set for a minimum of twenty-four 24 months for Standby product from registered commissioning and start-up.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: The basis for this specification is Cummins Power Generation equipment, approved equals may be considered if equipment performance is shown to meet the requirements herein.

2.2 ENGINE-GENERATOR SET

A. Factory-assembled and -tested, engine-generator set.

B. Mounting Frame: Maintain alignment of mounted components without depending on concrete foundation; and have lifting attachments.

1. Rigging Information: Indicate location of each lifting attachment, generator-set center of gravity, and total package weight in submittal drawings.

C. Capacities and Characteristics:

1. Power Output Ratings: Electrical output power rating for Standby operation of not less than 100.0, at 80 percent lagging power factor, 120/240, Single phase, 3 -wire, 60 hertz.
2. Alternator shall be capable of accepting maximum 607.0 kVA in a single step and be capable of recovering to a minimum of 90% of rated no load voltage. Following the

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application of the specified kVA load at near zero power factor applied to the generator set.

3. Nameplates: For each major system component to identify manufacturer's name and address, and model and serial number of component. The engine-generator nameplate shall include information of the power output rating of the equipment.
- D. Generator-Set Performance:
1. Steady-State Voltage Operational Bandwidth: 0.5 percent of rated output voltage from no load to full load.
 2. Transient Voltage Performance: Not more than 20 percent variation for 50 percent step-load increase or decrease. Voltage shall recover and remain within the steady-state operating band within 5 seconds. On application of a 100% load step the generator set shall recover to stable voltage within 10 seconds.
 3. Steady-State Frequency Operational Bandwidth: 0.25 percent of rated frequency from no load to full load.
 4. Steady-State Frequency Stability: When system is operating at any constant load within the rated load, there shall be no random speed variations outside the steady-state operational band and no hunting or surging of speed.
 5. Transient Frequency Performance: Not more than 15 percent variation for 50 percent step-load increase or decrease. Frequency shall recover and remain within the steady-state operating band within 5 seconds. On application of a 100% load step the generator set shall recover to stable frequency within 10 seconds.
 6. Output Waveform: At full load, harmonic content measured line to line or line to neutral shall not exceed 5 percent total and 3 percent for any single harmonic. Telephone influence factor, determined according to NEMA MG 1, shall not exceed 50.
 7. Sustained Short-Circuit Current: (For engine-generator sets using a PMG-excited alternator) for a 1-phase, bolted short circuit at system output terminals, system shall regulate both voltage and current to prevent over-voltage conditions on the non-faulted phases.
 8. Start Time: Comply with NFPA 110, Level 1, Type 10, system requirements.
 9. Ambient Condition Performance: Engine generator shall be designed to allow operation at full rated load in an ambient temperature under site conditions, based on highest ambient condition. Ambient temperature shall be as measured at the air inlet to the engine generator for enclosed units, and at the control of the engine generator for machines installed in equipment rooms.

2.3 ENGINE

- A. Fuel: ASTM D975 #2 Diesel Fuel
- B. Rated Engine Speed: 1800RPM.
- C. Lubrication System: The following items are mounted on engine or skid:
 1. Lube oil pump: shall be positive displacement, mechanical, full pressure pump.
 2. Filter and Strainer: Provided by the engine manufacturer of record to provide adequate filtration for the prime mover to be used.

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3. Crankcase Drain: Arranged for complete gravity drainage to an easily removable container with no disassembly and without use of pumps, siphons, special tools, or appliances.
- D. Engine Fuel System: The engine fuel system shall be installed in strict compliance to the engine manufacturer's instructions
- E. Main Fuel Pump: Mounted on engine. Pump ensures adequate primary fuel flow under starting and load conditions.
- F. Coolant Jacket Heater: Electric-immersion type, factory installed in coolant jacket system. Comply with NFPA 110 requirements for Level 1 equipment for heater capacity and performance.
1. Designed for operation on a single 120 VAC, Single phase, 60Hz power connection. Heater voltage shall be shown on the project drawings.
 2. Installed with isolation valves to isolate the heater for replacement of the element without draining the engine cooling system or significant coolant loss.
 3. Provided with a 12VDC thermostat, installed at the engine thermostat housing
- G. Governor: Adjustable isochronous, with speed sensing. The governing system dynamic capabilities shall be controlled as a function of engine coolant temperature to provide fast, stable operation at varying engine operating temperature conditions. The control system shall actively control the fuel rate as appropriate to the state of the engine generator. Fuel rate shall be regulated as a function of starting, accelerating to start disconnect speed, accelerating to rated speed, and operating in various isochronous states.
- H. Cooling System: Closed loop, liquid cooled
1. The generator set manufacturer shall provide prototype test data for the specific hardware proposed demonstrating that the machine will operate at rated standby load in an outdoor ambient condition of 50 deg C.
 2. Coolant: Solution of 50 percent ethylene-glycol-based antifreeze and 50 percent water, with anticorrosion additives as recommended by engine manufacturer.
 3. Size of Radiator overflow tank: Adequate to contain expansion of total system coolant from cold start to 110 percent load condition.
 4. Expansion Tank: Constructed of welded steel plate and rated to withstand maximum closed-loop coolant system pressure for engine used. Equip with gage glass and petcock.
 5. Temperature Control: Self-contained, thermostatic-control valve modulates coolant flow automatically to maintain optimum constant coolant temperature as recommended by engine manufacturer.
- I. Muffler/Silencer: Selected with performance as required to meet sound requirements of the application, sized as recommended by engine manufacturer and selected with exhaust piping system to not exceed engine manufacturer's engine backpressure requirements. For generator sets with outdoor enclosures the silencer shall be inside the enclosure.

