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SECTION 00 0200
BIDDING REQUIREMENTS

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BIDDING REQUIREMENTS

FOR SMALL PROJECTS (U.S.)

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INVITATION TO BID (U.S.)

1. CONTRACTORS INVITED TO BID THE PROJECT:

Cache Valley Builders
Saunders Construction
Wadman Corporation

2. PROJECT:

Helena Distribution Store

3. LOCATION:

4185 North Montana Avenue, Suite 1, Helena, MT 59602

4. OWNER:

The Church of Jesus Christ of Latter-day Saints, a Utah corporation sole
c/o
Logan King, North America Project Management Group
50 E North Temple St. COB12, Salt Lake City, UT 84150-0012

5. CONSULTANT:

Design West Architects

6. DESCRIPTION OF PROJECT:

- A. Renovations to an existing 1,000 sf office space to convert to a retail space for at Distribution Store. New Spaces will include Sales Floor, Office, Changing Room, Temple Room, Restroom and Breakroom/Storage Room
- B. Products or systems may be provided through relationships the Owner has negotiated with suppliers as indicated in the Specifications.

7. TYPE OF BID: Bids will be on a lump-sum basis. Segregated bids will not be accepted.

8. TIME OF SUBSTANTIAL COMPLETION: The time limit for substantial completion of this work will be 60 calendar days and will be as noted in the Agreement.

9. BID OPENING: Bids will be received by Owners preferred method at 10:30 on Monday June. 2nd, 2025 via ConsLog to be announced. Bids will be publicly opened at 2:00 on Tuesday June 17th, 2025 via ConsLog to be announced.

10. BIDDING DOCUMENTS:

- A. Bidding Documents may be examined at the following plan room locations:
 - 1) Available via ConsLog
 - 2)
- B. Bidding Documents may be obtained from the Architect.
- C. Bidding Documents may be obtained from Owner's electronic bidding tool.

11. **BIDDER'S QUALIFICATIONS:** Bidding by the Contractors will be by invitation only.
12. **OWNER'S RIGHT TO REJECT BIDS:** Owner reserves the right to reject any or all bids and to waive any irregularity therein.

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INSTRUCTIONS TO BIDDERS (U.S.)

1. DOCUMENTS:

- A. Bidding Documents include Bidding Requirements and proposed Contract Documents. Proposed Contract Documents consist of:
 - 1) Agreement Between Owner and Contractor for Small Project (U.S.)
 - 2) Other documents included by reference
 - 3) Addenda.
- B. Bidding Requirements are those documents identified as such in proposed Project Manual.
- C. Addenda are written or graphic documents issued prior to execution of the Contract which modify or interpret the Bidding Documents. They become part of the Contract Documents as noted in the Agreement Between Owner and Contractor for Small Project (U.S.) upon execution of the Agreement by Owner.

2. BIDDER'S REPRESENTATIONS:

- A. By submitting a bid proposal, bidder represents that
 - 1) Bidder has carefully studied and compared Bidding Documents with each other. Bidder understands the Bidding Documents and the bid is fully in accordance with the requirements of those documents,
 - 2) Bidder has thoroughly examined the site and any building located thereon, has become familiar with local conditions which might directly or indirectly affect contract work, and has correlated its personal observations with requirements of proposed Contract Documents, and
 - 3) Bid is based on materials, equipment, and systems required by Bidding Documents without exception.

3. BIDDING DOCUMENTS:

- A. Copies
 - 1) Owner will provide the Bidding Documents as set forth in the Invitation to Bid.
 - 2) Partial sets of Bidding Documents will not be issued.
- B. Interpretation or Correction of Bidding Documents
 - 1) Bidders will request interpretation or correction of any apparent errors, discrepancies, and omissions in the Bidding Documents.
 - 2) Corrections or changes to Bidding Documents will be made by written Addenda.
- C. Substitutions and Equal Products
 - 1) Generally speaking, substitutions for specified products and systems, as defined in the Uniform Commercial Code, are not acceptable. However, equal products may be approved upon compliance with Contract Document requirements.
 - 2) Base bid only on materials, equipment, systems, suppliers or performance qualities specified in the Bidding documents.
 - 3) Where a specified product is identified as a "quality standard", products of other manufacturers that meet the performance, properties, and characteristics of the specified "quality standard" may be used without specific approval as a substitute.

- D. Addenda - Addenda will be sent to bidders and to locations where Bidding Documents are on file no later than 2 business days prior to bid opening.

4. BIDDING PROCEDURES:

- A. Form and Style of Bids
 - 1) Use Owner's online bidding tool.
 - 2) Fill in all blanks on online bidding tool. Signatures will be executed by representative of bidder duly authorized to make contracts.
 - 3) Bids will bear no information other than that requested on bid form. Do not delete from or add to the information requested on the bid form.
- B. Submission of Bids
 - 1) Follow the instructions in the Owner's bidding tool when submitting your bid.
 - 2) It is bidder's sole responsibility to see that its bid is received at specified time.
 - 3) No oral, facsimile transmitted, telegraphic, or telephonic bids, modifications, or cancellations will be considered.
- C. Modification or Withdrawal of Bid
 - 1) Bidder guarantees there will be no revisions or withdrawal of bid amount for 45 days after bid opening.
 - 2) Prior to bid opening, bidders may withdraw bid from Owner's bidding tool.

5. CONSIDERATION OF BIDS:

- A. Opening Of Bids - See Invitation to Bid.
- B. Rejection of Bids - Owner reserves right to reject any or all bids and to waive any irregularity therein.
- C. Acceptance Of Bid
 - 1) No bidder will consider itself under contract after opening and reading of bids until Agreement between Owner and Contractor is fully executed.
 - 2) Bidder's past performance, organization, subcontractor selection, equipment, and ability to perform and complete its contract in manner and within time specified, together with amount of bid, will be elements considered in award of contract.

6. FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR:

- A. Agreement form will be "Small Project Agreement Between Owner and Contractor (U.S.)" and "Supplementary Conditions for Small Project Agreement (U.S.)."

7. MISCELLANEOUS:

- A. Pre-Bid Conference. A pre-bid conference may be held at a time and place to be announced.
- B. Examination Schedule for Existing Building and Site
 - 1)

END OF DOCUMENT

INFORMATION AVAILABLE TO BIDDERS (U.S.)

1. GEOTECHNICAL DATA

- A. Geotechnical Report -
 - 1) Owner has secured the services of a geotechnical engineer to aid in design of the Project. Following conditions apply -
 - a) A geotechnical report has been prepared by N/A, referred to as the Geotechnical Engineer.
 - b) A copy of this report will be issued to each invited Contractor.
 - c) This report was obtained solely for use in design by Consultant and is not a part of the Contract Documents. It is not intended that Contractor rely on geotechnical engineer's report.
 - d) Reports are provided for Contractor's information but are not a warranty of subsurface conditions.
 - 2) Prior to bidding, Contractor may make his own subsurface investigations to satisfy himself with site and subsurface conditions.

2. ASBESTOS-CONTAINING MATERIAL (ACM)

- A. The building upon which work is being performed has been examined for asbestos-containing material. The following have been identified as containing asbestos in the areas of the building being worked on as part of this Project:
 - 1) N/A
- B. Refer to Section , Article for requirements to be followed.

END OF DOCUMENT

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CONSTRUCTION MATERIAL ASBESTOS STATEMENT (U.S.)

PROJECTS FOR:
THE CHURCH OF JESUS CHRIST OF LATTER-DAY SAINTS,
a Utah corporation sole

Building Name: _____

Building Plan Type: _____

Building Address: _____

Building Owner: The Church of Jesus Christ of Latter-day Saints, a Utah corporation sole.

Project Number: _____

Completion Date: _____

As PROJECT CONSULTANT and principal in charge; based on my best knowledge, information, inspection, and belief; I certify that on the above referenced Project, no asbestos-containing building materials were specified in the construction documents or given approval in shop drawings or submittals.

Project Consultant and Principal in Charge (signature)

Date

Company Name

As GENERAL CONTRACTOR in charge of construction; based on my best knowledge, information, inspection, and belief; I affirm that on the above-referenced Project, no asbestos-containing building materials were used in the construction.

General Contractor (signature)

Date

Company Name

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*ATTACH APPROPRIATE SMALL PROJECT AGREEMENT FORM,
CURRENT FROM AGREEMENT LIBRARY*

**SECTION 00 0300
SUPPLEMENTAL CONDITIONS**

Helena Distribution Store – Project # 89018312501	00 0300 - 1	Supplemental Conditions
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SUPPLEMENTARY CONDITIONS

FOR SMALL PROJECT AGREEMENT BETWEEN OWNER AND CONTRACTOR (U.S.)

ITEM 1 - GENERAL

1. Conditions of the Small Project Agreement Between Owner and Contractor (U.S.) apply to each Division of the Specifications.
2. Provisions contained in Division 01 apply to all Divisions of the Specifications.

ITEM 2 - LIQUIDATED DAMAGES PAYABLE TO OWNER

This section may be included as a separate additional paragraph to the Small Project Agreement Between Owner and Contractor (U.S.), at Owner's discretion:

Delay in Completion of the Work. For each day after the expiration of the designated Time of Completion that Contractor has not completed the Work, Contractor will pay Owner the amount of Two Hundred Fifty dollars (\$250.00) per day as liquidated damages for Owner's loss of use and the added administrative expense to Owner to administer the Project during the period of delay. In addition, Contractor will reimburse Owner for any additional Architect's fees, attorneys' fees, expert fees, consultant fees, copy costs, and other expenses incurred by Owner as a result of the delay. Owner may deduct any liquidated damages or reimbursable expenses from any money due or to become due to Contractor. If the amount of liquidated damages and reimbursable expenses exceeds any amounts due to Contractor, Contractor will pay the difference to Owner within ten (10) days after receipt of a written request from Owner for payment.

ITEM 3 - STATE SPECIFIC SUPPLEMENTARY CONDITIONS

Alabama

N/A

Alaska

N/A

Arizona

Replace section 5.b. of the Agreement with the following:

- b. Not more than once each month, Contractor will submit a payment request to Owner. Owner will pay Contractor for Work completed within seven (7) days after:
 1. Contractor submits to Owner Contractor's payment request for Work to date;
 2. Contractor provides to Owner a certification by Contractor that Contractor has paid for all labor, materials, and equipment relating to the Work covered by prior payment requests and that Contractor will pay for all labor, materials, and equipment relating to the Work covered by the current payment request;
 3. Contractor has obtained releases of all mechanics' liens and claims of subcontractors, laborers, or material suppliers who supplied labor and/or materials for the Work covered by the payment request; and
 4. Owner has certified and approved all or part of the payment request and notified Contractor in writing (which Owner must do within 14 days of Contractor's submission of the payment request to Owner).

Owner may modify or reject the payment request if, in Owner's opinion, the Work for which payment is requested is not acceptable or is less complete than represented on the payment request.

Arkansas

N/A

California

N/A

Colorado

COLORADO STATE SALES TAX:

Add the following to the Small Project Agreement Between Owner and Contractor (U.S.):

1. Contractor will make an application to State Department of Revenue for certificate of exemption to permit purchase of building materials for construction of this Project without payment of Sales Tax. Applications and certificates will be on forms provided by the Department of Revenue.
2. Prior to start of construction, Contractor will furnish to the Owner copies of the applications submitted and certificates obtained. Upon receipt of the certificate Contractor shall make a copy for each subcontractor involved in the Project and complete it by filling in the subcontractor's name and address and signing it. The original certificate and copies of all certificates that the Contractor issues to subcontractors should be kept at the Contractor's place of business for a minimum of three years.
3. The Owner's sales tax exemption number for the State of Colorado is 98-01587.

Connecticut

CONNECTICUT STATE SALES TAX:

Add the following to the Small Project Agreement Between Owner and Contractor (U.S.):

1. Sales of materials and supplies that will be physically and permanently incorporated into the construction project should be exempt from Connecticut state sales tax. The Owner's sales tax exemption number for the State of Connecticut is E-9613.

Delaware

N/A

District of Columbia

WASHINGTON D.C. SALES TAX:

Add the following to the Small Project Agreement Between Owner and Contractor (U.S.):

1. Materials that will be physically incorporated into and made a part of the Owner's real property may be purchased by the Contractor free of Washington D.C. sales tax.
2. The Owner's tax exempt number is 8661-0185848-001.
3. Contractor is responsible for submitting the Tax Exempt Purchase Certificate Form for real property projects on behalf of the Owner.

Florida

NOTICE OF COMMENCEMENT

Add the following to the Small Project Agreement Between Owner and Contractor (U.S.):

Before commencing the Project, Contractor shall record a notice of commencement in the clerk's

office and post a certified copy thereof. The notice of commencement shall substantially comply with the form in Florida Statutes 713.13 and contain the following information:

1. A description sufficient for identification of the real property to be improved. The description should include the legal description of the property and also should include the street address and tax folio number of the property if available or, if there is no street address available, such additional information as will describe the physical location of the real property to be improved.
2. A general description of the improvement.
3. The name and address of the owner, the owner's interest in the site of the improvement, and the name and address of the fee simple titleholder, if other than such owner. A lessee who contracts for the improvements is an owner as defined under Florida Statutes s. 713.01(23) and must be listed as the owner together with a statement that the ownership interest is a leasehold interest.
4. The name and address of the contractor.
5. The name and address of the surety on the payment bond under Florida Statutes s. 713.23, if any, and the amount of such bond.
6. The name and address of any person making a loan for the construction of the improvements.
7. The name and address within the state of a person other than himself or herself who may be designated by the owner as the person upon whom notices or other documents may be served under this part; and service upon the person so designated constitutes service upon the owner.

Georgia

N/A

Hawaii

N/A

Idaho

N/A

Illinois

ILLINOIS STATE CONTRACTOR TO PROVIDE NOTICE OF SUBCONTRACTORS:

Add the following to the Small Project Agreement Between Owner and Contractor (U.S.):

Contractor shall provide to Owner a statement of names and addresses of all those furnishing for this Project labor, services, material, fixtures, apparatus or machinery, and form or forms work, as well as the amounts due or to become due to such persons / entities. Such notice shall be in writing and under oath or verified by affidavit. Notwithstanding any provision to the contrary, Owner is not required to make payments to Contractor until Contractor provides Owner sufficient evidence of Contractor's compliance with this notice requirement.

ILLINOIS STATE SALES TAX:

Add the following to the Small Project Agreement Between Owner and Contractor (U.S.):

1. Sales of materials to construction contractors for incorporation into the Owner's real estate may be exempt from Illinois state sales tax. (Sales of tools, fuel, lumber for forms, and other end use or consumption items to contractors who do not incorporate these items into real estate are subject to Illinois state sales tax.)
2. Contractor will obtain and provide subcontractors and suppliers with a certificate that
 - States the construction contractor's purchases are for conversion into real estate under a contract with the Owner;
 - Identifies the Owner by name and address; and

- States on what date the contract was entered into.
- The Contractor will also provide subcontractors and suppliers with the sales tax exemption number for Owner. The Owner's sales tax exemption number for the State of Illinois is E9986-4045-06.

Indiana

INDIANA STATE SALES TAX:

Add the following to the Small Project Agreement Between Owner and Contractor (U.S.):

1. Purchase of materials and supplies might be exempt from Indiana state sales tax. In the event that the Project qualifies for a sales and use tax exemption, the Owner's sales tax exemption number for the State of Indiana is 7343965.