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- J. Air-Intake Filter: Engine-mounted air cleaner with replaceable dry-filter element and restriction indicator.
- K. Starting System: 12V, as recommended by the engine manufacturer; electric, with negative ground.
 - 1. Components: Sized so they will not be damaged during a full engine-cranking cycle with ambient temperature at maximum specified in Part 1 "Project Conditions" Article.
 - 2. Cranking Cycle: As required by NFPA 110 for level 1 systems.
 - 3. Battery Cable: Size as recommended by engine manufacturer for cable length as required. Include required interconnecting conductors and connection accessories.
 - 4. Battery Compartment: Factory fabricated of metal with acid-resistant finish.
 - 5. Battery-Charging Alternator: Factory mounted on engine with solid-state voltage regulation. The battery charging alternator shall have sufficient capacity to recharge the batteries with all parasitic loads connected within 4 hours after a normal engine starting sequence.
 - 6. Battery Chargers: Unit shall comply with UL 1236, provide fully regulated, constant voltage, current limited, battery charger for each battery bank. It will include the following features:
 - a. Operation: Equalizing-charging rate based on generator set manufacturer's recommendations shall be initiated automatically after battery has lost charge until an adjustable equalizing voltage is achieved at battery terminals. Unit shall then be automatically switched to a lower float-charging mode and shall continue to operate in that mode until battery is discharged again.
 - b. Automatic Temperature Compensation: Adjust float and equalize voltages for variations in ambient temperature from minus 20 deg C to plus 40 deg C to prevent overcharging at high temperatures and undercharging at low temperatures.
 - c. Automatic Voltage Regulation: Maintain constant output voltage regardless of input voltage variations up to plus or minus 10 percent.
 - d. Safety Functions: Sense abnormally low battery voltage and close contacts providing low battery voltage indication on control and monitoring panel. Sense high battery voltage and loss of ac input or dc output of battery charger. Either condition shall close contacts that provide a battery-charger malfunction indication at system control and monitoring panel.
 - e. Provide LED indication of general charger condition, including charging, faults, and modes. Provide a LCD display to indicate charge rate and battery voltage. Charger shall provide relay contacts for fault conditions as required by NFPA110.
 - f. Enclosure and Mounting: NEMA, Type 1, wall-mounted cabinet.

2.4 FUEL OIL STORAGE

- A. Comply with NFPA 30.
- B. Sub Base-Mounted Fuel Oil Tank: Provide a double wall secondary containment type sub base fuel storage tank. The tank shall be constructed of corrosion resistant steel and shall be UL 142 listed and labeled. The fuel tank shall include the following features:

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1. Capacity: Fuel for 24 Hour(s) continuous operation at 100 percent rated power output.
2. Tank rails and lifting eyes shall be rated for the full dry weight of the tank, genset, and enclosure.
3. Electrical stub up(s)
4. Normal & emergency vents
5. Lockable fuel fill
6. Mechanical fuel level gauge
7. High and low level switches to indicate fuel level
8. Leak detector switch
9. Sub base tank shall include a welded steel containment basin, sized at a minimum of 110% of the tank capacity to prevent escape of fuel into the environment in the event of a tank rupture.
10. Fill port with overflow prevention valve (OFPV)
11. 5 gallon fill/spill dam or bucket
12. Tank design shall meet the regional requirements for the Project location

2.5 CONTROL AND MONITORING

- A. Engine generator control shall be microprocessor based and provide automatic starting, monitoring, protection and control functions for the unit.
- B. Automatic Starting System Sequence of Operation: When mode-selector switch on the control and monitoring panel is in the automatic position, remote-control contacts in one or more separate automatic transfer switches initiate starting and stopping of generator set. When mode-selector switch is switched to the on position, generator set starts. The off position of same switch initiates generator-set shutdown. (Switches with different configurations but equal functions are acceptable.) When generator set is running, specified system or equipment failures or derangements automatically shut down generator set and initiate alarms. Operation of the local (generator set-mounted) and/or remote emergency-stop switch also shuts down generator set.
- C. Manual Starting System Sequence of Operation: Switching on-off switch on the generator control panel to the on position starts generator set. The off position of same switch initiates generator-set shutdown. When generator set is running, specified system or equipment failures or derangements automatically shut down generator set and initiate alarms. Operation of the local (generator set-mounted) and/or remote emergency-stop switch also shuts down generator set.
- D. Configuration: Operating and safety indications, protective devices, system controls, engine gages and associated equipment shall be grouped in a common control and monitoring panel. Mounting method shall isolate the control panel from generator-set vibration. AC output power circuit breakers and other output power equipment shall not be mounted in the control enclosure.
- E. Indicating and Protective Devices and Controls: As required by NFPA 110 for Level 1 system, and the following:
 1. AC voltmeter (3-phase, line to line and line to neutral values).

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2. AC ammeter (3-phases).
 3. AC frequency meter.
 4. Ammeter-voltmeter displays shall simultaneously display conditions for all three phases.
 5. Emergency Stop Switch: Switch shall be a red "mushroom head" pushbutton device complete with lock-out/tag-out provisions. Depressing switch shall cause the generator set to immediately stop the generator set and prevent it from operating.
 6. Fault Reset Switch: Supply a dedicated control switch to reset/clear fault conditions.
 7. DC voltmeter (alternator battery charging).
 8. Engine-coolant temperature gauge.
 9. Engine lubricating-oil pressure gauge.
 10. Running-time meter.
 11. Generator-voltage and frequency digital raise/lower switches. Rheostats for these functions are not acceptable. The control shall adjustment of these parameters in a range of plus or minus 5% of the voltage and frequency operating set point (not nominal voltage and frequency values.) The voltage and frequency adjustment functions shall be disabled when the paralleling breaker is closed.
 12. Fuel tank derangement alarm.
 13. Fuel tank high-level shutdown of fuel supply alarm.
 14. AC Protective Equipment: The control system shall include over/under voltage, reverse kVAR over current, loss of voltage reference, and over excitation shut down protection. There shall be a overload warning, and overcurrent warning alarm.
 15. Status LED indicating lamps to indicate remote start signal present at the control, existing shutdown condition, existing alarm condition, not in auto, and generator set running.
 16. A graphical display panel with appropriate navigation devices shall be provided to view all information noted above, as well as all engine status and alarm/shutdown conditions (including those from an integrated engine emission control system). The display shall also include integrated provisions for adjustment of the gain and stability settings for the governing and voltage regulation systems.
 17. Panel lighting system to allow viewing and operation of the control when the generator room or enclosure is not lighted.
 18. Data Logging: The control system shall log the latest 20 different alarm and shut down conditions, the total number of times each alarm or shutdown has occurred, and the date and time the latest of these shutdown and fault conditions occurred.
 19. DC control Power Monitoring: The control system shall continuously monitor DC power supply to the control, and annunciate low or high voltage conditions. It shall also provide an alarm indicating imminent failure of the battery bank based on degraded voltage recover on loading (engine cranking).
- F. Common Remote Audible Alarm: Comply with NFPA 110 requirements for Level 1 systems. Include necessary contacts and terminals in control and monitoring panel.
1. Overcrank shutdown.
 2. Coolant low-temperature alarm.
 3. Control switch not in auto position.
 4. Battery-charger malfunction alarm.
 5. Battery low-voltage alarm.

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- G. Remote Alarm Annunciator: Comply with NFPA 110. An LED labeled with proper alarm conditions shall identify each alarm event and a common audible signal shall sound for each alarm condition.
- H. Remote Emergency-Stop Switch: Flush; wall mounted, unless otherwise indicated; and labeled. Push button shall be protected from accidental operation.

2.6 GENERATOR, EXCITER, AND VOLTAGE REGULATOR

- A. Comply with NEMA MG 1.
- B. Drive: Generator shaft shall be directly connected to engine shaft. Exciter shall be rotated integrally with generator rotor.
- C. Electrical Insulation: Class H
- D. Temperature Rise: 120 / Class H environment.
- E. Construction shall prevent mechanical, electrical, and thermal damage due to vibration, over speed up to 125 percent of rating, and heat during operation at 110 percent of rated capacity.
- F. Permanent Magnet Generator (PMG) shall provide excitation power for optimum motor starting and short circuit performance.
- G. Enclosure: Drip-proof.
- H. Voltage Regulator: SCR type, Separate from exciter, providing performance as specified. The voltage regulation system shall be microprocessor-controlled, full wave rectified, and provide a pulse-width modulated signal to the exciter. No exceptions or deviations to these requirements will be permitted.
- I. Windings: Two-thirds pitch stator winding and fully linked amortisseur winding.
- J. Subtransient Reactance: 10 percent maximum, based on the rating of the engine generator set.

2.7 OUTDOOR GENERATOR-SET ENCLOSURE

- A. Description: Weather Aluminum housing. Multiple panels shall be lockable and provide adequate access to components requiring maintenance. Instruments, control, and battery system shall be mounted within enclosure.
- B. Construction:
 - 1. Hinged Doors: With padlocking provisions. Restraint/Hold back hardware to prevent door to keep door open at 180 degrees during maintenance. Rain lips over all doors.

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2. Exhaust System:
 - a. Muffler Location: Within enclosure.
 3. Hardware: All hardware and hinges shall be stainless steel.
 4. Mounting Base: Suitable for mounting on sub-base fuel tank or housekeeping pad.
 5. A weather protective enclosure shall be provided which allows the generator set to operate at full rated load with a static pressure drop equal to or less than 0.5 inches of water.
- C. Engine Cooling Airflow through Enclosure: Housing shall provide ample airflow for engine generator operation at rated load in an ambient temperature of 50 deg C.
 1. Louvers: Fixed-engine, cooling-air inlet and discharge.
- D. Sound Performance: Reduce the sound level of the engine generator while operating at full rated load to a maximum of 82 dBA measured at any location 7 m from the engine generator in a free field environment.
- E. Site Provisions:
 1. Lifting: Complete assembly of engine generator, enclosure, and sub base fuel tank (when used) shall be designed to be lifted into place as a single unit, using spreader bars.

2.8 VIBRATION ISOLATION DEVICES

- A. Vibration Isolation: Generators installed on grade shall be provided with elastomeric isolator pads integral to the generator, unless the engine manufacturer requires use of spring isolation.
- B. IBC Compliance: Isolators complying with IBC requirements shall be specified in the equipment documentation, as well as the installation requirements for the unit.

2.9 FINISHES

- A. Indoor and Outdoor Enclosures and Components: Powder-coated and baked over corrosion-resistant pretreatment and compatible primer. Manufacturer's standard color or as directed on the drawings.

2.10 SOURCE QUALITY CONTROL

- A. Prototype Testing: Factory test engine-generator set using same engine model, constructed of identical or equivalent components and equipped with identical or equivalent accessories.

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1. Tests: Comply with NFPA 110, Level 1 Energy Converters. In addition, the equipment engine, skid, cooling system, and alternator shall have been subjected to actual prototype tests to validate the capability of the design under the abnormal conditions noted in NFPA110. Calculations and testing on similar equipment which are allowed under NFPA110 are not sufficient to meet this requirement.
- B. Project-Specific Equipment Tests: Before shipment, factory test engine-generator set manufactured specifically for this Project. Perform tests at rated load and power factor. Include the following tests:
 1. Test engine generator set manufactured for this Project to demonstrate compatibility and functionality.
 2. Full load run.
 3. Maximum power.
 4. Voltage regulation.
 5. Steady-state governing.
 6. Single-step load pickup.
 7. Simulated safety shutdowns.
 8. Provide 14 days' advance notice of tests and opportunity for observation of tests by Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with packaged engine-generator manufacturers' written installation, application, and alignment instructions and with NFPA 110.
- B. Equipment shall be installed by the contractor in accordance with final submittals and contract documents. Installation shall comply with applicable state and local codes as required by the authority having jurisdiction. Install equipment in accordance with manufacturer's instructions and instructions included in the listing or labeling of UL listed products.
- C. Installation of equipment shall include furnishing and installing all interconnecting wiring between all major equipment provided for the on-site power system. The contractor shall also perform interconnecting wiring between equipment sections (when required), under the supervision of the equipment supplier.
- D. Equipment shall be installed on concrete housekeeping pads. Equipment shall be permanently fastened to the pad in accordance with manufacturer's instructions and seismic requirements of the site.
- E. Equipment shall be initially started and operated by representatives of the manufacturer. All protective settings shall be adjusted as instructed by the consulting engineer.

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- F. All equipment shall be physically inspected for damage. Scratches and other installation damage shall be repaired prior to final system testing. Equipment shall be thoroughly cleaned to remove all dirt and construction debris prior to initial operation and final testing of the system.
- G. On completion of the installation by the electrical contractor, the generator set supplier shall conduct a site evaluation to verify that the equipment is installed per manufacturer's recommended practice.