Iowa

N/A

Kansas

KANSAS STATE SALES TAX:

Add the following to the Small Project Agreement Between Owner and Contractor (U.S.):

1. Upon obtaining a certificate of tax exemption for the project, an exemption from Kansas state sales tax should be allowed for tangible personal property and services purchased by Contractor for the project. Purchases of construction machinery, equipment or tools for the project are not exempt but rather are subject to state sales tax.
2. Prior to beginning work on the project, Contractor will assist the Owner in making a timely application to the State for a certificate of tax exemption for the project. After the certificate of tax exemption is obtained from the State, Contractor will furnish the number of the certificate to all suppliers from whom it makes purchases; and all such suppliers shall execute invoices covering the items purchased bearing the number of such certificate. In addition, upon completion of the project, Contractor will timely furnish to Owner a sworn statement (on the form provided by the Kansas Director of Taxation) that all purchases made under such exemption certificate were entitled to the tax exemption. All invoices for such tax exempt purchases shall be held by Contractor for a period of five years.

Kentucky

N/A

Louisiana

N/A

Maine

MAINE STATE SALES TAX:

Add the following to the Small Project Agreement Between Owner and Contractor (U.S.):

1. The General Contractor should be exempt from Maine state sales tax on its purchases for this project.
2. The Owner's tax exempt number is 20460.

Maryland

MARYLAND STATE SALES TAX:

Add the following to the Small Project Agreement Between Owner and Contractor (U.S.):

1. The General Contractor should be exempt from Maryland state sales tax on its purchases for this project.
2. The Owner's tax exempt number is 29020063.

Massachusetts

MASSACHUSETTS STATE SALES TAX:

Add the following to the Small Project Agreement Between Owner and Contractor (U.S.):

1. The General Contractor and its subcontractors should be exempt from Massachusetts state sales tax on purchases for this project. Contractors will obtain and complete state form ST-5C and submit it to Owner for signature and return. Contractor will then use the completed Purchase Certificate in making purchases for this Project.
2. The Owner's tax exempt number is E870-234-341.

Michigan

NOTICE OF COMMENCEMENT

Add the following to the Small Project Agreement Between Owner and Contractor (U.S.):

Before commencing the Project, Contractor shall record a Notice of Commencement in the office of the register of deeds for each county in which the real property to be improved is located and post a copy thereof in a conspicuous place on the property. The notice of commencement shall substantially comply with the form in Michigan Compiled Laws 570.1108 and contain the following information:

1. The legal description of the real property on which the improvement is to be made conforming with Michigan Compiled Laws sections 560.212 and 560.255.
2. The name, address, and capacity of the signor for the Owner.
3. The name and address of Owner's designee signing on behalf of Owner.
4. The name and address of the general contractor, if any.
5. The following statement:

To lien claimants and subsequent purchasers:

Take notice that work is about to commence on an improvement to the real property described in this instrument. A person having a construction lien may preserve the lien by providing a notice of furnishing to the above-named designee and the general contractor, if any, and by timely recording a claim of lien, in accordance with law.

A person having a construction lien arising by virtue of work performed on this improvement should refer to the name of the Owner or lessee and the legal description appearing in this Notice. A person subsequently acquiring an interest in the land described is not required to be named in a claim of lien.

A copy of this Notice with an attached form for notice of furnishing may be obtained upon making a written request by certified mail to the above-named Owner or lessee; the designee; or the person with whom you have contracted.

6. The name and address of the person preparing the Notice.
7. An affidavit of the Owner or the agent of the Owner which verifies the Notice.

Contractor must provide to Owner a copy of the Notice as well as prepare and provide to Owner the Affidavit verifying the Notice for Owner's signature no later than seven (7) days prior to the time Contractor needs to receive the Affidavit back from Owner in order for Contractor to timely finalize and record the Notice of Commencement with its attachments.

In addition to recording and posting the Notice of Commencement, Contractor shall provide the Notice of Commencement and a blank notice of furnishing (described in Michigan Compiled Laws 570.1108), from

time to time, to the property Owner as well as all subcontractors, laborers, or suppliers who request the Notice of Commencement.

CONTRACTOR TO PROVIDE SWORN STATEMENTS

Notwithstanding all other terms and conditions of the Contract Documents, Owner has the right (but no obligation) to require Contractor to submit to Owner a sworn statement that complies with Michigan Compiled Laws 570.1110 prior to the time payment is due or otherwise from time to time.

Minnesota

N/A

Mississippi

N/A

Missouri

MISSOURI STATE SALES TAX:

Add the following to the Small Project Agreement Between Owner and Contractor (U.S.):

1. The Church of Jesus Christ of Latter-day Saints is a Religious Organization exempt from sales tax in accordance with Section 144.062 RSMO as modified by the 1994 Missouri General Assembly.
2. The Owner will furnish a 'Missouri Project Exemption Certificate' and a MO Tax Exemption Letter' to the Contractor.
3. The Owner's tax exempt number is 12473863.

Montana

N/A

Nebraska

NEBRASKA STATE SALES TAX:

Add the following to the Small Project Agreement Between Owner and Contractor (U.S.):

1. Pursuant to applicable laws, Contractor will make application to The Nebraska Department of Revenue to act as prime contractor for approval to use Owner's tax exempt number to permit the purchase of building materials for construction of this Project without payment of sales and use tax. Contractor may delegate its authority to its subcontractors as allowed by law to act as the purchasing agent for tax exemption purposes. Subcontractors shall follow the same application and compliance requirements as the Contractor. Applications will be on forms provided by The Nebraska Department of Revenue.
2. Prior to start of construction, Contractor will furnish copies of the submitted application forms to Owner.

Nevada

NEVADA NOTICE OF COMPLETION:

Add the following to the Small Project Agreement Between Owner and Contractor (U.S.):

- A. Within five (5) calendar days of final completion of the Project and in compliance with Section 108.228 Nevada Revised Statutes, Contractor shall, on behalf of the Owner, file with the office of the county recorder of the county where the property is located, and copy to Owner, a notice of completion which shall include, without limitation, the following:

1. The date of completion of the work of improvement;
2. The owner's name, the address of the owner, and the nature of the title of any person signing the notice;
3. A description of the property sufficient for identification;
4. The name of the prime contractor or contractors, if any.

Contractor shall verify the notice of completion on the Owner's behalf.

- B. Upon recording the notice, Contractor shall within ten (10) days deliver a copy of the notice by certified mail to each prime contractor and each potential lien claimant who, before the notice was recorded, either submitted a request to the owner to receive the notice or delivered a preliminary notice of right to lien.
- C. Notwithstanding any other provision of the Contract Documents to the contrary, Contractor and Owner agree that any breach or failure to comply with this Section by the Contractor will constitute a breach of contract and the Contractor will be liable for any direct, indirect, or consequential damages to the Owner flowing from this breach.

N/A

New Hampshire

N/A

New Jersey

NEW JERSEY STATE SALES TAX:

Add the following to the Small Project Agreement Between Owner and Contractor (U.S.):

1. The General Contractor should be exempt from New Jersey state sales tax on its purchases for this project.
2. The Owner's tax exempt number is EO-237-300-405.

New Mexico

NEW MEXICO STATE PROGRESS PAYMENT AND FINAL PAYMENT:

Replace section 5. of the Small Project Agreement Between Owner and Contractor (U.S.) with the following:

5. Payment.

- a. If the Contractor's Bid Proposal Amount is over \$100,000, Contractor will submit to Owner a schedule of values which allocates the Contractor's Bid Proposal Amount to various portions of the Work. This schedule, when accepted by Owner will be used as a basis for reviewing Contractor's payment requests.
- b. Not more than once each month, Contractor will submit a payment request to Owner. Owner will pay Contractor for work completed within twenty-one (21) days after the following:
 - (1) Owner receives Contractor's undisputed payment request for work to date;
 - (2) Owner receives a certification by Contractor that Contractor has paid for all labor, materials, and equipment relating to the Work covered by prior payment requests and that Contractor will pay for all labor, materials, and equipment relating to the Work covered by the current payment request; and
 - (3) Contractor has obtained releases of all mechanics' liens and claims of subcontractors, laborers, or material suppliers who supplied labor and/or materials for the Work covered by the payment request.
- c. Owner may modify or reject the payment request if, in Owner's opinion, the Work for which payment is requested is not acceptable or is less complete than represented on the payment request.

- d. Owner will make full and final payment within twenty-one (21) days of the completion of all of the following requirements:
1. Contractor has submitted to Owner Contractor's final payment request;
 2. Architect, if any, has declared to Owner in writing that the Work is complete; and
 3. Contractor has obtained waiver and release upon final payment documents executed by all of the subcontractors performing work and/or providing materials covered by the Contractor's final payment request; and
 4. Contractor has provided to Owner all manufacturers' and other warranties and guaranties, properly signed and endorsed to Owner. (Delivery of such guaranties and warranties will not relieve Contractor of any obligation assumed under any other provision of the Contract Documents.)

NEW MEXICO STATE PAYMENT OF SUBCONTRACTORS AND MATERIALMEN:

Add the following section to the Small Project Agreement Between Owner and Contractor (U.S.):

- 11. Payment of Subcontractors and Materialmen.** Contractor will promptly pay for all labor, materials, and equipment used to perform the Work. Contractor agrees to make prompt payment to its subcontractors within seven (7) days of Contractor's receipt of payment from Owner for that portion of the funds received which represents the subcontractor's portion of the Work completed to Contractor's satisfaction for which payment was made by Owner. Failure of Contractor to make payment within that seven (7) day period will subject Contractor to pay interest to its subcontractors on the undisputed amount at one and one-half percent per month or fraction of a month until payment is issued. Contractor agrees to require of its subcontractors that they make prompt payment to their subcontractors within seven (7) days of their receipt of payment from the Contractor for that portion of the funds received which represents their subcontractor's portion of the Work completed and to be subject to interest at one and one-half percent per month on undisputed amounts not paid to their subcontractors within that seven (7) day period.

New York

NEW YORK STATE SALES TAX:

Add the following to the Small Project Agreement Between Owner and Contractor (U.S.):

1. Exemption from tax is allowed for materials sold to the Contractor for this project. For equipment rentals as well as any materials not used in the building, the Contractor is subject to New York sales tax.
2. The Owner's tax exempt number is 105318.

North Carolina

NORTH CAROLINA STATE SALES TAX:

Add the following to the Small Project Agreement Between Owner and Contractor (U.S.):

1. At end of each calendar quarter, Contractor will provide Owner with the following information from invoices for materials and sub-contract work where North Carolina sales tax has been paid:
 - a. Date of invoice
 - b. Amount of tax
 - c. Name and address of person or company.

LIEN AGENT

Add the following to the Small Project Agreement Between Owner and Contractor (U.S.):

Where the Contract Sum exceeds Thirty Thousand Dollars (\$30,000), Contractor on behalf of Owner shall, simultaneous with the execution of the Agreement and at Contractor's sole expense, obtain and

maintain throughout the duration of the Project a lien agent for the Project in satisfaction of North Carolina statutes G.S. § 44A-11.1 & § 44A-11.2. In addition, Contractor shall satisfy all notice requirements under applicable law regarding the lien agent, including, without limitation, providing written information of the lien agent in the building permit and/or on a sign posted and maintained on the Project Site.

North Dakota

N/A

Ohio

OHIO STATE SALES TAX:

Add the following to the Small Project Agreement Between Owner and Contractor (U.S.):

1. Contractor's purchases of materials to be used for this project should be exempt from Ohio state sales tax. Contractor will issue exemption certificates to suppliers.

OHIO STATE NOTICE OF COMMENCEMENT:

Add the following to the Small Project Agreement Between Owner and Contractor (U.S.):

1. In accordance with State of Ohio lien laws, Owner may file Notice of Commencement with the County Recorder of the county in which the Project is located and provide a copy of that notice to Contractor. Contractor will be responsible for distributing notice to subcontractors and suppliers.

Oklahoma

OKLAHOMA STATE SALES TAX

Add the following to the Small Project Agreement Between Owner and Contractor (U.S.):

1. The General Contractor and its subcontractors should be exempt from Oklahoma state sales tax on purchases for this project.
2. The Owner will provide a copy of its exemption documentation.
3. In compliance with Oklahoma Rule 710:65-7-13, Contractor will, on the face of each invoice or sales receipt, set out the name of the Owner, that the purchases are being made on behalf of the Owner, and that the purchases are necessary for the completion of the Agreement.

Oregon

N/A

Pennsylvania

PENNSYLVANIA STATE SALES TAX:

Add the following to the Small Project Agreement Between Owner and Contractor (U.S.):

1. Sales of certain materials to construction contractors for incorporation into the Owner's real estate may be exempt from Pennsylvania state sales tax. Pennsylvania law 72 P.S. § 7201 allows construction contractors to claim the Owner's sales tax exemption for "Building Machinery and Equipment" that is transferred pursuant to the construction contract to the Owner. "Building Machinery and Equipment" is "[g]eneration equipment, storage equipment, conditioning equipment, distribution equipment and termination equipment" limited to the following:
 - i. air conditioning limited to heating, cooling, purification, humidification, dehumidification and ventilation;
 - ii. electrical;

- iii. plumbing;
- iv. communications limited to voice, video, data, sound, master clock and noise abatement;
- v. alarms limited to fire, security and detection;
- vi. control system limited to energy management, traffic and parking lot and building access;
- vii. medical system limited to diagnosis and treatment equipment, medical gas, nurse call and doctor paging;
- viii. laboratory system;
- ix. cathodic protection system; or
- x. furniture, cabinetry and kitchen equipment.

The definition also explicitly includes: boilers, chillers, air cleaners, humidifiers, fans, switchgear, pumps, telephones, speakers, horns, motion detectors, dampers, actuators, grills, registers, traffic signals, sensors, card access devices, guardrails, medial devices, floor troughs and grates and laundry equipment, together with integral coverings and enclosures, whether or not the item constitutes a fixture or is otherwise affixed to the real estate whether or not damage would be done to the item or its surroundings upon removal or whether or not the item is physically located within a real estate structure.

However, the term "building machinery and equipment" shall not include guardrail posts, pipes, fittings, pipe supports and hangers, valves, underground tanks, wire, conduit, receptacle and junction boxes, insulation, ductwork and coverings thereof.

2. Contractor will obtain and provide subcontractors with Pennsylvania Exemption Certificates—Pennsylvania Form Rev-1220 AS—to be filled out and used when purchasing tax-exempt "Building Machinery and Equipment" for the project. For purposes of filling out Form Rev-1220 AS, the Owner's tax exempt number is 75-259-773.
3. If Contractor or any subcontractor fails to obtain a sales-tax exemption when purchasing "Building Machinery and Equipment," the Contractor or subcontractor shall be responsible for seeking its own refund of sales tax expending by filing a Refund Petition with the Pennsylvania Department of Revenue Board of Appeals.

Rhode Island

RHODE ISLAND STATE SALES TAX:

Add the following to the Small Project Agreement Between Owner and Contractor (U.S.):

1. Exemption from Rhode Island state sales tax should be allowed for materials purchased by Contractor for this project. Equipment rentals as well as materials not used in the building are subject to state sales tax.
2. The Owner's tax exempt number is 11034.

South Carolina

N/A

South Dakota

Replace section 11 of the Small Project Agreement Between Owner and Contractor (U.S.) with the following:

- 11. Permits, Surveys, and Taxes.** Contractor will obtain and pay for all permits and licenses. Contractor will pay all privilege, sales, use, consumer, payroll, workers compensation, unemployment, old age pension, surtax, and similar taxes assessed in connection with the

performance of the Work (including without limitation all excise tax). Contractor will also obtain and pay for any surveys it needs to perform the Work.