3.2 ON-SITE ACCEPTANCE TEST

- A. The complete installation shall be tested to verify compliance with the performance requirements of this specification following completion of all site work. Testing shall be conducted by representatives of the manufacturer, with required fuel supplied by Contractor. The Engineer shall be notified in advance and shall have the option to witness the tests. The generator set manufacturer shall provide a site test specification covering the entire system. Tests shall include:
 - B. Prior to start of active testing, all field connections for wiring, power conductors, and bus bar connections shall be checked for proper tightening torque.
 - C. Installation acceptance tests to be conducted on site shall include a "cold start" test, a two hour full load (resistive) test, and a one-step rated load pickup test in accordance with NFPA 110. Provide a resistive load bank and make temporary connections for full load test, if necessary.
 - D. Perform a power failure test on the entire installed system. This test shall be conducted by opening the power supply from the utility service, and observing proper operation of the system for at least 2 hours. Coordinate timing and obtain approval for start of test with site personnel.

3.3 TRAINING

- A. The equipment supplier shall provide training for the facility operating personnel covering operation and maintenance of the equipment provided. The training program shall be not less than 4 hours in duration and the class size shall be limited to 5 persons. Training date shall be coordinated with the facility owner.

3.4 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

3.5 SERVICE AND SUPPORT

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- A. The generator set supplier shall maintain service parts inventory for the entire power system at a central location which is accessible to the service location 24 hours per day, 365 days per year. The inventory shall have a commercial value of \$3 million or more. The manufacturer of the generator set shall maintain a central parts inventory to support the supplier, covering all the major components of the power system, including engines, alternators, control systems, paralleling electronics, and power transfer equipment.
- B. The generator set shall be serviced by a local service organization that is trained and factory certified in generator set service. The supplier shall maintain an inventory of critical power system replacement parts in the local service location. Service vehicles shall be stocked with critical replacement parts. The service organization shall be on call 24 hours per day, 365 days per year. The service organization shall be physically located within 50 of the site.
- C. The manufacturer shall maintain model and serial number records of each generator set provided for at least 20 years.

END OF SECTION

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SECTION 26 36 00 - TRANSFER SWITCHES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes transfer switches rated 600 V and less, including the following:
1. Automatic transfer switches: 200A, 120/240 single phase, NEMA 3R.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, weights, operating characteristics, furnished specialties, and accessories.
1. Technical data on all major components of all transfer switches and other products described in this section. Data is required for the transfer switch mechanism, control system, cabinet, and protective devices specifically listed for use with each transfer switch. Include steady state and fault current ratings, weights, operating characteristics, and furnished specialties and accessories.
 2. Single Line Diagram: Show connections between transfer switch, power sources and load
- B. Shop Drawings: Dimensioned plans, elevations, sections, and details showing minimum clearances, conductor entry provisions, gutter space, installed features and devices, and material lists for each switch specified.
1. Dimensioned outline drawings of assembly, including elevations, sections, and details including minimal clearances, conductor entry provisions, gutter space, installed features and devices and material lists for each switch specified.
 2. Internal electrical wiring and control drawings.
 3. Interconnection wiring diagrams, showing recommended conduit runs and point-to-point terminal connections to generator set.
 4. Installation and mounting instructions, including information for proper installation of equipment to meet seismic requirements.
- C. Manufacturer and Supplier Qualification Data
1. The transfer switch manufacturer shall be certified to ISO 9001 International Quality Standard and shall have third party certification verifying quality

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assurance in design/development, production, installation, and service, in accordance with ISO 9001.

2. The manufacturer of this equipment shall have produced similar equipment for a minimum period of 10 years. When requested, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.
- D. Operation and Maintenance Data: For each type of product to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:
1. Features and operating sequences, both automatic and manual.
 2. List of all factory settings of relays, timers and protective devices; provide setting and calibration instructions where applicable.
- E. Warranty documents demonstrating compliance with the project's contract requirements.

1.3 QUALITY ASSURANCE

- F. Manufacturer Qualifications: The equipment supplier shall maintain a service center capable of providing training, parts, maintenance and emergency repairs to equipment, including transfer switch generator sets and remote monitoring equipment (if applicable) at the site within a response period of less than (eight hours or appropriate time period designated for Project) from time of notification.
1. The transfer switch shall be serviced by technicians employed by, and specially trained and certified by, the generator set supplier and the supplier shall have a service organization that is factory-certified in both generator set and transfer switch service. The supplier shall maintain an inventory of critical replacement parts at the local service organization, and in service vehicles. The service organization shall be on call 24 hours per day, 365 days per year.
 2. Submit names, experience level, training certifications, and locations for technicians that will be responsible for servicing equipment at this site.
 3. The manufacturer shall maintain model and serial number records of each transfer switch provided for at least 20 years.

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- G. Source Limitations: All transfer switches are to be obtained through one source from a single manufacturer. The generator set manufacturer shall warrant transfer switches to provide a single source of responsibility for products provided.
- H. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked as suitable for use in emergency, legally required or optional standby use as appropriate for the connected load.
- I. The automatic transfer switch installation and application shall conform to the requirements of the following codes and standards:
1. Transfer switches and enclosures shall be UL 1008 listed and labeled as suitable for use in emergency, legally required, and optional standby applications.
 2. CSA 282, Emergency Electrical Power Supply for Buildings, and CSA C22.2, No. 14-M91 Industrial Control Equipment
 3. NFPA 70, National Electrical Code. Equipment shall be suitable for use in systems in compliance with Articles 700, 701 and 702.
 4. Comply with NEMA ICS 10-1993 AC Automatic Transfer Switches
 5. IEEE 446 – Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications
 6. EN55011, Class B Radiated Emissions and Class B Conducted Emissions
 7. IEC 1000-4-5 (EN 61000-4-5); AC Surge Immunity
 8. IEC 1000-4-4 (EN 61000-4-4) Fast Transients Immunity
 9. IEC 1000-4-2 (EN 61000-4-2) Electrostatic Discharge Immunity
 10. IEC 1000-4-3 (EN 61000-4-3) Radiated Field Immunity
 11. IEC 1000-4-6 Conducted Field Immunity
 12. IEC 1000-4-11 Voltage Dip Immunity
 13. IEEE 62.41, AC Voltage Surge Immunity
 14. IEEE 62.45, AC Voltage Surge Testing
- J. Comply with NFPA 99 – Essential Electrical Systems for Healthcare Facilities

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- K. Comply with NFPA 110 – Emergency and Standby Power Systems. The transfer switch shall meet all requirements for Level 1 systems, regardless of the actual circuit level.
- L. The manufacturer shall warrant the material and workmanship of the transfer switch equipment for a minimum of two (2) year from the warranty start date. The warranty start date is the date of registered commissioning and start up or eighteen (18) months from date of shipment, whichever is sooner.
- M. The warranty shall be comprehensive. No deductibles shall be allowed for travel time, service hours, repair parts cost, and etc. during the minimum noted warranty period described above.