Tennessee

N/A

Texas

TEXAS STATE SALES TAX:

Add the following to the Small Project Agreement Between Owner and Contractor (U.S.):

1. The Church of Jesus Christ of Latter-day Saints is a Religious Organization exempt from sales tax under Texas Tax Code §151.310. The general Contractor, when purchasing materials and equipment for this Project, should advise the vendors that Owner is an exempt organization and that no sales tax will be paid.

Utah

UTAH STATE SALES TAX:

Add the following to the Small Project Agreement Between Owner and Contractor (U.S.):

1. Contractors should be exempt on purchases of material installed or converted into real property to be used by the Owner. The Contractor will furnish each vendor with a completed Exemption Certificate Form TC-721. The certificate will be prepared by the Contractor for each vendor in order to obtain the exemption.
2. The Owner's tax exempt number is 11871701-002-STC.

UTAH NOTICE OF INTENT TO OBTAIN FINAL COMPLETION:

Add the following to the Small Project Agreement Between Owner and Contractor (U.S.):

- A. Contractor shall file with the State Construction Registry, on its own behalf and/or on behalf of Owner, a notice of intent to obtain final completion at least 45 days before the day on which the Owner or Contractor files or could file a notice of completion under Utah Code Ann. Section 38-1a-506 if:
 1. The completion of performance time under the original contract for construction work is greater than 120 days;
 2. The total original construction contract price exceeds \$500,000; and
 3. The original contractor or owner has not obtained a payment bond in accordance with Utah Code Ann. Section 14-2-1.

UTAH NOTICE OF COMPLETION:

Add the following to the Small Project Agreement Between Owner and Contractor (U.S.):

- A. Within five (5) calendar days of final completion of the Project and in compliance with Section 38-1a-507 Utah Code Annotated, Contractor shall file with the State Construction Registry, and copy to Owner, a notice of completion which shall include, without limitation, the following:
 1. The name, address, telephone number, and email address of the person filing the notice of completion;
 2. The name of the county in which the Project and/or Project site is located;
 3. The date on which final completion is alleged to have occurred;
 4. The method used to determine final completion; and
 5. One of the following:
 - a. The tax parcel identification number of each parcel included in the Project and/or Project site;

- b. The entry number of a preliminary notice on the same project that includes the tax parcel identification number of each parcel included in the Project and/or Project site; or
 - c. The entry number of the building permit issued for the Project.
- B. Notwithstanding any other provision of the Contract Documents to the contrary, Contractor and Owner agree that any breach or failure to comply with this Section by the Contractor will constitute a breach of contract and the Contractor will be liable for any direct, indirect, or consequential damages to the Owner flowing from this breach.

UTAH STATE PROGRESS PAYMENTS AND FINAL PAYMENT:

Replace paragraph 5 of the Small Project Agreement Between Owner and Contractor (U.S.) with the following:

5. Payment

- a. If the Contractor's Bid Proposal Amount is over \$100,000, Contractor will submit to Owner a schedule of values which allocates the Contractor's Bid Proposal Amount to various portions of the Work. This schedule, when accepted by Owner, will be used as a basis for reviewing Contractor's payment requests.
- b. Progress Payments: Not more than once each month, Contractor will submit a payment request to Owner. Owner will pay Contractor progress payments for work completed within fifteen (15) days after Owner receives:
 - 1. Contractor's progress payment request for work to date;
 - 2. A certification by Contractor that Contractor has paid for all labor, materials, and equipment relating to the Work covered by prior payment requests and that Contractor will pay for all labor, materials, and equipment relating to the Work covered by the current payment request; and
 - 3. Conditional Waiver and Release Upon Progress Payment documents submitted by Contractor (in content complying with Utah Code § 38-1a-802) executed by each of the subcontractors performing work and/or providing materials covered by the Contractor's progress payment request.
- c. Final Payment: Owner will make full and final payment of the Contract Sum due within thirty (30) days of the completion of all of the following requirements:
 - 1. Contractor has submitted its final payment request;
 - 2. Contractor has submitted a certification that Contractor has paid for all labor, materials, and equipment relating to the Work covered by prior payment requests and that Contractor will pay for all labor, materials, and equipment relating to the Work covered by the final payment request; and
 - 3. Contractor has submitted Waiver and Release Upon Final Payment documents (in content complying with Utah Code § 38-1a-802) executed by each of the subcontractors performing work and/or providing materials covered by the Contractor's final payment request.

Acceptance of final payment by Contractor or any Subcontractor will constitute a waiver of claims by the payee except for those claims previously made to Owner in writing and identified by Contractor in its affidavit as still pending.

If the aggregate of previous payments made by Owner exceeds the amount due Contractor, Contractor will reimburse the difference to Owner.

- d. Owner may modify or reject any payment request if, in Owner's opinion, the Work for which payment is requested is not acceptable or is less complete than represented on the payment request.
- e. Upon receipt of any payment from Owner, Contractor will pay to each Subcontractor the amount paid to Contractor on account of such Subcontractor's portion of the Work.
- f. Contractor will maintain a copy of each payment request at the Project site for review by the Subcontractors.
- g. No payment made, either in whole or in part, by Owner will be construed to be an acceptance of defective or improper materials or workmanship.

Vermont

VERMONT STATE SALES TAX:

Add the following to the Small Project Agreement Between Owner and Contractor (U.S.):

1. Purchases of building materials and supplies should be exempt from Vermont state sales tax if those materials and supplies are consumed in the construction of this Project.
2. The Owner's tax exempt number is 450-870234341F-01.

Virginia

N/A

Washington

WASHINGTON STATE CONTRACTOR DISCLOSURE NOTICE:

Add the following to the Small Project Agreement Between Owner and Contractor (U.S.):

1. For Projects in state of Washington, the Contractor will provide a 'job site' disclosure notice in accordance with Statute 60.04.230. Contractor will post this notice at the job site. This notice will detail the following:
 - a. Legal description and street address of the construction site.
 - b. Property Owner's name address, and phone number as shown in the Contract Documents.
 - c. Contractor's registration number and identification.
 - d. Contractor's business name, address, and telephone number.

WASHINGTON STATE COMPENSATION:

Replace section 4 in the Small Project Agreement Between Owner and Contractor (U.S.) with the following:

1. **Compensation.** Owner will pay Contractor for performance of Contractor's obligations under the Contract Documents the sum of _____ Dollars (\$_____) (the "Contract Sum"), plus applicable sales tax. This Contract Sum includes all labor, materials, equipment, tools, costs, expenses, work and services of Contractor and its subcontractors necessary to perform the Work in accordance with the terms of this Agreement, including without limitation travel, communications, and copying costs.

West Virginia

N/A

Wisconsin

N/A

Wyoming

N/A

END OF DOCUMENT

SECTION 00 0400
SAMPLE - SMALL PROJECT AGREEMENT BETWEEN OWNER AND CONTRACTOR US

Helena Distribution Store – Project # 89018312501	00 0400 - 1	Sample - Small Project Agreement Between Owner and Contractor US
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SMALL PROJECT AGREEMENT BETWEEN OWNER AND CONTRACTOR Fixed Sum (U.S.)

The Church of Jesus Christ of Latter-day Saints, a Utah corporation sole ("Owner") and _____ ("Contractor") enter into this *Small Project Agreement Between Owner and Contractor (U.S.)* ("Agreement") and agree as follows:

1. **Property/Project.**

Property/Project Number: _____
Property Address ("Project Site"): _____
Project Type: _____
Project Name ("Project"): _____
Stake Name: _____

2. **Scope of Work.** Contractor will furnish all labor, materials, tools, and equipment necessary to complete the Work in accordance with the Contract Documents. The Work is all labor, materials, tools, equipment, construction, and services required by the Contract Documents (the "Work").

3. **Contract Documents.** Contract Documents consist of:

- a. This Agreement;
- b. Supplementary Conditions for Small Project Agreement Between Owner and Contractor (U.S.);
- c. The Specifications (Division 01 and Divisions _____);
- d. Drawings entitled and dated _____;
- e. Addendum No. with date(s) _____;
- g. All written Field Changes, written Construction Change Directives and written Change Orders when prepared and signed by Owner and Contractor.

4. **Compensation.** Owner will pay Contractor for performance of Contractor's obligations under the Contract Documents the sum of _____ Dollars (\$ _____) (the "Contract Sum"). This Contract Sum includes all labor, materials, equipment, tools, costs, expenses, work and services of Contractor and its subcontractors necessary to perform the Work in accordance with the terms of this Agreement, including without limitation travel, communications, and copying costs.

5. **Payment.**

- a. If the Contract Sum is over \$100,000 or if otherwise requested by Owner, Contractor will submit to Owner a schedule of values which allocates the Contractor's Bid Proposal Amount to various portions of the Work. This schedule, when accepted by Owner will be used as a basis for reviewing Contractor's payment requests.
- b. Not more than once each month, Contractor will submit a payment request to Owner. Owner will pay Contractor for work completed within thirty (30) days after Owner receives:
 - 1) Contractor's payment request for work to date;
 - 2) a certification by Contractor that Contractor has paid for all labor, materials, and equipment relating to the Work covered by prior payment requests and that Contractor will pay for all labor, materials, and equipment relating to the Work covered by the current payment request; and
 - 3) releases of all mechanics' liens and claims of subcontractors, laborers, or material suppliers who supplied labor and/or materials for the Work covered by the payment request.
 - 4) updated Construction Schedule.
- c. Owner may modify or reject the payment request if, in Owner's opinion, the Work for which payment is requested is not acceptable or is less complete than represented on the payment request.
- d. Contractor will timely pay subcontractors their portion of fees and expenses that Owner has paid to Contractor.

6. **Extras and Change Orders.**

- a. Owner may order changes in the Work by altering, adding to, or deducting from the Work. In the event of such a change, the Contract Sum and/or the time of completion will be adjusted to reflect the change by means of a written Change Order signed by Contractor and Owner. Contractor will not commence work on any change until either: (a) Contractor and Owner have executed a Change Order; or (b) Owner has issued a written order for the change acknowledging that there is a dispute regarding the compensation adjustment relating to the change. If Contractor proceeds with a change in the Work without complying with the preceding sentence, Contractor agrees that it will not be entitled to any additional compensation for such change.
- b. For any Change Order, Contractor will timely furnish a proposal for the Change Order containing a price breakdown itemized as required by Owner. The break down will be in sufficient detail to allow Owner to determine any increase or decrease in the Contractor's direct out of pocket cost to perform the Change Order Work. Any amount claimed for Subcontractors will be supported by a similar price breakdown and will itemize the Subcontractor's direct out of pocket costs as well as profit and overhead charges resulting from the Change in the Work. Profit and overhead will be subject to the following limitations:
 1. The Subcontractor's profit and overhead will not exceed eight (8%) percent of Subcontractor's Direct Costs.
 2. Contractor's profit and overhead mark-up on work performed by its own crews will not exceed five (5%) percent of Contractor's direct out of pocket costs for such work.
 3. Contractor's profit and overhead mark up on work performed by Subcontractors will not exceed five percent (5%).
 4. Amounts due Owner as a result of a credit change will be the actual net decrease in the Contractor's direct out of pocket costs to perform the Work as a result of the Change in the Work. Overhead and profit for the Change Order will be calculated based on the net increase or decrease in Contractor's direct out of pocket costs resulting from the Change in the Work.

7. **Warranty and Correction of Work.** For all Work, services, labor, materials, products, and equipment provided under the Contract Documents, Contractor provides and extends to Owner all statutory, common law, and standard industry warranties as well as those warranties set forth in Owner's Contract Documents. Unless a longer period is specified by Owner's Contract Documents or otherwise, Contractor, at a minimum and in addition to all other warranties, warrants all Work under the Contract Documents for at least one year. Specifically, and without limitation, Contractor will promptly correct at its own expense:

- a. any portion of the Work which
 - 1) fails to conform to the requirements of the Contract Documents, or
 - 2) is rejected by the Owner as defective or because it is damaged or rendered unsuitable during installation or resulting from failure to exercise proper protection.
- b. any defects due to faulty materials, equipment, or workmanship which appear within a period of one year from the date of completion of the Work or within such longer period of time as may be prescribed by law or the terms of any applicable special warranty required by the Contract Documents.

8. **Time of Completion.** Contractor will complete the Work and have it ready for Owner's inspection within _____ (_____) calendar days from Notice to Proceed issued by Owner. Time is of the essence. If Contractor is delayed at any time in the progress of the Work by any act or neglect of Owner, or by changes in the Work, or by strikes, lockouts, unusual delay in transportation, unavoidable casualties, or acts of nature beyond Contractor's control, then the time for completion will be extended by the time that completion of the Work is delayed. However, Contractor expressly waives any damages for any such delays.

9. **Owner Provided Items.** Owner may provide furnishings, equipment, and/or other items for the Project. Contractor will install items furnished by Owner and/or receive, store, and protect such items on site until the date Owner accepts the Project.

10. **Product Requirements.** Contractor will provide products that comply with Contract Documents, are undamaged, and, unless otherwise indicated, are new and unused at time of installation. Contractor will provide products complete with accessories, trim, finish, safety guards, and other devices and details needed for complete installation and for intended use and effect.

11. **Permits, Surveys, and Taxes.** Contractor will obtain and pay for all permits and licenses, and also pay any applicable taxes. Contractor will also obtain and pay for any surveys it needs to perform the Work.
12. **Independent Contractor Relationship.** Contractor is not an agent or employee of Owner but is an independent contractor.
13. **Comply with Laws.** Contractor will comply, and ensure that all subcontractors comply, with all applicable laws, ordinances, rules, regulations, covenants, and restrictions.
14. **Indemnity and Hold Harmless.**
- Contractor will indemnify and hold harmless Owner and Owner's representatives, employees, agents, architects, and consultants from and against any and all claims, liens, damages, liability, demands, costs, judgments, awards, settlements, causes of action, losses and expenses (collectively "Claims" or "Claim"), including but not limited to attorney fees, consultant fees, expert fees, copy costs, and other expenses, arising out of or resulting from performance of or failure to perform the Work, attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of real or personal property, including loss of use resulting therefrom, except to the extent that such liability arises out of the negligence of Owner, its representatives, agents, and employees. This indemnity includes, without limitation, indemnification of Owner from all losses or injury to Owner's property, except to the extent that such loss or injury arises out of the negligence of Owner, its representatives, agents, and employees. This indemnity applies, without limitation, to include Claims occurring both during performance of the Work and/or subsequent to completion of the Work. In the event that any Claim is caused in part by a party indemnified hereunder, that party will bear the cost of such Claim to the extent it was the cause thereof. In the event that a claimant asserts a Claim for recovery against any party indemnified hereunder, the party indemnified hereunder may tender the defense of such Claim to Contractor. If Contractor rejects such tender of defense and it is later determined that the negligence of the party indemnified hereunder did not cause all of the Claim, Contractor will reimburse the party indemnified hereunder for all costs and expenses incurred by that party in defending against the Claim. Contractor will not be liable hereunder to indemnify any party for damages resulting from the sole negligence of that party.
 - In addition to the foregoing, Contractor will be liable to defend Owner in any lawsuit filed by any Subcontractor relating to the Project. Where liens have been filed against Owner's property, Contractor (and/or its bonding company which has issued bonds for the Project) will obtain lien releases and record them in the appropriate county and/or local jurisdiction and provide Owner with a title free and clear from any liens of Subcontractors. In the event that Contractor and/or its bonding company are unable to obtain a lien release, Owner in its absolute discretion may require Contractor to provide a bond around the lien or a bond to discharge the lien, at Contractor's sole expense.
 - In addition to the foregoing, Contractor will indemnify and hold Owner harmless from any claim of any other contractor resulting from the performance, nonperformance or delay in performance of the Work by Contractor.
 - The indemnification obligation herein will not be limited by a limitation on the amount or type of damages, compensation or benefits payable by or for Contractor or a Subcontractor under workers compensation acts, disability benefit acts, or other employee benefit acts.
15. **Work Restrictions.** Contractor will ensure that Contractor, its agents, employees, and subcontractors:
- Do not use or consume alcohol or cannabis, or illegally use drugs, on the Project Site or enter on or perform any Work on the Project Site while under their influence.
 - Do not smoke or vape anything on the Project Site. Do not use tobacco in any form on the Project Site.
 - Do not perform Work on the Project Site on Sundays except for emergency work.
 - Refrain from using profanity or being discourteous or uncivil to others on the Project Site or while performing Work under this Agreement.
 - Do not view or allow pornographic or other indecent materials on the Project Site.
 - Do not play obnoxious and/or loud music on the Project Site. Do not play any music within existing facilities.
 - Refrain from wearing immodest, offensive, or obnoxious clothing, while on the Project Site.
 - Do not bring weapons on the Project Site.