1.4 PROJECT CONDITIONS

- A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service:
 - 1. Notify (Architect/Construction Manager/Owner) no fewer than (insert appropriate number) days in advance of proposed interruption of electrical service.
 - 2. Do not proceed with interruption of electrical service without (Architect/Construction Manager/Owner's) written permission.
 - 3. Do not energize any new service or distribution equipment without notification and permission of the (Architect/Construction Manager/Owner).

1.5 COORDINATION

- A. Size and location of concrete bases and anchor bolt inserts shall be coordinated. Concrete, reinforcement and formwork must meet the requirements specified in Division 03. See section "INSTALLATION" for additional information on installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Cummins Power Generation

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- B. Equipment specifications for this Project are based on automatic transfer switches manufactured by Cummins Power Generation. Switches manufactured by other manufacturers that meet the requirement of this specification are acceptable, if approved not less than two weeks before scheduled bid date. Proposals must include a line-by-line compliance statement based on this specification.

2.2 GENERAL TRANSFER-SWITCH PRODUCT REQUIREMENTS

- A. Provide transfer switches in the number and ratings that are shown on the drawings.
- B. Indicated Current Ratings: Apply as defined in UL 1008 for continuous loading and total system transfer.
- C. Fault-Current Closing and Withstand Ratings: UL 1008 WCR ratings must be specifically listed as meeting the requirements for use with protective devices at installation locations, under specified fault conditions. Withstand and closing ratings shall be based on use of the same set of contacts for the withstand test and the closing test.
- D. Solid-State Controls: All settings should be accurate to +/- 2% or better over an operating temperature range of - 40 to + 60 degrees C (- 40 to + 140 degrees F).
- E. Resistance to Damage by Voltage Transients: Components shall meet or exceed voltage-surge withstand capability requirements when tested according to IEEE C62.41. Components shall meet or exceed voltage-impulse withstand test of NEMA ICS 1.
- F. Electrical Operation: Accomplished by a non-fused, momentarily energized solenoid or electric motor operator mechanism, mechanically and electrically interlocked in both directions (except that mechanical interlock is not required for closed transition switches).
- G. Switch Characteristics: Designed for continuous-duty repetitive transfer of full-rated current between active power sources.
 - 1. Switches using molded-case switches or circuit breakers, or insulated case circuit breaker components are not acceptable.
 - 2. Transfer switches shall be double-throw, electrically and mechanically interlocked, and mechanically held in the Source 1 and Source 2 positions.
 - 3. Main switch contacts shall be high pressure silver alloy. Contact assemblies shall have arc chutes for positive arc extinguishing. Arc chutes shall have insulating covers to prevent inter-phase flashover.
 - 4. Contacts shall be operated by a high-speed electrical mechanism that causes contacts to open or close within three electrical cycles from signal.
 - 5. Transfer switch shall be provided with flame retardant transparent covers to allow viewing of switch contact operation but prevent direct contact with components that could be operating at line voltage levels.

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6. The transfer switch shall include the mechanical and control provisions necessary to allow the device to be field-configured for operating speed. Transfer switch operation with motor loads shall be as is recommended in NEMA MG1.
 - a. Phase angle monitoring/timing equipment is not an acceptable substitute for this functionality
 7. Transfer switches designated on the drawings as "3-pole" shall have a full current-rated neutral bar with lugs.
 8. Transfer switches designated on the drawings as "service entrance" switches shall meet the requirements of section "SERVICE ENTRANCE TRANSFER SWITCHES" of this specification.
- H. Factory wiring: Transfer switch internal wiring shall be composed of pre-manufactured harnesses that are permanently marked for source and destination. Harnesses shall be connected to the control system by means of locking disconnect plug(s), to allow the control system to be easily disconnected and serviced without disconnecting power from the transfer switch mechanism
- I. Terminals: Terminals shall be pressure type and appropriate for all field wiring. Control wiring shall be equipped with suitable lugs, for connection to terminal strips.
- J. Enclosures: All enclosures shall be third-party certified for compliance to NEMA ICS 6 and UL 508, unless otherwise indicated:
1. The enclosure shall provide wire bend space in compliance to the latest version of NFPA70, regardless of the direction from which the conduit enters the enclosure.
 2. Exterior cabinet doors shall provide complete protection for the system's internal components. Doors must have permanently mounted key-type latches. Bolted covers or doors are not acceptable.
 3. Transfer switches shall be provided in enclosures that are third party certified for their intended environment per NEMA requirements.

2.3 AUTOMATIC TRANSFER SWITCHES

- A. Comply with requirements for Level 1 equipment according to NFPA 110.
- B. Indicated current ratings:
1. Refer to the Project drawings for specifications on the sizes and types of transfer switch equipment, withstand and closing ratings, number of poles, voltage and ampere ratings, enclosure type, and accessories.
 2. Main contacts shall be rated for 600 VAC minimum.
 3. Transfer switches shall be rated to carry 100% of rated current continuously in the enclosure supplied, in ambient temperatures of -40 to +60 degrees C (-40 to +140 degrees F), relative humidity up to 95% (non-condensing), and altitudes up to 10,000 feet (3000 meters).

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- C. Relay Signal: Control shall include provisions for addition of a pre-transfer relay signal, adjustable from 0 to 60 seconds, to be provided if necessary for elevator operation, based on equipment provided for the project.
- D. Transfer switches that are designated on the drawings as 3-pole shall be provided with a neutral bus and lugs. The neutral bus shall be sized to carry 100% of the current designated on the switch rating.
- E. Automatic Transfer Switch Control Features
1. The transfer switch control system shall be configurable in the field for any operating voltage level up to 600 VAC. Voltage sensing shall be monitored based on the normal voltage at the site. Systems that utilize voltage monitoring based on standard voltage conditions that are not field configurable are not acceptable.
 2. All transfer switch sensing shall be configurable from an operator panel or from a Windows XP or later PC-based service tool. Designs utilizing DIP switches or other electromechanical devices are not acceptable.
 3. The transfer switch shall provide a relay contact signal prior to transfer or re-transfer. The time period before and after transfer shall be adjustable in a range of 0 to 60 seconds.
 4. The control system shall be designed and prototype tested for operation in ambient temperatures from - 40 degrees C to + 60 degrees C (- 40 to +140 degrees F). It shall be designed and tested to comply with the requirements of the noted voltage and RFI/EMI standards.
 5. The control shall have optically isolated logic inputs, high isolation transformers for AC inputs and relays on all outputs, to provide optimum protection from line voltage surges, RFI and EMI.
 6. The transfer switch network monitoring equipment, when supplied, shall be provided with a battery-based auxiliary power supply to allow monitoring of the transfer switch when both AC power sources are non-operational.
- F. Transfer Switch Control Panel: The transfer switch shall have a microprocessor-based control with a sealed membrane panel incorporating pushbuttons for operator-controlled functions, and LED lamps for system status indicators. The panel shall also include an alphanumeric display for detailed system information. Panel display and indicating lamps shall include permanent labels.
1. The indicator panel LEDs shall display:
 - a. Which source the load is connected to (Source 1 or Source 2)
 - b. Which source or sources are available
 - c. When switch is not set for automatic operation, the control is disabled
 - d. When the switch is in test/exercise mode
 2. The indicator shall have pushbuttons that allow the operator to activate the following functions:
 - a. Activate pre-programmed test sequence
 - b. Override programmed delays, and immediately go to the next operation
 - c. Reset the control by clearing any faults

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- d. Test all of the LEDs by lighting them simultaneously
- 3. The alphanumeric digital display shall be vacuum fluorescent-type, clearly visible in both bright sunlight and no-light conditions over an angle of 120 degrees, and shall display the following:
 - a. AC voltage for all phases, normal and emergency
 - b. Source status: connected or not connected.
- 4. The display panel shall be password-protected, and allow the operator to view and make adjustments:
 - a. Set nominal voltage and frequency for the transfer switch
 - b. Adjust voltage and frequency sensor operation set points
 - c. Set up time clock functions
 - d. Set up load sequence functions
 - e. Enable or disable control functions including program transition
 - f. View real-time clock data, operation log (hours connected, times transferred, failures) and service history
- G. Control Functions: Functions managed by the control shall include:
 - 1. Software adjustable time delays:
 - a. Engine start (prevents nuisance genset starts in the event of momentary power fluctuation): 0 to 120 seconds (default 3 sec)
 - b. Transfer normal to emergency (allows genset to stabilize before load is transferred): 0 to 120 seconds (default 3 sec)
 - c. Re-transfer emergency to normal (allows utility to stabilize before load is transferred from genset): 0 to 30 minutes (default 3 sec)
 - d. Engine cooldown: 0 to 30 minutes (default 10 min)
 - e. Programmed transition: 0 to 60 seconds (default 3 sec)
 - 2. Voltage imbalance sensing:
 - a. Dropout: 2 to 10% (default 4%)
 - b. Pickup: 90% of dropout
 - c. Time delay: 2.0 to 20 seconds (default 5 sec)
 - 3. Phase rotation sensing:
 - a. Time delay: 100 msec
 - 4. Loss of single-phase detection:
 - a. Time delay: 100 msec
- H. Control features shall include:
 - 1. Programmable genset exerciser: A field-programmable control shall periodically start and run the generator with or without transferring the load for a preset time period, then re-transfer and shut down the generator after a preset cool-down period.

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2. In event of a loss of power to the control, all control settings, real-time clock setting and the engine start-time delay setting will be retained.
 3. The system continuously logs information including the number of hours each source has been connected to the load, the number of times transferred, and the total number of times each source has failed. An event recorder stores information, including time and date-stamp, for up to 50 events.
 4. Re-Transfer Inhibit Switch: Inhibits automatic re-transfer control so automatic transfer switch will remain connected to emergency power source as long as it is available regardless of condition of normal source.
 5. Transfer Inhibit Switch: Inhibits automatic transfer control so automatic transfer switch will remain connected to normal power source regardless of condition of emergency source.
- I. Control Interface
1. Provide one set Form C auxiliary contacts on both sides, operated by transfer switch position, rated 10 amps 250 VAC.
- J. Engine Starting Contacts
1. One isolated and normally closed pair of contacts rated 10A at 32 VDC minimum.

2.4 SERVICE ENTRANCE TRANSFER SWITCHES

- A. Transfer switches must be specifically intended for service entrance applications, and labeled "Suitable for service entrance use only"
- B. Transfer switch shall meet NEC requirements for emergency, legally required and standby applications as specified in UL 1008.
- C. Entire transfer switch including enclosure must be listed and labeled to UL 1008; switches with only the mechanism listed are not acceptable.
- D. Molded case circuit breaker must be UL 489 listed.

2.5 REMOTE ANNUNCIATOR SYSTEM

- A. Functional Description: Remote annunciator panel shall annunciate conditions for indicated transfer switches. Annunciation shall include the following:
 1. Sources available, as defined by actual pickup and dropout settings of transfer-switch controls.
 2. Switch position.
 3. Switch in test mode.
 4. Failure of communication link.