16. **Safety Hazards.** Contractor will ensure that no work or services will be performed that may pose an undue safety hazard to Contractor, Contractor's employees, or any other person.
17. **Contractor's Insurance.** Prior to performing any work, Contractor will obtain and maintain during the term of this Agreement the following insurance:
- Workers Compensation Insurance or evidence of exemption.
 - Employers Liability Insurance with minimum limits of the greater of \$500,000 E.L. each accident, \$500,000 E. L. disease-each employee, \$500,000 E.L. disease-policy limit or as required by the law of the state in which the Project is located.
 - Commercial General Liability Insurance – ISO Form CG 00 01 (12/07) or equivalent Occurrence policy which will provide primary coverage to the additional insureds (the Owner and the Architect) in the event of any Occurrence, Claim, or Suit with:
 - Limits of the greater of: Contractor's actual coverage amounts or the following:
 - \$2,000,000 General Aggregate;
 - \$2,000,000 Products - Comp/Ops Aggregate;
 - \$1,000,000 Personal and Advertising Liability;
 - \$1,000,000 Each Occurrence; and
 - \$50,000 Fire Damage to Rented Premises (Each Occurrence)
 - Endorsements attached to the General Liability policy including the following or their equivalent:
 - ISO Form CG-25-03 (05/09), Amendment of Limits of Insurance (Designated Project or Premises) describing the Agreement and specifying limits as shown above.
 - ISO Form CG 20 10 (07/04), Additional Insured – Owners, Lessees, Or Contractors (Form B), naming Owner and Architect as additional insureds.
 - Automobile Liability Insurance, with:
 - Combined Single Limit each accident in the amount of no less than \$500,000; and
 - Coverage applying to "Any Auto" or its equivalent.

Contractor will provide evidence of these insurance coverages to Owner by providing an ACORD 25 (2010/05) Form or its equivalent: (1) listing Owner as the Certificate Holder and Additional Insured on the general liability and any excess liability policies, (2) listing the insurance companies providing coverage (all companies listed must be rated in A.M. Best Company Key Rating Guide-Property-Casualty and each company must have a rating of B+ Class VII or higher), (3) attaching the endorsements set forth above for the Certificate of Liability Insurance, and (4) bearing the name, address and telephone number of the producer and signed by an authorized representative of the producer. (The signature may be original, stamped, or electronic.) Notwithstanding the foregoing, Owner may, in writing and at its sole discretion, modify these insurance requirements.

18. **Resolution of Disputes.** In the event there is any dispute arising under the Contract Documents which cannot be resolved by agreement between the parties, either party may submit the dispute with all documentation upon which it relies to Director of Architecture, Engineering, and Construction, 50 East North Temple, Salt Lake City, Utah 84150, who will convene a dispute resolution conference within thirty (30) days. The dispute resolution conference will constitute settlement negotiations and any settlement proposal made pursuant to the conference will not be admissible as evidence of liability. In the event that the parties do not resolve their dispute pursuant to the dispute resolution conference, either party may commence legal action to resolve the dispute. Any such action must be commenced within six (6) months from the first day of the dispute resolution conference or be time barred. Submission of the dispute to the Director as outlined above is a condition precedent to the right to commence legal action to resolve any dispute. In the event that either party commences legal action to adjudicate any dispute without first submitting the dispute to the Director, the other party will be entitled to obtain an order dismissing the litigation without prejudice and awarding such other party any costs and attorney fees incurred by that party in obtaining the dismissal, including without limitation copy costs, and expert and consultant fees and expenses. Pending final resolution of a dispute hereunder, Contractor will proceed diligently with the performance of its obligations pursuant to this Agreement.
19. **Termination by Contractor.** In the event Owner materially breaches any term of the Contract Documents, Contractor will promptly give Written Notice of the breach to Owner. If Owner fails to cure the breach within

ten (10) days of the Written Notice, Contractor may terminate this Agreement by giving Written Notice to Owner and recover from Owner the percentage of the Contract Sum represented by the Work completed on the Project site as of the date of termination together with any out of pocket loss Contractor has sustained with respect to materials and equipment as a result of the termination prior to completion of the Work, less any offsets. Contractor will not be entitled to unearned profits or any other compensation or damages as a result of the termination and hereby waives any claim therefor. Contractor will provide to Owner all warranty, as built, inspection, and other close out documents as well as materials that Contractor has in its possession or control at the time of termination. Without limitation, Contractor's indemnities and obligations as well as all warranties relative to Work provided through the date of termination survive a termination hereunder.

20. **Termination by Owner for Cause.** Should Contractor fail to timely provide Owner with the certificates of insurance, make a general assignment for the benefit of its creditors, fail to apply enough properly skilled workmen or specified materials to properly prosecute the Work in accordance with Contractor's schedule, or otherwise materially breach any provision of the Contract Documents, then Owner may, without any prejudice to any other right or remedy, give Contractor Written Notice thereof. If Contractor fails to cure its default within ten (10) days, Owner may terminate this Agreement by giving Written Notice to Contractor. In such case, Owner may, in Owner's sole discretion, take legal assignment of subcontracts and other contractual rights of Contractor and/or take possession of the premises and all materials, tools, equipment, and appliances thereon, and finish the Work by whatever method Owner deems expedient. Contractor will not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Sum exceeds the expense of finishing the Work, including compensation for additional administrative, architectural, consultant, and legal services (including without limitation attorney fees, expert fees, copy costs, and other expenses), such excess will be paid to Contractor, less any offsets. If such expense exceeds the unpaid balance, Contractor will pay the difference to Owner. Contractor will provide to Owner all warranty, as built, inspection, and other close out documents as well as materials that Contractor has in its possession or control at the time of termination. Without limitation, Contractor's indemnities and obligations as well as all warranties relative to Work provided through the date of termination survive a termination hereunder.
21. **Termination by Owner for Convenience.** Notwithstanding any other provision contained in the Contract Documents, Owner may, without cause and in its absolute discretion, terminate this Agreement at any time. In the event of such termination, Contractor will be entitled to recover from Owner the percentage of the Contract Sum equal to the percentage of the Work which Owner and/or its architect determines has been completed on the Project site as of the date of termination together with any out of pocket loss Contractor has sustained with respect to materials and equipment as a result of the termination prior to completion of the Work, less any offsets. Contractor will not be entitled to unearned profits or any other compensation as a result of the termination and hereby waives any claim therefor. Contractor will provide to Owner all warranty, as built, inspection, and other close out documents as well as materials that Contractor has in its possession or control at the time of termination. Owner may, in Owner's sole discretion, take legal assignment of subcontracts and other contractual rights of Contractor. Without limitation, Contractor's indemnities and obligations as well as all warranties relative to Work provided through the date of termination survive a termination hereunder.
22. **Enforcement.** In the event either party commences legal action to enforce or rescind any term of this Agreement, the prevailing party will be entitled to recover its attorney fees, costs and legal expenses, including without limitation all copy costs and expert and consultant fees and expenses, incurred in that action and on all appeals, from the other party.
23. **Ownership of Materials, Products, and Intellectual Property Rights.** Owner will retain ownership and intellectual property rights in all plans, designs, drawings, documents, concepts, and materials provided by or on behalf of Owner to Contractor and to all work products of Contractor and its subcontractors for products, services, and Work provided under this Agreement, such products, services, and Work of Contractor and its subcontractors constituting works made for hire. Neither Contractor nor its subcontractors will reuse any portion of such items provided by Owner or work products developed by Contractor or its subcontractors for Owner pursuant to this Agreement or disclose any such items to any third party without the prior written consent of Owner. Owner may withhold its consent in its absolute discretion. Contractor shall obtain the written agreement of each of its subcontractors to the terms of this section prior to permitting the subcontractor to perform any

services contemplated by this Agreement.

24. **Comply with Intellectual Property Rights of Others.** Contractor represents and warrants that no Work or services (with its means, methods, goods, and services attendant thereto), provided to Owner will infringe or violate any right of any third party and that Owner may use and exploit such Work, means, methods, goods, and services without liability or obligation to any person or entity (specifically and without limitation, such Work, means, methods, goods, and services will not violate rights under any patent, copyright, trademark, or other intellectual property right or application for the same).
25. **Ownership and Use of Renderings and Photographs.** Renderings, photographs, and/or other images of or representing the services, Work, or any improvement on or relative to the Project Site, whether created before, during, or at completion of construction (and whether created by Owner, Contractor, or Contractor's subcontractors), are the property of the Owner. Contractor hereby transfers and assigns to Owner all ownership and intellectual property rights that Contractor and/or its subcontractors may have in and to all such renderings, photographs, and other images. The Owner reserves all rights including copyrights and other intellectual property rights to such renderings, photographs, and other images. No such renderings, photographs, or other images shall be used or distributed without written consent of the Owner.
26. **Public Statements.** Contractor will not make any statements or provide any information to the media about the Project or Work without the prior written consent of Owner. If Contractor receives any requests for information from media, Contractor will refer such requests to Owner.
27. **Confidentiality.** Contractor shall ensure that Contractor and its subcontractors, and the employees, agents and representatives of Contractor and its subcontractors, maintain in strict confidence, and shall use and disclose only as authorized by Owner all Confidential Information of Owner that Contractor receives in connection with the performance of this Agreement. Notwithstanding the foregoing, Contractor may use and disclose any information to the extent required by an order of any court or governmental authority, but only after it has notified Owner and Owner has had an opportunity to obtain reasonable protection for such information in connection with such disclosure. For purposes of this Agreement, "Confidential Information" means:
- a. The name or address of any affiliate, customer or contractor of Owner or any information concerning the transactions of any such person with Owner;
 - b. Any contracts, agreements, business plans, budgets or other financial information, renderings, photographs, and materials provided by Owner, relating to the Work or any improvement on the Project Site to the extent such has not been made available to the public by the Owner;
 - c. Any other information that is marked or noted as confidential at the time of its disclosure.
28. **No Commercial Use of Transaction or Relationship.** Without the prior written consent of Owner, which Owner may grant or withhold in its sole discretion, neither Contractor nor Contractor's affiliates, officers, directors, agents, representatives, shareholders, members, Subcontractors, or employees shall make any private commercial use of their relationship to Owner or the Project, including, without limitation:
- a. By referring to the Owner or Project verbally or in any sales, marketing or other literature, letters, client lists, press releases, brochures or other written materials except as may be necessary for Contractor to perform Contractor's obligations under the terms of this Agreement;
 - b. By using or allowing the use of any photographs of the Work or Project or any part thereof, or of any service marks, trademarks or trade names or other intellectual property now or which may hereafter be associated with, owned by or licensed by Owner, in connection with any work, service or product; or
 - c. By contracting with or receiving money or anything of value from any person or commercial entity to facilitate such person or entity obtaining any type of commercial identification, advertising or visibility in connection with the Owner or Project.
- Notwithstanding the foregoing, Contractor may include a reference to Owner or the Project in a professional résumé or other similar listing of Contractor's references without seeking Owner's written consent in each instance, provided that such reference to Owner or the Project is included with at least several other similar references to projects of different owners and is given no more prominence than such other references.
29. **Entire Agreement.** This Agreement contains the entire and integrated agreement between the parties hereto and supersedes all prior negotiations, representations, or agreements, either written or oral, relating to the

Project. This Agreement may be amended only by a writing signed by both parties. This Agreement will not be construed to create a contractual relationship of any kind between any persons or entities other than Owner and Contractor.

30. **Assignment.** Contractor will not assign any right or obligation hereunder without the prior written consent of the Owner, which consent may be granted or withheld in Owner's absolute discretion.

31. **Governing Law.** The parties acknowledge that the Contract Documents have substantial connections to the State of Utah. The Contract Documents will be deemed to have been made, executed, and delivered in Salt Lake City, Utah. To the maximum extent permitted by law, (i) the Contract Documents and all matters related to their creation and performance will be governed by and enforced in accordance with the laws of the State of Utah, excluding conflicts of law rules, and (ii) all disputes arising from or related to the Contract Documents will be decided only in a state or federal court located in Salt Lake City, Utah and not in any other court or state. Toward that end, the parties hereby consent to the jurisdiction of the state and federal courts located in Salt Lake City, Utah and waive any other *venue* to which they might be entitled by virtue of domicile, habitual residence, place of business, or otherwise.

32. **Effective Date.** The effective date of this Agreement is the date indicated by Owner's signature.

OWNER:

The Church of Jesus Christ of Latter-day Saints,
a Utah corporation sole

CONTRACTOR:

Signature:

Signature:

Print Name:

Print Name:

Title:

Title:

Address:

Address:

Telephone No:

Telephone No:

Facsimile No:

Facsimile No:

Email:

Email:

Effective Date:

Fed. I.D. or SSN:

License No:

Reviewed By:

Date Signed:

**SECTION 01 2000
PRICE AND PAYMENT PROCEDURES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Procedures for preparation and submittal of applications for progress payments.
- B. Procedures for preparation and submittal of application for final payment.

1.02 SCHEDULE OF VALUES

- A. Submit schedule of values as directed by Owner's representative within 24 hours of project bid. Coordinate preparation of schedule of values with preparation of Contractor's Construction Schedule. Correlate line items in Schedule of Values with other required administrative schedules and forms, including:
 - 1. Contractor's Construction Schedule.
 - 2. Payment Request form.
 - 3. Schedule of Allowances.
 - 4. Schedule of Alternates.
- B. Electronic media printout including equivalent information may be considered in lieu of standard form specified; submit draft to Architect for approval.
- C. Forms filled out by hand will not be accepted.

1.03 APPLICATIONS FOR PROGRESS PAYMENTS

- A. Payment Period: Submit at intervals stipulated in the Agreement.
- B. Use Payment Request forms provided by Owner.
- C. Provide following submittals before or with submittal of Initial Payment Request:
 - 1. List of Subcontractors.
 - 2. Initial progress report.
 - 3. Contractor's Construction Schedule.
 - 4. Submittal Schedule.
- D. Each Payment Request will be consistent with previous requests and payments certified by Architect and paid for by Owner.
- E. Electronic media printout including equivalent information may be considered in lieu of standard form specified; submit sample to Architect for approval.
- F. Forms filled out by hand will not be accepted.
- G. Execute certification by signature of authorized officer.
- H. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed.
- I. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of work.
- J. Submit copy of each Application for Payment.
- K. Construction progress schedule, revised and current as specified in Section 01 3216.

1.04 APPLICATION FOR FINAL PAYMENT

- A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.
- B. Provide Affidavit of Contractor and Consent of Surety with Payment Request following Substantial Completion.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

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END OF SECTION

Helena Distribution Store – Project # 89018312501	01 2000 - 2	Price and Payment Procedures
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**SECTION 01 3000
ADMINISTRATIVE REQUIREMENTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General administrative requirements.
- B. Preconstruction meeting.
- C. Progress meetings.
- D. Pre-Installation Conferences
- E. Submittals for review, information, and project closeout.
- F. Submittal procedures.

1.02 GENERAL ADMINISTRATIVE REQUIREMENTS

- A. Comply with requirements of Section 01 7000 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.
- B. Project designation for this Project is [Insert Project Designation]. This Project designation will be included on documents generated for Project by Contractor and Subcontractors, or be present on a cover letter accompanying such documents.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRECONSTRUCTION MEETING

- A. Architect will schedule a meeting after Notice of Award.
- B. Architect will record minutes and distribute copies within three working days after meeting to participants and those affected by decisions made.

3.02 PROGRESS MEETINGS

- A. Architect will make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
- B. Progress meetings will be open to Owner, Architect, Subcontractors, and anyone invited by Owner, Architect, and Contractor.
- C. Architect will record minutes and distribute copies within three working days after meeting to participants and those affected by decisions made.

3.03 PRE-INSTALLATION CONFERENCES

- A. Attend pre-installation conferences specified in Contract Documents.
 - 1. If possible, schedule these conferences on same day as regularly scheduled Progress Meetings. If this is not possible, coordinate scheduling with Architect.
 - 2. Request input from attendees in preparing agenda.
- B. See individual specification sections for information to include in Pre-Installation Conferences.
- C. Architect will record minutes and distribute copies within three working days after meeting to participants and those affected by decisions made.

3.04 SUBMITTAL SCHEDULE

- A. Submit to Architect for review a schedule for submittals in tabular format, listing items specified to be furnished for review to Architect including product data, shop drawings, samples, and Informational Submittals.
 - 1. Submit at the same time as the preliminary schedule or 20 days after receipt of Notice to Proceed.
 - 2. Coordinate with Contractor's construction schedule.

3. Format schedule to allow tracking of status of submittals throughout duration of construction.
4. Enclose the following information for each item:
 - a. Scheduled date for first submittal.
 - b. Related Section number.
 - c. Submittal category.
 - d. Name of Subcontractor.
 - e. Description of part of the Work covered.
 - f. Scheduled date for resubmittal.
 - g. Scheduled date for Architect's final release or approval.
5. Account for time required for preparation, review, manufacturing, fabrication and delivery when establishing submittal delivery and review deadline dates.
 - a. For assemblies, equipment, systems comprised of multiple components and/or requiring detailed coordination with other work, allow for additional time to make corrections or revisions to initial submittals, and time for their review.
 - b. Print and distribute copies to Architect and Owner and post copy in field office. When revisions are made, distribute to same parties and post in same location.
 - c. Revise schedule monthly. Send copy of revised schedule to Owner and Architect and post copy in field office.

3.05 SUBMITTALS FOR REVIEW

- A. When the following are specified in individual sections, submit them for review:
 1. Product data.
 2. Shop drawings.
 3. Samples for selection.
 4. Samples for verification.
- B. Submit to Architect for review for the limited purpose of checking for compliance with information given and the design concept expressed in Contract Documents.
- C. Samples will be reviewed for aesthetic, color, or finish selection.
- D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 7800 - Closeout Submittals.

3.06 SUBMITTALS FOR INFORMATION

- A. When the following are specified in individual sections, submit them for information:
 1. Design data.
 2. Certificates.
 3. Test reports.
 4. Inspection reports.
 5. Manufacturer's instructions.
 6. Manufacturer's field reports.
 7. Field engineering daily reports.
 8. Special Procedure Submittals: Describe submittals intended to document special procedures. An example would be construction staging or phasing for remodeling an existing facility while keeping it in operation. While the Contractor would normally be responsible for managing this, submittal of his plan as documentation could be specified.
 9. Qualification Statements: Describe submittals intended to document qualification of entities employed by Contractor.
 10. Other types indicated.
- B. Submit for Architect's knowledge as contract administrator or for Owner.

3.07 SUBMITTALS FOR PROJECT CLOSEOUT

- A. Submit Correction Punch List for Substantial Completion.

- B. Submit Final Correction Punch List for Substantial Completion.
- C. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 01 7800 - Closeout Submittals:
 - 1. Project record documents.
 - 2. Operation and maintenance data.
 - 3. Warranties.
 - 4. Bonds.
 - 5. Project Manual: Complete Project Manual including Addenda and Modifications as defined in General Conditions.
 - 6. Record Documentation: Describe submittal of record documentation specific to the Section.
 - 7. Software: Describe submittal system software and programming software specific to the Section.
- D. Final Property Survey.
- E. Submit for Owner's benefit during and after project completion.

3.08 MAINTENANCE MATERIAL SUBMITTALS

- A. This title groups maintenance material required submittals specific to the Section. Items may be provided at completion of Work or submitted with section 01 7800 - Closeout Submittals:
 - 1. Spare Parts: Describe spare parts necessary for Owner's use in facility operation and maintenance. 'Parts' are generally understood to be items such as filters, motor drive belts, lamps, and other similar manufactured items that require only simple replacement.
 - 2. Extra Stock Materials: Describe extra stock materials to be provided for Owner's use in facility operation and maintenance. Extra stock materials are generally understood to be items such as ceiling tiles, flooring, paint etc.
 - 3. Tools:
 - a. Describe tools to be provided for Owner's use in facility operation and maintenance. Tools are generally understood to be wrenches, gauges, circuit setters, etc, required for proper operation or maintenance of a system.

3.09 NUMBER OF COPIES OF SUBMITTALS

- A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.

3.10 SUBMITTAL PROCEDURES

- A. General Requirements:
 - 1. Identification:
 - a. Place permanent label or title block on each submittal for identification. Include name of entity that prepared each submittal on label or title block.
 - 1) Provide space approximately 4 by 5 inches on label or beside title block on Shop Drawings to record Contractor's review and approval markings and action taken.
 - 2) Include following information on label for processing and recording action taken:
 - (a) Project name.
 - (b) Date.
 - (c) Name and address of Architect.
 - (d) Name and address of Contractor.
 - (e) Name and address of Subcontractor.
 - (f) Name and address of supplier.
 - (g) Name of manufacturer.
 - (h) Number and title of appropriate Specification Section.
 - (i) Drawing number and detail references, as appropriate.
 - 2. Use a single transmittal for related items.
 - 3. Submit separate packages of submittals for review and submittals for information, when included in the same specification section.

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4. Transmit using approved form.
 - a. Use Contractor's form, subject to prior approval by Architect.
 5. Sequentially identify each item. For revised submittals use original number and a sequential "R" suffix.
 6. Identify: Project; Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on each copy.
 7. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.
 - a. Submittals from sources other than the Contractor, or without Contractor's stamp will not be acknowledged, reviewed, or returned.
 8. Deliver each submittal on date noted in submittal schedule, unless an earlier date has been agreed to by all affected parties, and is of the benefit to the project.
 - a. Deliver submittals to Architect at business address.
 - b. Send submittals in electronic format via email to Architect.
 9. Schedule submittals to expedite the Project, and coordinate submission of related items.
 - a. For each submittal for review, allow 21 days excluding delivery time to and from the Contractor.
 - b. For sequential reviews involving Architect's consultants, Owner, or another affected party, allow an additional 10 days.
 - c. For sequential reviews involving approval from authorities having jurisdiction (AHJ), in addition to Architect's approval, allow an additional 30 days.
 10. No extension of Contract Time will be authorized because of failure to transmit submittals to Architect in sufficient time before work is to be performed to allow processing.
- B. Product Data Procedures:
1. Mark each copy of each set of submittals to show choices and options used on Project. Where printed Product Data includes information on products that are not required for Project, mark copies to indicate information relating to Project.
 2. Certify that proposed product complies with requirements of Contract Documents. List any deviations from those requirements on form or separate sheet.
 3. Submit only information required by individual specification sections.
 4. Collect required information into a single submittal.
 5. Submit concurrently with related shop drawing submittal.
 6. Do not submit (Material) Safety Data Sheets for materials or products.
- C. Shop Drawing Procedures:
1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting Contract Documents and coordinating related work.
 2. Do not reproduce Contract Documents to create shop drawings.
 3. 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 36 by 48 inches. Highlight, encircle, or otherwise show deviations from Contract Documents. Include following information as a minimum:
 - a. Dimensions.
 - b. Identification of products and materials included.
 - c. Compliance with specified standards.
 - d. Notation of coordination requirements.
 - e. Notation of dimensions established by field measurement.
 4. Review and designate (stamp) approval of shop drawings. Unless otherwise specified, submit to Architect six copies of shop drawings required by Contract Documents. Shop drawings not required by Contract Documents, but requested by Contractor or supplied by Subcontractor, need not be submitted to Architect for review.
- D. Samples Procedures:

1. Transmit related items together as single package.
2. Identify each item to allow review for applicability in relation to shop drawings showing installation locations.
3. Include with transmittal high-resolution image files of samples to facilitate electronic review and approval. Provide separate submittal page for each item image.
4. Submit full-size, fully fabricated Samples cured and finished as specified and physically identical with material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture, and pattern.
 - a. Mount, display, or package Samples to ease review of qualities specified. Prepare Samples to match samples provided by Architect, if applicable. Include following:
 - 1) Generic description of Sample.
 - 2) Sample source.
 - 3) Product name or name of manufacturer.
 - 4) Compliance with recognized standards.
 - 5) Availability and delivery time.
5. Submit Samples for review of kind, color, pattern, and texture, for final check of these characteristics with other elements, and for a comparison of these characteristics between final submittal and actual component as delivered and installed.
 - a. Where variations in color, pattern, texture or other characteristics are inherent in material or product represented, submit set of three samples minimum that show approximate limits of variations.
 - b. Refer to other specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation and similar construction characteristics.
 - c. Refer to other Sections for Samples to be returned to Contractor for incorporation into The Work. Such Samples shall be undamaged at time of use. On transmittal, indicate special requests regarding disposition of Sample submittals.
6. Where Samples are for selection of color, pattern, texture, or similar characteristics from a range of standard choices, submit full set of choices for material or product. Preliminary submittals will be reviewed and returned with Architect's mark indicating selection and other action.
7. Except for Samples illustrating assembly details, workmanship, fabrication techniques, connections, operation, and similar characteristics, submit three sets. One will be returned marked with action taken.
8. Samples, as accepted and returned by Architect, will be used for quality comparisons throughout course of construction.
 - a. Unless noncompliance with Contract Documents is observed, submittal may serve as final submittal.
 - b. Sample sets may be used to obtain final acceptance of construction associated with each set.

END OF SECTION

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**SECTION 01 3216
CONSTRUCTION PROGRESS SCHEDULE**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Preliminary schedule.
- B. Construction progress schedule, bar chart type.
- C. Construction progress schedule, with network analysis diagrams and reports if required by Owner.
- D. Daily Construction Reports.

1.02 SUBMITTALS

- A. Within 10 days after date of Agreement, submit preliminary schedule defining planned operations for the first 60 days of Work, with a general outline for remainder of Work.
- B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.
- C. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
 - 1. Include written certification that major contractors have reviewed and accepted proposed schedule.
- D. Within 10 days after joint review, submit complete schedule.
- E. Submit updated schedule with each Application for Payment.

1.03 SCHEDULE FORMAT

- A. Provide separate time bar for each construction activity listed on Owner's payment request form.
- B. Listings: In chronological order according to the start date for each activity. Identify each activity with the applicable specification section number.
- C. Sheet Size: Multiples of 8-1/2 x 11 inches.
- D. Scale and Spacing: To allow for notations and revisions.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRELIMINARY SCHEDULE

- A. Prepare preliminary schedule in the form of a horizontal bar chart.

3.02 CONTENT

- A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.
- B. Provide separate time bar for each construction activity listed on Owner's payment request form.
- C. Identify each item by specification section number.
- D. Identify work of separate stages and other logically grouped activities.
- E. Provide sub-schedules to define critical portions of the entire schedule.
- F. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.
- G. Indicate delivery dates for owner-furnished products.
- H. Coordinate content with schedule of values specified in Section 01 2000 - Price and Payment Procedures.
- I. Provide legend for symbols and abbreviations used.

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3.03 ACCELERATION OF WORK

- A. Complete The Work in accordance with Construction Schedule. If Contractor falls behind schedule, take such actions as are necessary, at no additional expense to Owner, to bring progress of The Work back in accordance with schedule.
- B. Owner may request proposal for completion of The Work at date earlier than expiration of Contract Time:
 - 1. Promptly provide requested proposal showing cost of such acceleration of The Work. Consult with Owner and Architect regarding possible options to decrease cost of such acceleration.
 - 2. If Owner determines to order acceleration of The Work, change in Contract Sum and Contract Time resulting from acceleration will be included in a Change Order.

3.04 BAR CHARTS

- A. Provide separate time bar for each construction activity listed on Owner's payment request form.
- B. Include a separate bar for each major portion of Work or operation.
- C. Identify the first work day of each week.
- D. Project Management Software Programs:
 - 1. Any software project management program capable of Bar Chart Scheduling for projects of equal size and complexity is approved by Contractor and approved by Owner's Project Manager.

3.05 NETWORK ANALYSIS IF REQUIRED BY OWNER

- A. Prepare network analysis diagrams and supporting mathematical analyses using the Critical Path Method.
- B. Illustrate order and interdependence of activities and sequence of work; how start of a given activity depends on completion of preceding activities, and how completion of the activity may restrain start of subsequent activities.
- C. Mathematical Analysis: Tabulate each activity of detailed network diagrams, using calendar dates, and identify for each activity:
 - 1. Preceding and following event numbers.
 - 2. Activity description.
 - 3. Estimated duration of activity, in maximum 15 day intervals.
 - 4. Earliest start date.
 - 5. Earliest finish date.
 - 6. Actual start date.
 - 7. Actual finish date.
 - 8. Latest start date.
 - 9. Latest finish date.
 - 10. Total and free float; float time shall accrue to Owner and to Owner's benefit.
 - 11. Monetary value of activity, keyed to Schedule of Values.
 - 12. Percentage of activity completed.
 - 13. Responsibility.
- D. Analysis Program: Capable of compiling monetary value of completed and partially completed activities, accepting revised completion dates, and re-computation of all dates and float.
- E. Required Reports: List activities in sorts or groups:
 - 1. By preceding work item or event number from lowest to highest.
 - 2. By amount of float, then in order of early start.
 - 3. By responsibility in order of earliest possible start date.
 - 4. In order of latest allowable start dates.
 - 5. In order of latest allowable finish dates.
 - 6. Contractor's periodic payment request sorted by Schedule of Values listings.

7. Listing of basic input data that generates the report.
8. Listing of activities on the critical path.

3.06 REVIEW AND EVALUATION OF SCHEDULE

- A. Participate in joint review and evaluation of schedule with Architect at each submittal.
- B. Evaluate project status to determine work behind schedule and work ahead of schedule.
- C. After review, revise as necessary as result of review, and resubmit within 10 days.