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- B. Annunciator Panel: LED-lamp type with audible signal and silencing switch.
 - 1. Indicating Lights: Grouped for each transfer switch monitored.
 - 2. Label each group, indicating transfer switch it monitors, location of switch, and identity of load it serves.
 - 3. Switch in test mode.
 - 4. Lamp Test: Push-to-test or lamp-test switch on front panel.
- C. Malfunction of annunciator or communication link shall not affect functions of automatic transfer switch. In the event of failure of communication link, automatic transfer switch automatically reverts to stand-alone, self-contained operation.
- D. Automatic transfer-switch sensing, controlling, or operating function shall not depend on remote panel for proper operation. The remote annunciation system shall not prevent transfer to the alternate source when the primary power source fails, nor prevent return to the primary source if the alternate source fails.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Design each fastener and support to carry load indicated by seismic requirements and according to seismic-restraint details. See Division 26 Section "Vibration and Seismic Controls for Electrical Systems."
- B. Floor-Mounting Switch: Anchor to floor by bolting.
 - 1. Floor-mounted transfer switches (except drawout switches supported by wheeled carriages, which must be rolled out at floor level) shall be mounted on concrete bases complying with the following requirements:
 - a. Concrete Bases: 4 inches (100 mm) high, reinforced, with chamfered edges. Extend base no more than 4 inches (100 mm) in all directions beyond the maximum dimensions of switch, unless otherwise indicated or unless required for seismic support. Construct concrete bases according to Division 26 Section "Hangers and Supports for Electrical Systems."
- C. Annunciator Panel Mounting: Flush in wall, unless otherwise indicated.
- D. Identify components according to Division 26 Section "Identification for Electrical Systems."
- E. Set field-adjustable intervals and delays, relays, and engine exerciser clock.

3.2 CONNECTIONS

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- A. Wiring to Remote Components: Match type and number of cables and conductors to control and communication requirements of transfer switches as recommended by manufacturer. Increase raceway sizes at no additional cost to Owner if necessary to accommodate required wiring.
- B. Field control connections shall be made on a common terminal block that is clearly and permanently labeled.
- C. Transfer switch shall be provided with AL/CU mechanical lugs sized to accept the full output rating of the switch. Lugs shall be suitable for the number and size of conductors shown on the drawings.
- D. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."
- E. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.3 SOURCE QUALITY CONTROL

- A. Prior to shipping, factory shall test and inspect components, assembled switches, and associated equipment to ensure proper operation.
- B. Factory shall check transfer time and voltage, frequency, and time-delay settings for compliance with specified requirements.
- C. Factory shall perform dielectric strength test complying with NEMA ICS 1.

3.4 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: The supplier of the transfer switch(es) and associated equipment shall inspect, test, and adjust components, assemblies, and equipment installations, including connections, and report results in writing.
- B. Manufacturer's representative shall perform tests and inspections and prepare test reports.
- C. After installing equipment and after electrical circuitry has been energized, installer shall test for compliance with requirements.
 - 1. Perform recommended installation tests as recommended in manufacturer's installation and service manuals.
 - 2. After energizing circuits, demonstrate interlocking sequence and operational function for each switch.
 - a. Simulate power failures of normal source to automatic transfer switches and of emergency source with normal source available.

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- b. Verify time-delay settings.
 - c. Verify that the transfer switch is accurately metering AC voltage.
 - d. Verify proper sequence and correct timing of automatic engine starting, transfer time delay, retransfer time delay on restoration of normal power, and engine cool-down and shutdown.
- D. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each switch. Remove all access panels so joints and connections are accessible to portable scanner.
- 1. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each switch 11 months after date of Substantial Completion.
 - 2. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
 - 3. Record of Infrared Scanning: Prepare a certified report that identifies switches checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 DEMONSTRATION

- A. After generator set installation, the generator and transfer switch supplier shall conduct a complete operation, basic maintenance, and emergency service seminar covering generator set and transfer switch equipment, for up to 10 people employed by the Owner.
- 1. The seminar shall include instruction on operation of the transfer equipment, normal testing and exercise, adjustments to the control system, use of the PC based service and maintenance tools provided under this contract, and emergency operation procedures.
 - 2. The class duration shall be at least 8 hours in length, and include practical operation with the installed equipment.

3.6 SERVICE AND SUPPORT

- A. The manufacturer shall supply the Service Provider with a complete set of the service and maintenance software required to support the product. The software shall be provided at a training class attended by the user, to qualify the user in proper use of the software. The software shall have the following features and capabilities:
- 1. The software shall allow adjustment of all functions described herein, adjustment of operating levels of all protective functions, and programming of all optional functions in the controller. Adjustments shall be possible over modem from a facility that is remote from the generator set.

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2. The software shall be capable of storing and displaying data for any function monitored by the generator set control. This data shall be available in common file formats, and on graphical "strip chart" displays.
3. The software shall automatically record all control operations and adjustments performed by any operator or software user, for tracking of changes to the control.
4. The software shall display all warning, shutdown, and status changes programmed into transfer switch controller. For each event, the control shall provide information on the nature of the event, when it last occurred, and how many times it has occurred.

END OF SECTION 26 36 00

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SECTION 26 43 13 - SURGE PROTECTION FOR LOW-VOLTAGE ELECTRICAL POWER CIRCUITS

PART 1 - GENERAL

1.1 GENERAL SPD REQUIREMENTS

- A. SPD with Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.
- C. Comply with UL 1449.
- D. MCOV of the SPD shall be the nominal system voltage.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 SERVICE ENTRANCE SUPPRESSORS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 1. Schneider Electric USA, Inc.
- B. Surge Protective Devices (SPD): Integrally mounted, complying with UL 1449 Type 1.
 - 1. The minimum single-pulse surge current withstand rating per phase shall not be less than 200 kA. Non-modular type with the following features and accessories:
 - a. Integral disconnect switch.
 - b. LED indicator lights for power and protection status.
- C. Protection modes and UL 1449 voltage protection rating (VPR) for grounded wye circuits with 208Y/120 V, three-phase, four-wire circuits shall be as follows:
 - 1. Line to Neutral: 600 V for 208Y/120 V.

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2. Line to Ground: 1000 V for 208Y/120 V.
 3. Line to Line: 1000 V for 208Y/120 V.
- D. Protection modes and UL 1449 VPR for 240/120 V, single-phase, three-wire circuits shall be as follows:
1. Line to Neutral: 700 V.
 2. Line to Ground: 1000 V.
 3. Line to Line: 1000 V.

2.3 ENCLOSURES

- A. Indoor Enclosures: NEMA 250, Type 1.
- B. Outdoor Enclosures: NEMA 250, Type 3R.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Do not energize or connect service entrance equipment to their sources until transient-voltage surge-suppression devices are installed and connected.