3.07 UPDATING SCHEDULE

- A. Update schedule monthly.
- B. Maintain schedules to record actual start and finish dates of completed activities.
- C. Indicate progress of each activity to date of revision, with projected completion date of each activity.
- D. Annotate diagrams to graphically depict current status of Work.
- E. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.
- F. Indicate changes required to maintain Date of Substantial Completion.
- G. Submit reports required to support recommended changes.
- H. Provide narrative report to define problem areas, anticipated delays, and impact on the schedule. Report corrective action taken or proposed and its effect.

3.08 DISTRIBUTION OF SCHEDULE

- A. Distribute copies of updated schedules to Contractor's project site file, to subcontractors, suppliers, Architect, Owner, and other concerned parties.
- B. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

3.09 DAILY CONSTRUCTION REPORTS

- A. Prepare daily reports utilizing means and methods as defined by the Owner.
- B. Prepare daily reports of operations at Project including at least the following information:
 1. Approximate count of personnel at site.
 2. High and low temperatures, general weather conditions.
 3. Materials, equipment, or Owner-furnished items arriving at or leaving site.
 4. Accidents and unusual events.
 5. Site or structure damage by water, frost, wind, or other causes.
 6. Stoppages, delays, shortages, losses.
 7. Any tests made and their result if known.
 8. Meter readings and similar recordings.
 9. Emergency procedures.
 10. Orders and requests of governing authorities.
 11. Services connected, disconnected.
 12. Equipment or system tests and start-ups.
 13. Brief summary of work accomplished that day.
 14. Signature of person preparing report.
- C. Submit daily reports to Architect at least weekly unless directed to submit reports on owner provided project management software.
- D. Maintain copies of daily reports at field office.

END OF SECTION

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Helena Distribution Store – Project # 89018312501	01 3216 - 4	Construction Progress Schedule
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**SECTION 01 4000
QUALITY REQUIREMENTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Submittals.
- B. Quality assurance.
- C. Qualifications.
- D. Testing and inspection agencies and services.
- E. Contractor's construction-related professional design services.
- F. Contractor's design-related professional design services.
- G. Control of installation.
- H. Mock-ups.
- I. Tolerances.
- J. Manufacturers' field services.
- K. Defect Assessment.

1.02 REFERENCE STANDARDS

- A. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection 2021.

1.03 CONTRACTOR'S CONSTRUCTION-RELATED PROFESSIONAL DESIGN SERVICES

- A. Coordination: Contractor's professional design services are subject to requirements of project's Conditions for Construction Contract.
- B. Provide such engineering design services as may be necessary to plan and safely conduct certain construction operations, pertaining to, but not limited to the following:
 - 1. Temporary sheeting, shoring, or supports.
 - 2. Temporary scaffolding.
 - 3. Temporary bracing.
 - 4. Temporary falsework for support of spanning or arched structures.
 - 5. Temporary foundation underpinning.
 - 6. Temporary stairs or steps required for construction access only.
 - 7. Temporary hoist(s) and rigging.
 - 8. Investigation of soil conditions and design of temporary foundations to support construction equipment.

1.04 CONTRACTOR'S DESIGN-RELATED PROFESSIONAL DESIGN SERVICES

- A. Coordination: Contractor's professional design services are subject to requirements of project's Conditions for Construction Contract.
- B. Base design on performance and/or design criteria indicated in individual specification sections.
 - 1. Submit a Request for Interpretation to Architect if the criteria indicated are not sufficient to perform required design services.

1.05 SUBMITTALS

- A. General: Additional submittal requirements are specified in Individual Sections in Division 01 through Division 50.
- B. Certificates:
 - 1. Testing Agency will submit certified written report of each inspection, test, or similar service.
- C. Tests and Evaluation Reports:

1. Testing Agency or Agencies will prepare logs, test reports, and certificates applicable to specific tests and inspections and deliver copies (or electronic record) distributed as follows:
 - a. 1 copy to Owner's Representative.
 - b. 1 copy to Architect.
 - c. 1 copy to Consulting Engineers (Engineer of Record).
 - d. 1 copy to General Contractor.
 - e. 1 copy to Authorities Having Jurisdiction (if required).
2. Other tests, certificates, and similar documents will be obtained by Contractor and delivered to Owner's Representative and Architect in such time as not to delay progress of the Work or final payment therefore.
3. Submittal Format:
 - a. Schedule of Tests and Inspections: Prepare in tabular form and include following:
 - 1) Specification Section number and title.
 - 2) Description of test and inspection.
 - 3) Identification of applicable standards.
 - 4) Identification of test and inspection methods.
 - 5) Number of tests and inspections required.
 - 6) Time schedule or time span for tests and inspections.
 - 7) Entity responsible for performing tests and inspections.
 - 8) Requirements for obtaining samples.
 - b. Certified written reports of each inspection, test, or similar service will include, but not be limited:
 - 1) Date of issue.
 - 2) Project title and number.
 - 3) Name, address, and telephone number of Testing Agency.
 - 4) Dates and locations of samples and tests or inspections.
 - 5) Names of individuals making tests and inspections.
 - 6) Description of the Work and test and inspection method.
 - 7) Identification of product and Specification Section.
 - 8) Complete test or inspection data.
 - 9) Test and inspection results and an interpretation of test results.
 - 10) Record of temperature and weather conditions at time of sample taking and testing and inspecting.
 - 11) Comments or professional opinion on whether tested or inspected Work complies with Contract Document requirements.
 - 12) Name and signature of laboratory inspector.
 - 13) Recommendations on retesting and re-inspecting.
- D. Source Quality Control Submittals:
 1. Testing Agency will submit following prior to commencing the Work:
 - a. Qualifications of Testing Agency management and personnel designated to project.
 - b. Testing Agency 'Written Practice for Quality Assurance'.
 - c. Qualification records for Inspector and non-destructive testing technicians designated for project.
 - d. Testing Agency non-destructive testing procedures, equipment calibration records, and personnel training records.
 - e. Testing Agency Quality Control Plan for monitoring and control of testing operations.
 - f. Welding Inspection Procedures (Structural Steel testing).
 - g. Bolting Inspection Procedures (Structural Steel testing).
 - h. Shear Connector Stud Inspection Procedures (Structural Steel testing).
 - i. Seismic Connections Inspection Procedures (Structural Steel testing).
- E. Testing and Inspection Reports:

1. Conduct and interpret tests and inspections and state in each report whether tested and inspected the Work complies with or deviates from requirements.
2. Laboratory Reports: Testing Agency will furnish reports of materials and construction as required, including:
 - a. Description of method of test.
 - b. Identification of sample and portion of the Work tested.
 - 1) Description of location in the Work of sample.
 - 2) Time and date when sample was obtained.
 - 3) Weather and climatic conditions at time when sample was obtained.
 - c. Evaluation of results of tests including recommendations for action.
3. Inspection Reports:
 - a. Testing Agency will furnish 'Inspection at Site' reports for each site visit documenting activities, observations, and inspections.
 - b. Include notation of weather and climatic conditions, time and date conditions and status of the Work, actions taken, and recommendations or evaluation of the Work.
4. Reporting Testing and Inspection (Conforming Work):
 - a. Submit testing and inspection reports as required within twenty four (24) hours of test or inspection having been performed.
5. Reporting Testing and Inspection Defective Work (Non-Conforming Work):
 - a. Testing Agency, upon determination of irregularities, deficiencies observed or test failure(s) observed in the Work during performance of its services of test or inspection having been performed, will:
 - 1) Verbally notify results to Architect, Contractor, and Owner's Representative within one hour of test or inspection having been performed (if Defective Work (Non-Conforming Work) is incorporated into project).
 - 2) Submit written inspection report and test results as required within twenty four (24) hours of test or inspection having been performed.
 - b. Prepare non-compliance log to track non-compliant testing or inspections.
6. Final Report:
 - a. Submit final report of tests and inspections at Substantial Completion, which identify unresolved deficiencies.

1.06 QUALIFICATIONS

- A. Qualifications paragraphs in this Article establish minimum qualification levels required; individual Specification Sections specify additional requirements:
 1. Fabricator / Supplier / Installer Qualifications: Firm experienced in producing products similar to those indicated for this Project and with record of successful in-service performance, as well as sufficient production capacity to produce required units.
 - a. Approved:
 - 1) Where heading 'Approved Suppliers / Distributors / Installers / Applicators / Fabricators' is used to identify list of specified suppliers / distributors / installers / applicators / fabricators, use only listed suppliers / installers / fabricators.
 - 2) No substitutions will be allowed.
 - b. Acceptable Suppliers / Installers:
 - 1) Where heading 'Acceptable Suppliers / Installers / Fabricators' is used, qualifications as specified in Quality Assurance in Part 1 of individual sections will be used to determine requirements of those that will be acceptable to be used on Project. Lists for acceptable installers can include additional installers that may be approved before bidding or by addendum.
 2. Factory-Authorized Service Representative Qualifications:
 - a. 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.
 3. 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.
- 4. 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.
- 5. Manufacturer's Field Services Qualifications:
 - a. Experienced authorized representative of manufacturer to inspect field-assembled components and equipment installation, including service connections.
- 6. 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 kind indicated. Engineering services are defined as those performed for installations of system, assembly, or products that are similar to those indicated for this Project in material, design, and extent.
- 7. Specialists:
 - a. Certain sections of Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations.
 - b. Specialists shall satisfy qualification requirements indicated and shall be engaged for activities indicated.
 - c. Requirement for specialists shall not supersede building codes and regulations governing the Work.
- 8. Testing Agency Qualifications:
 - a. Independent Testing Agency with experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E329; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
 - 1) Testing Laboratory:
 - (a) AASHTO Materials Reference Laboratory (AMRL) Accreditation Program.
 - (b) Cement and Concrete Reference Laboratory (CCRL).
 - (c) Nationally Recognized Testing Laboratory (NRTL): Nationally recognized testing laboratory according to 29 CFR 1910.7.
 - (d) National Voluntary Laboratory (NVLAP): Testing Agency accredited according to National Institute of Standards and Technology (NIST) Technology Administration, U. S. Department of Commerce Accreditation Program.

1.07 TESTING AND INSPECTION AGENCIES AND SERVICES

- A. Testing and inspecting services are used to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with Contract Document requirements.
 - 1. Specific quality assurance and quality control requirements for individual construction activities are specified in 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 control procedures that facilitate compliance with Contract Document requirements.
 - 3. Requirements for Contractor to provide quality assurance and quality control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
- B. As indicated in individual specification sections, Owner or Contractor shall employ and pay for services of an independent testing agency to perform specified testing and inspection.
- C. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 QUALITY ASSURANCE

- A. Activities, actions, and procedures performed before and during execution of the Work to verify compliance and guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Owner or Owner's designated representative(s) will perform quality assurance to verify compliance with Contract Documents.

3.02 MOCK-UPS

- A. Before installing portions of the Work where mock-ups are required, construct mock-ups in location and size indicated for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work. The purpose of mock-up is to demonstrate the proposed range of aesthetic effects and workmanship.
- B. Accepted mock-ups establish the standard of quality the Architect will use to judge the Work.
- C. Demonstrate proposed range of aesthetic effects and workmanship.
- D. Notify Architect seven (7) working days in advance of dates and times when mock-ups will be constructed.
- E. Provide supervisory personnel who will oversee mock-up construction. Provide workers that will be employed during the construction at Project.
- F. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.
- G. Obtain Architect's approval of mock-ups before starting work, fabrication, or construction.
 - 1. Architect will issue written comments within seven (7) working days of initial review and each subsequent follow up review of each mock-up.
 - 2. Make corrections as necessary until Architect's approval is issued.
- H. Architect will use accepted mock-ups as a comparison standard for the remaining Work.
- I. Where mock-up has been accepted by Architect and is specified in product specification sections to be removed, protect mock-up throughout construction, remove mock-up and clear area when directed to do so by Architect.

3.03 QUALITY CONTROL

- A. Quality Control Services:
 - 1. Quality Control will be sole responsibility of Contractor.
 - a. 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 performed by Contractor:
 - 1) They do not include inspections, tests or related actions performed by Architect, Owner, governing authorities or independent agencies hired by Owner or Architect.
 - 2) Quality assurance performed by Owner will be used to validate Quality Control performed by Contractor.
 - b. Where services are indicated as Contractor's responsibility, engage a qualified Testing Agency to perform these quality control services.
 - 1) Contractor shall not employ same testing entity engaged by Owner, without Owner's written approval.

3.04 TOLERANCES

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

- B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

3.05 TESTING AND INSPECTION

- A. See individual specification sections for testing and inspection required.
- B. Activities performed by Owner's Quality Assurance Testing Agency include, but are not limited to following:
 - 1. Individual Sections in Division 01 through Division 49:
 - a. Pre-Installation Conference agenda review items for:
 - 1) Schedule requirements.
 - 2) Testing and inspection requirements:
 - 3) Requirements and frequency of testing and inspections.
 - 4) Mock-up or sample requirements.
 - 5) Submittals requirements.
 - b. Quality Assurance personal qualifications.
 - 1) Qualification documentation including certificates if required.
 - c. Non-Conforming Work:
 - 1) Prepare non-compliance log to track non-compliant testing or inspections.
 - 2. Weekly Activities:
 - a. Summarize and track any non-compliance issues.
 - b. Provide summary report of previous week's performed Work.
 - c. Visit contractors periodically to find out if they have any concerns with Quality Assurance inspectors and check on any schedule changes.
 - d. Visit Owner's Representatives periodically to find out if they have any concerns with how project is progressing.
- C. Testing Agency Duties:
 - 1. Test samples of mixes submitted by Contractor.
 - 2. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
 - 3. Perform specified sampling and testing of products in accordance with specified standards.
 - 4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
 - 5. Promptly notify Architect and Contractor of observed irregularities or non-compliance of Work or products.
 - 6. Perform additional tests and inspections required by Architect.
 - 7. Attend preconstruction meetings and progress meetings.
 - 8. Submit reports of all tests/inspections specified.
- D. Limits on Testing/Inspection Agency Authority:
 - 1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
 - 2. Agency may not approve or accept any portion of the Work.
 - 3. Agency may not assume any duties of Contractor.
 - 4. Agency has no authority to stop the Work.
- E. Contractor Responsibilities:
 - 1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
 - 2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
 - 3. Provide incidental labor and facilities:
 - a. To provide access to Work to be tested/inspected.

- b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
 - c. To facilitate tests/inspections.
 - d. To provide storage and curing of test samples.
- 4. Notify Architect and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
- 5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
- 6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
- F. Architect Duties:
 - 1. Notify Owner's Representative before each test and/or inspection.
- G. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Architect.
- H. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

3.06 MANUFACTURERS' FIELD SERVICES

- A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust, and balance equipment as applicable, and to initiate instructions when necessary.
- B. Submit qualifications of observer to Architect 30 days in advance of required observations.
 - 1. Observer subject to approval of Architect.
 - 2. Observer subject to approval of Owner.
- C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

3.07 DEFECT ASSESSMENT

- A. Replace Work or portions of the Work not complying with specified requirements.
- B. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
 - 1. Provide materials and comply with installation requirements specified in other Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.
 - 2. Comply with Contract Document requirements for Section 01 7000 - Execution and Closeout Requirements for cutting and patching.
- C. Protect construction exposed by or for Quality Assurance and Quality Control activities.
- D. Repair and protection are Contractor's responsibility, regardless of assignment of responsibility for Quality Assurance and Quality Control Services.

END OF SECTION

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**SECTION 01 4219
REFERENCE STANDARDS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements relating to referenced standards.

1.02 QUALITY ASSURANCE

- A. For products or workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Comply with the reference standard of date of issue specified in this section, except where a specific date is established by applicable code.
- C. Obtain copies of standards when required by Contract Documents.
- D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Date of Substantial Completion.
- E. Should specified reference standards conflict with Contract Documents, request clarification from the Architect before proceeding.
- F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of the Architect shall be altered by Contract Documents by mention or inference otherwise in any reference document.
- G. Minimum Quantity or Quality Levels:
 - 1. Quantity or quality level shown or specified shall be minimum provided or performed.
 - 2. Actual installation may comply exactly with minimum quantity or quality specified, or it may exceed minimum within reasonable limits.
 - 3. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for context of requirements.
- H. Coordination:
 - 1. Coordinate sequence of activities to accommodate required quality assurance and quality control services with minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
- I. Scheduling:
 - 1. Schedule times for tests, inspections, obtaining samples, and similar activities.

1.03 INDUSTRY STANDARDS

- A. Except where Contract Documents specify otherwise, construction industry standards will apply and are made a part of Contract Documents by reference.
- B. Where compliance with two or more standards is specified and standards apparently establish different or conflicting requirements for minimum quantities or quality levels, refer to Architect for decision before proceeding. Quantity or quality level shown or specified will be minimum provided or performed. Actual installation may comply exactly with minimum quantity or quality specified, or it may exceed minimum within reasonable limits. In complying with these requirements, indicated numeric values are minimum or maximum, as appropriate for context of requirements. Refer uncertainties to Architect for decision before proceeding.
- C. Each entity engaged in construction on Project is required to be familiar with industry standards applicable to that entity's construction activity. Copies of applicable standards are not bound with Contract Documents. Where copies of standards are needed for performance of a required construction activity, Contractor will obtain copies directly from publication source.
- D. 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

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Thomson Gale's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the U.S."

1.04 GOVERNING REGULATIONS

- A. Governing Regulations / Authorities:
 - 1. Contact authorities having jurisdiction directly for information and decisions having a bearing on the Work.
 - 2. Obtain copies of regulations required to be retained at Project Site, available for reference by parties who have a reasonable need for such reference.

1.05 ABMA -- AMERICAN BEARING MANUFACTURERS ASSOCIATION, INC.

- A. ABMA STD 9 - Load Ratings and Fatigue Life for Ball Bearings 2015 (Reaffirmed 2020).

1.06 AHRI -- AIR-CONDITIONING, HEATING, AND REFRIGERATION INSTITUTE

- A. AHRI 410 - Forced-Circulation Air-Cooling and Air-Heating Coils 2001, with Addenda (2011).
- B. AHRI 430 (I-P) - Performance Rating of Central Station Air-handling Unit Supply Fans 2020.
- C. AHRI 610 (I-P) - Standard for Performance Rating of Central System Humidifiers for Residential Applications 2014.
- D. AHRI 851 (SI) - Performance Rating of Commercial and Industrial Air Filter Equipment 2013.

1.07 AISC -- AMERICAN INSTITUTE OF STEEL CONSTRUCTION, INC.

1.08 AITC -- AMERICAN INSTITUTE OF TIMBER CONSTRUCTION

1.09 ALI -- AMERICAN LADDER INSTITUTE

- A. ALI A14.3 - Ladders - Fixed - Safety Requirements 2008.

1.10 AMCA -- AIR MOVEMENT AND CONTROL ASSOCIATION INTERNATIONAL, INC.

- A. AMCA (DIR) - (Directory of) Products Licensed Under AMCA International Certified Ratings Program 2015.
- B. AMCA 99 - Standards Handbook 2016.
- C. AMCA 204 - Balance Quality and Vibration Levels for Fans 2020.
- D. AMCA 210 - Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating 2016.
- E. AMCA 300 - Reverberant Room Method for Sound Testing of Fans 2014.
- F. AMCA 301 - Methods for Calculating Fan Sound Ratings from Laboratory Test Data 2014.
- G. AMCA 500-D - Laboratory Methods of Testing Dampers for Rating 2018.
- H. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating 2012 (Reapproved 2015).

1.11 ASHRAE -- AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS, INC.

- A. ASHRAE Std 52.2 - Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size 2017, with Addendum (2022).
- B. ASHRAE Std 62.1 - Ventilation for Acceptable Indoor Air Quality Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- C. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. ASHRAE Std 103 - Method of Testing for Annual Fuel Utilization Efficiency of Residential Central Furnaces and Boilers 2022.

1.12 ASSE -- AMERICAN SOCIETY OF SANITARY ENGINEERING

1.13 ASTM A SERIES -- ASTM INTERNATIONAL

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2022.

1.14 ASTM B SERIES -- ASTM INTERNATIONAL

- A. ASTM B177/B177M - Standard Guide for Engineering Chromium Electroplating 2011 (Reapproved 2021).
- B. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2014.
- C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel 2019.

1.15 ASTM C SERIES -- ASTM INTERNATIONAL

- A. ASTM C1184 - Standard Specification for Structural Silicone Sealants 2018, with Editorial Revision.

1.16 ASTM D SERIES -- ASTM INTERNATIONAL

- A. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications 2019.
- B. ASTM D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position 2022.
- C. ASTM D882 - Standard Test Method for Tensile Properties of Thin Plastic Sheeting 2018.
- D. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials 2020.

1.17 ASTM E SERIES -- ASTM INTERNATIONAL

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.
- B. ASTM E2273 - Standard Test Method for Determining the Drainage Efficiency of Exterior Insulation and Finish Systems (EIFS) Clad Wall Assemblies 2018.
- C. ASTM E2486/E2486M - Standard Test Method for Impact Resistance of Class PB and PI Exterior Insulation and Finish Systems (EIFS) 2022.

1.18 ASTM G SERIES -- ASTM INTERNATIONAL

- A. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi 2015, with Editorial Revision (2021).

1.19 AWI/AWMAC/WI -- JOINT PUBLICATION OF ARCHITECTURAL WOODWORK INSTITUTE/ARCHITECTURAL WOODWORK MANUFACTURERS ASSOCIATION OF CANADA/WOODWORK INSTITUTE

1.20 BIA -- BRICK INDUSTRY ASSOCIATION

1.21 HPVA -- HARDWOOD PLYWOOD VENEER ASSOCIATION

1.22 ICC-ES -- ICC EVALUATION SERVICE, INC.

- A. ICC-ES AC235 - Acceptance Criteria for EIFS Clad Drainage Wall Assemblies 2009, with Editorial Revision (2012).

1.23 ISO -- INTERNATIONAL STANDARDS ORGANIZATION

1.24 MFMA -- MAPLE FLOORING MANUFACTURERS ASSOCIATION

1.25 MFMA -- METAL FRAMING MANUFACTURERS ASSOCIATION

- A. MFMA-4 - Metal Framing Standards Publication 2004.

1.26 MPI -- MASTER PAINTERS INSTITUTE (MASTER PAINTERS AND DECORATORS ASSOCIATION)

- A. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association Current Edition.

- B. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual Current Edition.
- 1.27 MSS -- MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY, INC.**
 - A. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation 2018, with Amendment (2019).
- 1.28 NAAMM -- THE NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS**
 - A. NAAMM AMP 510 - Metal Stairs Manual 1992.
- 1.29 NEMA -- NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION**
 - A. NEMA MG 1 - Motors and Generators 2021.
- 1.30 NFPA -- NATIONAL FIRE PROTECTION ASSOCIATION**
 - A. NFPA 54 - National Fuel Gas Code 2021.
 - B. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
 - C. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems 2021.
 - D. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems 2021.
 - E. NFPA 211 - Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances 2019.
 - F. NFPA 701 - Standard Methods of Fire Tests for Flame Propagation of Textiles and Films 2019.
- 1.31 NSF -- NSF INTERNATIONAL (THE PUBLIC HEALTH AND SAFETY ORGANIZATION)**
- 1.32 RCSC -- RESEARCH COUNCIL ON STRUCTURAL CONNECTIONS**
- 1.33 RIS -- REDWOOD INSPECTION SERVICE**
- 1.34 SMACNA -- SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION, INC.**
 - A. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible 2021.
- 1.35 TMS -- THE MASONRY SOCIETY**
- 1.36 TPI -- TRUSS PLATE INSTITUTE**
- 1.37 UL -- UNDERWRITERS LABORATORIES INC.**
 - A. UL (DIR) - Online Certifications Directory Current Edition.
 - B. UL 705 - Power Ventilators Current Edition, Including All Revisions.
 - C. UL 900 - Standard for Air Filter Units Current Edition, Including All Revisions.

END OF SECTION

**SECTION 01 4546
DUCT TESTING, ADJUSTING, AND BALANCING**

PART 1 GENERAL

1.01 SUMMARY

- A. Includes But Is Not Limited To:
 - 1. Test, balance, and adjust air duct systems services provided by Owner as described in Contract Documents.
- B. Related Requirements:
 - 1. Division 01: 'General Requirements':
 - a. Section 01 1000 - Summary: Owner will provide test, balance, and adjust air duct systems. PART 3 of this Section establishes requirements for field tests of 'Testing Agency'.
 - b. Section 01 4000 - Quality Requirements: for testing and inspection, and testing laboratory services for materials, products, and construction methods.
 - 2. Division 23:
 - a. Completing installation and start-up of mechanical systems, and changing sheaves, belts, and dampers as required for correct balance.
 - b. Maintain HVAC system and equipment in full operation each working day of testing, balancing, and adjusting.

1.02 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Contractor to assist Testing Agency in testing and balancing of mechanical system.
 - 2. Assisting Testing Agency in testing and balancing of mechanical system.
- B. Scheduling:
 - 1. Contractor to schedule this work in cooperation with other Sections involved and to comply with completion date for test, balance, and adjust air duct systems as described in Contract Documents.
 - 2. Contact Testing Agency and coordinate (Owner's Representative to provide 'Testing Agency' contact information):
 - a. One inspection when 60 percent of ductwork is installed.
 - b. One inspection when 90 percent of equipment and ductwork is installed.
 - 3. Contact Testing Agency and coordinate date(s) for test and balance work when following is completed:
 - a. HVAC and exhaust systems including installation of specialties, devices, and new filters.
 - b. Proper function of control system components including electrical interlocks, damper sequences, air and water reset, and fire and freeze stats has been verified.
 - c. Automatic temperature controls have been calibrated and set for design operating conditions.
 - d. Verification of proper thermostat calibration and setting of control components such as static pressure controllers and other devices that may need set points changed during process of balancing system.
 - 4. If, in opinion of Testing Agency, systems are not ready for test and balance, reschedule as required.

1.03 SUBMITTALS

- A. Informational Submittals:
 - 1. Test and Evaluation Reports:
 - a. Preliminary Report(s):
 - 1) Copy to be given to Owner's Representative.
 - b. Final Report:
 - 1) Copy to be given to Owner's Representative.

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- B. Closeout Submittals:
 - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
 - a. Record Documentation:
 - 1) Testing and Inspection Reports:
 - (a) Testing Agency Testing and Evaluation Final Report of testing, balancing, and adjusting air duct systems. Bind approved copy of Testing and Evaluation Report in Operations And Maintenance Manual for Division 23.

1.04 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Approved Testing Agency. Section 01 4000 applies, but is not limited to following:
 - a. Testing Agency shall specialize in testing and balancing of heating, ventilating, and cooling systems to balance, adjust, and test air moving equipment, air distribution, and exhaust systems.
 - b. Testing Agency shall provide proof of having successfully completed at least five years of specialized experience in air and hydronic system balancing.
 - c. Testing Agency shall provide testing under direct supervision of qualified heating and ventilating engineer.
 - d. Neither Architect's engineering consultant nor anyone performing work on this Project under other Sections of Division 23 shall be permitted to do this work.

PART 2 PRODUCTS: NOT USED

PART 3 EXECUTION

3.01 OWNER-FURNISHED TESTING AND INSPECTION

- A. Owner to provide Testing and Inspection for testing, balancing, and adjusting air duct systems:
 - 1. See Section 01 1000: Multiple contracts for administrative and procedural requirements for Testing and Inspection services.

3.02 FIELD QUALITY CONTROL

- A. Field Tests
 - 1. Air System Testing, Adjusting, And Balance:
 - a. Inspections and site visits. (For paragraph a thru c, note deficiencies, if any, that needs to be corrected and report this to Owner's Representative, Architect, and Mechanical Engineer):
 - 1) One inspection when ductwork installation is 60 percent complete.
 - 2) One inspection when ductwork is installation is 90 percent complete.
 - 3) One inspection when potable hot and cold water system is 90 percent complete.
 - 4) Site visit for test and balance. Before commencing test and balance, perform an inspection to verify 100 percent completion of system. Confirm completion of work, correction of previously noted deficiencies, and look for new deficiencies not noted in previous inspections. If the work is complete, then proceed with test and balance. If the work is not complete and ready for test and balance, inform Contractor and submit an invoice to Owner's Representative for compensation for travel time, expenses, and time on site. Report deficiencies or incomplete work to Owner's Representative, Architect, and Mechanical Engineer.
 - 5) Additional site visits (beyond those set forth above) to complete the work after issues are resolved may be needed and will be paid for separately from compensation for services set forth in this Agreement, pursuant to hourly rates and conditions set forth in Attachment "A".
 - b. Checklist for Inspections and site visits:
 - 1) Pre-Startup Inspection - use for inspections and site visits a thru d in paragraph 1 above. All pertinent items shall be checked, including but not limited to following:
 - (a) Removal of shipping blocks and stops.