END OF SECTION 26 43 13

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SECTION 31 10 00 - SITE CLEARING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
- B. Salvageable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.
- C. Utility Locator Service: Notify "One Call" for area where Project is located before site clearing.
- D. Do not commence site-clearing operations until temporary erosion- and sedimentation-control and plant-protection measures are in place.
- E. Soil Stripping, Handling, and Stockpiling: Perform only when topsoil is dry or slightly moist.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance.
- B. Locate and clearly flag trees and vegetation to remain or to be relocated.
- C. Protect remaining trees and shrubs from damage and maintain vegetation. Employ a licensed arborist to repair tree and shrub damage. Restore damaged vegetation. Replace damaged trees that cannot be restored to full growth, as determined by arborist.
- D. Do not store materials or equipment or permit excavation within drip line of remaining trees.
- E. Protect site improvements to remain from damage. Restore damaged improvements to condition existing before start of site clearing.

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- F. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to a sediment and erosion control plan, specific to the site, that complies with EPA document No. EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.
- G. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed or abandoned in place.
 - 1. Arrange with utility companies to shut off indicated utilities.

3.2 SITE CLEARING

- A. Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction.
 - 1. Grind down stumps and remove roots, obstructions, and debris to a depth of 18 inches below exposed subgrade.
 - 2. Chip brush, branches, and trees and dispose of off-site.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
- C. Strip topsoil. Remove sod and grass before stripping topsoil. Stockpile topsoil away from edge of excavations without intermixing with subsoil. Grade stockpiles to drain water.
 - 1. Stockpile surplus topsoil to allow for respreading deeper topsoil.
- D. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.
- E. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
 - 1. Neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement.
- F. Dispose of waste materials and excess topsoil, off Owner's property. Burning waste materials on-site is not permitted.
 - 1. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities.

END OF SECTION 31 10 00

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SECTION 31 31 16 - TERMITE CONTROL

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product data and product certificates. Include EPA-registered label.
- B. Installer Qualifications: A specialist who is licensed according to regulations of authorities having jurisdiction to apply termite-control treatment and products in jurisdiction where Project is located, and who employs workers trained and approved by manufacturer to install manufacturer's products, and who is accredited by manufacturer.

1.2 WARRANTY

- A. As a part of the termite control work, issue for delivery to the Department, a Termite Damage Warranty with performance jointly Warranted by the manufacturer of the chemicals and the applicator and with performance further insured by an insurance company authorized to do business in the State of Arkansas.
- B. The Damage Warranty shall provide service and reservice for any subterranean termite infestation without cost to the Department. In addition, the Damage Guaranty Contract shall cover any and all subterranean termite damage to any of the structures and/or contents. Such damage to be repaired, replaced or corrected without cost to the Department.
- C. The Damage Warranty shall be effective for a period of five (5) years after completion of the initial treatment without payment of any additional fees or premiums by the Department. Upon expiration of the five (5) year period, the Department shall have the option of extending the Damage Warranty Contract at an annual fee mutually agreed upon by the Department and the applicator. The Department shall reserve the right to cancel as of any anniversary date. The service, reservice and Damage Guaranty provisions of the Contract shall be non-cancelable by the applicator, the manufacturers of the chemicals and the insurance company. The annual fee shall be subject to revision as of the fifth of any later extension date by giving advance written notice to the Department.
- D. Upon completion of the work, the Damage Warranty shall be issued in duplicate, one (1) copy for the General Contractor and one (1) for the Department.

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PART 2 - PRODUCTS

2.1 TERMITE-CONTROL PRODUCTS

- A. Soil Treatment Termiticide: EPA-registered termiticide acceptable to authorities having jurisdiction, in an aqueous solution.
 - 1. Service Life of Treatment: Soil treatment termiticide that is effective for not less than five years against infestation of subterranean termites.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Comply with requirements of authorities having jurisdiction and with manufacturer's EPA-registered label for products.
- B. Soil Treatment Application: Provide a continuous horizontal and vertical termiticidal barrier or treated zone around and under building construction:
 - 1. At foundations.
 - 2. Under concrete floor slabs-on-grade.
 - 3. Under basement floor slabs.
 - 4. At hollow masonry.
 - 5. At expansion and control joints and slab penetrations.
 - 6. At crawlspaces; treat soil under and adjacent to foundations. Treat adjacent areas, including around entrance platform, porches, and equipment bases.
- C. Post warning signs in areas of soil treatment application.
- D. Reapply soil termiticide treatment solution to areas disturbed by subsequent excavation or other construction activities following application.

3.2 MAINTENANCE SERVICE

- A. Continuing Service: Provide 12 months' continuing service, including monitoring, inspection, and re-treatment for occurrences of termite activity.

END OF SECTION 31 31 16



SUBMITTAL TRANSMITTAL

Project: _____ Date: _____
A/E Project Number: _____

TRANSMITTAL To (Contractor): _____ Date: _____ Submittal No. _____
A From (Subcontractor): _____ By: _____ Resubmission

Table with 4 columns: Qty., Reference / Number, Title / Description / Manufacturer, Spec. Section Title and Paragraph / Drawing Detail Reference

- Submitted for review and approval
Resubmitted for review and approval
Complies with contract requirements
Will be available to meet construction schedule
A/E review time included in construction schedule
Substitution involved - Substitution request attached
If substitution involved, submission includes point-by-point comparative data or preliminary details
Items included in submission will be ordered immediately upon receipt of approval

Other remarks on above submission: One copy retained by sender

TRANSMITTAL To (A/E): _____ Attn: _____ Date Rec'd by Contractor: _____
B From (Contractor): _____ By: _____ Date Trnsmt'd by Contractor: _____

- Approved
Approved as noted
Revise / Resubmit
Rejected / Resubmit

Other remarks on above submission: One copy retained by sender

TRANSMITTAL To (Contractor): _____ Attn: _____ Date Rec'd by A/E: _____
C From (A/E): _____ Other By: _____ Date Trnsmt'd by A/E: _____

- Approved
Approved as noted
Not subject to review
No action required
Revise / Resubmit
Rejected / Resubmit
Approved as noted / Resubmit
Provide file copy with corrections identified
Sepia copies only returned
Point-by-point comparative data required to complete approval process
Submission Incomplete / Resubmit

Other remarks on above submission: One copy retained by sender

TRANSMITTAL To (Subcontractor): _____ Attn: _____ Date Rec'd by Contractor: _____
D From (Contractor): _____ By: _____ Date Trnsmt'd by Contractor: _____

Copies: Owner Consultants _____ One copy retained by sender