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- (b) Vibration isolators' alignment and adjustment.
- (c) Flexible connections properly installed and aligned.
- (d) Safety controls, safety valves and high or low limits in operation.
- (e) All systems properly filled.
- (f) Filters in place and seal provided around edges.
- (g) Filters and strainers are clean.
- (h) Fire damper installation and operation, and access door installation.
- (i) Installation of all gauges on equipment.
- (j) Control system is operating.
- (k) All dampers, valves, and operators are properly installed and operating.
- (l) All ductwork is installed and sealed.
- (m) Voltage to unit matches nameplate voltage.
- 2) First Run Inspection - use for inspections and site visits d and e in paragraph 1 above. Recheck items in Pre-Startup list, and check for following items:
 - (a) Excessive vibration or noise.
 - (b) Loose components.
 - (c) Initial control settings.
 - (d) Motor amperages.
 - (e) Heat buildup in motors.
 - (f) Control system is calibrated and functioning as required.
- 3) System Operation Inspection - use for inspections and site visits d and e in paragraph 1 above. Observe mechanical systems under operation for sufficient amount of time to ensure proper operation in all running modes. Check following items periodically.
 - (a) Filters and strainers.
 - (b) Filters and strainers.
 - (c) Check for system leaks at seals and valves.
- c. Performance Requirements:
 - 1) Testing and balancing in complete accordance with Associated Air Balance Council (AABC) Standards for Field Measurement & Instructions.
 - 2) Noise level in chapel and / or cultural hall shall not exceed NC 35 with all HVAC equipment operating in full or second stage cooling mode.
- d. Site tests: Air Test and Balancing Procedure:
 - 1) Instruments used by Consultant shall be accurately calibrated and maintained in good working order.
 - 2) All supply air and return air fans in all HVAC zone systems, energy recovery ventilators, and exhaust fans in building shall be operating when final setup of all units is performed.
 - 3) Perform tests at high and low speeds of multi-speed systems and single speed systems.
 - 4) Perform following testing and balancing functions in accordance with Associated Air Balance Council National Standards.
 - (a) Fan Speeds - Air handling units (with variable pitch pulleys and sheaves): Test and adjust fan RPM to achieve design CFM requirements.
 - (b) Fan Speeds - Furnaces (with direct drive motors): Set fan speed to lowest possible setting that will achieve design CFM requirements. Adjust down from Contractor setting, if necessary. Adjust low voltage fan speed jumpers (provided and installed by installing contractor) as necessary to achieve design cooling air flow at lowest possible setting. An exception to this would be when furnace is variable speed blower for dehumidification applications.
 - (c) Current And Voltage: Measure and record motor current and voltage.
 - (d) Pitot-Tube Traverse Method:

- (1) Make measurements in duct where velocity is uniform, 7-1/2 duct diameters downstream and 2 duct diameters minimum upstream from any turbulence, i.e., elbow, damper, take-off, etc.
- (2) Perform pitot-tube traverse of outdoor ventilation air duct serving each piece of air moving equipment.
- (3) Where single outdoor ventilation air trunk duct serves multiple pieces of equipment, perform pitot-tube traverse of duct branch serving each piece of equipment as well as pitot-tube traverse of total air flow in trunk with all pieces of equipment operating.
- (e) Where pitot-tube traverse is not possible or if pitot-tube traverse is unreliable, flow hood measurement over exterior intake louver or grille is acceptable for measuring outdoor ventilation air.
- (f) Use proportionate method of air balance leaving fan at lowest possible speed and at least one branch balance damper fully open.
- 5) Static Pressure: Test and record system static pressures, including suction and discharge static pressure of each fan.
- 6) Air Temperature: Take dry bulb air temperatures on entering and leaving side of each cooling coil. Dry bulb temperatures shall be taken on entering and leaving side of each heating unit.
- 7) Zone Ducts: Adjust zone ducts to within design CFM requirements. At least one zone balancing damper shall be completely open.
- 8) Branch Ducts: Adjust branch ducts to within design CFM requirements. Multi-diffuser branch ducts shall have at least one outlet or inlet volume damper completely open.
- 9) Tolerances: Test and balance all fans, zone ducts, registers, diffusers etc. to + or - 10 percent of design CFM.
- 10) Identification: Identify location and area of each grille, diffuser, register, and terminal box. Record on air outlet data sheets.
- 11) Description: Record size, type, and manufacturer of each diffuser, grille, and register on air outlet data sheets.
- 12) Drafts: Adjust diffusers, grilles, and registers to minimize drafts. For high sidewall supply air diffusers install horizontal blade core to direct air flow upward 15 degree and set adjustable vertical blades to spread air flow horizontally and evenly in fan pattern.
- 13) Permanently mark all outside air, supply air, and return air damper positions after balancing has been completed.
- 14) Smoke testing: Smoke testing, or some other approved means, may be required to determine leak locations if air balance report indicates that any system's CFM total is less than 90 percent of design CFM. Prior to test, verify that system's duct joints have been sealed as specified and that air moving device in question is supplying required design system air flow. Mechanical Engineer will approve test method required. If smoke test is selected, use following procedure. Provide necessary precautions to protect those performing or observing test from being exposed to smoke.
 - (a) Use zinc chloride smoke candles, titanium tetrachloride ampules or sticks, or other devices acceptable to Mechanical engineer to generate smoke.
 - (b) Close openings in duct except for one opening at farthest end of duct run.
 - (c) Circulate smoke at pressurized condition of 1/2 inch (13 mm) minimum water gauge static pressure.
 - (d) Report findings to mechanical engineer in writing.
- e. Air System Test and Evaluation Report:
 - 1) Record test data on AABC standard forms or facsimile.
 - 2) Preliminary Report: Provide and deliver four copies of complete data for evaluation and approval to Owner.

- 3) Final report: Provide and deliver complete four copies of final report to Owner prior to project Substantial Completion date.
- 4) Complete with logs, data, and records as required herein. Print logs, data, and records on white bond paper bound together in report form.
- 5) Certified accurate and complete by Consultant's certified test and balance engineer.
- 6) Contain following general data in format selected by Consultant:
 - (a) Project Number.
 - (b) Project Title.
 - (c) Project Location.
 - (d) Project Architect and Mechanical Engineer.
 - (e) Consultant and Certified Engineer.
 - (f) Contractor and mechanical sub-contractor.
 - (g) Dates tests were performed.
 - (h) Certification Document.
 - (i) Report Forms similar to AABC Standard format.
- 7) Report shall include following:
 - (a) Instrumentation List including type, model, manufacturer, serial number, and calibration dates.
 - (b) HVAC zone identification to include reduced ductwork floor plan from project documents with outlets and inlets numbered to match written test and balance report. This page may be oversized but it should fold up neatly within standard 8 1/2 x 11 report paper size.
 - (c) Record following for each piece of air handling equipment:
 - (1) Manufacturer, model number, and serial number.
 - (2) Design and manufacture rated data.
 - (3) Actual CFM.
 - (4) Suction and discharge static pressure of each fan.
 - (5) Outdoor-ventilation-air and return-air total CFM.
 - (6) Final RPM of each motor or speed tap.
 - (7) Actual operating current and voltage of each fan motor.
 - (8) Fan and motor sheave manufacturer, model, size, number of grooves and center distance.
 - (9) Belt size and quantity.

3.03 PREPARATION

- A. Heating, ventilating, and cooling systems and equipment shall be in full operation and continue in operation during each working day of testing and balancing.

END OF SECTION

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**SECTION 01 5000
TEMPORARY FACILITIES AND CONTROLS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Safety.
- B. Temporary utilities.
- C. Temporary sanitary facilities.
- D. Temporary Controls: Barriers, enclosures, and fencing.
- E. Temporary erosion and sediment control.
- F. Temporary tree and plant protection.
- G. Security requirements.
- H. Waste removal facilities and services.
- I. Field offices.

1.02 RELATED REQUIREMENTS

- A. Section 01 5100 - Temporary Utilities.

1.03 REFERENCE STANDARDS

- A. 29 CFR 1926 - Safety and Health Regulations for Construction Current Edition.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Protection of Existing Improvements: Protect streets, private roads, and sidewalks, including overhead protection where required. Repair damage to existing improvements caused by construction activities.
- B. Protection of Adjacent Property: Provide necessary protection for adjacent property and lateral support thereof.
- C. Proprietary Camera Services: In its absolute discretion, and with or without notice to Contractor, Owner may provide from time to time, but is not obligated to provide, one or more cameras on or about Project site and/or signage or notices of the same:
 - 1. If provided by Owner, such camera(s) and/or signage and notices are solely for Owner's benefit and convenience and shall not be for benefit of Contractor, Subcontractor(s) or for any third person.
 - 2. Owner shall have no liability, obligation, or responsibility to Contractor, Subcontractors, or any third person relative to such camera(s), signage, or notices, or absence of camera(s), signage, or notices, including without limitation, installation, maintenance, operation, repair, testing, functionality, capacity, recording, monitoring, posting, etc., of the same (hereafter 'Proprietary Camera Services').
 - 3. Contractor, with Owner's prior consent (which shall not be unreasonably withheld), may relocate such camera(s), signage, or notices as necessary to not unreasonably, materially and physically interfere with work at Project Site.
 - 4. Contractor's obligations under Contract Documents, including but not limited to, Contractor's obligation for security of Project Site, are not modified by Owner's opportunity to provide, actually providing, or not providing Proprietary Camera Services and/or signage or notices regarding the same.
 - 5. This Specification Section does not preclude Contractor from providing its own camera(s), signage, or notices pursuant to terms and conditions of this Agreement. Neither does this Section reduce, expand or modify any other right or obligation of Owner pursuant to terms of this Agreement.
- D. Prepare schedule indicating dates for implementation and termination of each temporary facility.

- E. Keep temporary facilities clean and neat in appearance. Operate in safe and efficient manner. Take necessary fire prevention measures. Do not overload facilities, or allow them to interfere with progress of The Work. Do not allow hazardous, dangerous or unsanitary conditions, or public nuisances to develop or persist on Project site.
- F. Maintain facilities in good operating condition until removal.
- G. Remove each temporary facility when need has ended, or when replaced by authorized use of permanent facility, or by Substantial Completion. Complete 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 make up temporary facilities are property of Contractor.
 - 2. By Substantial Completion, clean and renovate permanent facilities used during construction period.

1.05 SAFETY REQUIREMENTS

- A. Meet regulations of 29 CFR 1926 OSHA, 'Construction Industry Regulations'.
- B. Owner's Safety Requirements:
 - 1. Personal Protection:
 - a. Contractor shall ensure:
 - 1) Positive means of fall protection, such as guardrails system, safety net system, personal fall arrest system, etc., is provided to employees whenever exposed to a fall 6 feet (1.80 m) or more above a lower level.
 - 2) Personnel working on Project shall wear hard hats and safety glasses as required by regulation and hazard.
 - 3) Personnel working on Project shall wear long or short sleeve shirts, long pants, and hard-toed boots or other sturdy shoes appropriate to type and phase of work being performed.
 - 2. Contractor Tools and Equipment:
 - a. Contractor shall ensure:
 - 1) Tools and equipment are in good working condition, well maintained, and have necessary guards in place.
 - 2) Ground Fault Circuit Interrupters (GFCI) is utilized on power cords and tools.
 - 3) Scaffolding and man lifts are in good working condition, erected and maintained as required by governmental regulations.
 - 4) Ladders are in good condition, well maintained, used as specified by Manufacturer, and secured as required.
 - 3. Miscellaneous:
 - a. Contractor shall ensure:
 - 1) Protection is provided on protruding rebar and other similar objects.
 - 2) General Contractor Superintendent has completed the OSHA 10-hour construction outreach training course or equivalent.
 - 3) Implementation and administration of safety program on Project.
 - 4) Material Safety Data Sheets (MSDS) are provided for substances or materials for which an MSDS is required by governmental regulations before bringing on site.
 - 5) Consistent safety training is provided to employees on Project.
 - 6) Implement and coordinate Lockout / Tagout procedures with Owner's Representative as required.
 - b. Report accidents involving injury to employees on Project that require off-site medical treatment to Owner's designated representative.
 - 4. Hot Work Permit:
 - a. Permit shall document that fire prevention and protection requirements in 29 CFR 1926.352, 'Fire Prevention' have been implemented prior to beginning hot work operations.

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- 1) Required for doing hot work involving open flames or producing heat or sparks such as:
 - (a) Brazing.
 - (b) Cutting.
 - (c) Grinding.
 - (d) Soldering.
 - (e) Thawing pipe.
 - (f) Torch applied roofing.
 - (g) Welding.

1.06 TEMPORARY UTILITIES - SEE SECTION 01 5100

1.07 TEMPORARY SANITARY FACILITIES

- A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.
- B. Maintain in clean and sanitary condition.
- C. At end of construction, return facilities to same or better condition as originally found.

1.08 BARRIERS

- A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.
- B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.
- C. Provide protection for plants designated to remain. Replace damaged plants.
- D. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.
- E. Secure building at the end of each workday.
- F. Maintain exterior building security until Substantial Completion.

1.09 FENCING

- A. Construction: Contractor's option.
- B. Before construction begins, install a fence sufficient in height and structure to protect the site and preclude access except through lockable entrance gates. Locate where shown on Drawings. If not shown on Drawings, enclose entire site or portion sufficient to accommodate construction operations.

1.10 EXTERIOR ENCLOSURES

- A. Provide temporary insulated weather tight closure of exterior openings to accommodate acceptable working conditions and protection for Products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification sections, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.

1.11 INTERIOR ENCLOSURES

- A. Provide temporary partitions and ceilings as indicated to separate work areas from Owner-occupied areas, to prevent penetration of dust and moisture into Owner-occupied areas, and to prevent damage to existing materials and equipment.

1.12 SCAFFOLDING, PLATFORMS, STAIRS, ETC

- A. Furnish and maintain equipment such as temporary stairs, ladders, ramps, platforms, scaffolds, hoists, runways, derricks, chutes, and elevators as required for proper execution of The Work.
- B. Apparatus, equipment, and construction shall meet requirements of applicable laws and safety regulations.

1.13 TEMPORARY EROSION AND SEDIMENT CONTROL

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- A. Take precautions necessary to prevent erosion and transportation of soil downstream, to adjacent properties, and into on-site or off-site drainage systems.
- B. Develop, install, and maintain an erosion control plan if required by law.
- C. Repair and correct damage caused by erosion.

1.14 TEMPORARY ENVIRONMENTAL CONTROLS

- A. Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations, and reduce possibility that air, waterways, and subsoil might be contaminated or polluted, or that other undesirable effects might result:
 - 1. Avoid use of tools and equipment that produce harmful noise.
 - 2. Restrict use of noise making tools and equipment to hours that will minimize complaints from persons or firms near site.
- B. Provide protection against weather (rain, winds, storms, frost, or heat) to maintain all work, materials, apparatus, and fixtures free from injury or damage.
- C. Protect excavation, trenches, and building from damage from rainwater, spring water, ground water, backing up of drains or sewers, and all other water:
 - 1. For temporary drainage and dewatering facilities and operations not directly associated with construction activities included under individual Sections, comply with requirements of applicable local regulations. Where feasible, use permanent facilities.
 - 2. If sewers are not available or cannot be used, provide drainage ditches, dry wells, stabilization ponds, and similar facilities. Filter out excessive amounts of soil, construction debris, chemicals, oils and similar contaminants that might clog sewers or pollute waterways before discharge.
- D. Comply with governing ordinances relating to weed control and removal.

1.15 TEMPORARY TREE AND PLANT PROTECTION

- A. Protection:
 - 1. Before commencing site work, build and maintain protective fencing around existing trees and vegetation as shown on the drawings.
 - 2. Individual trees will have protective fencing built beyond drip line.
 - 3. Build protective fencing around groups of trees and other vegetation as indicated on Drawings.
 - 4. Keep areas within protective fencing undisturbed and do not use for any purpose.
- B. Maintenance:
 - 1. Maintain existing tree, shrubs, and vegetation as indicated in Contract Documents:
 - a. Remove and replace vegetation that dies or is damaged beyond repair due to construction.
 - b. Damage to any tree, shrub, or vegetation that has been indicated to remain and be protected, will have a cost associated with it. This includes branches, trunk and root systems:
 - 1) Trees: \$1,000.00.
 - 2) Shrubs: \$ 100.00.
 - 3) Vegetation: \$ 50.00.
- C. Pruning:
 - 1. Provide a qualified Tree Service Firm if pruning is required:
 - a. Coordinate with authorities having jurisdiction.
 - b. Coordinate with Owner and Architect on site before pruning is to begin.

1.16 WASTE REMOVAL

- A. See Section 01 7419 - Construction Waste Management and Disposal, for additional requirements.

1.17 FIELD OFFICES

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- A. Office: Weathertight, with lighting, electrical outlets, heating, cooling and ventilating equipment, and equipped with sturdy furniture, drawing rack, drawing display table, locking door, light(s), table(s), bench(es), rack(s) for drawings, telephone, and fax machine. Provide an operable fire extinguisher in facility.
- B. Provide hardhats for Owner's Representatives for site visits.
- C. Provide space for Project meetings, with table and chairs to accommodate 6 persons.
- D. If Owner agrees to permit removal of temporary office before Substantial Completion, Contractor may use a room as an office after temporary office is removed. Equip room as specified above and restore to "like-new" condition before Substantial Completion.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

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**SECTION 01 5100
TEMPORARY UTILITIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Temporary Utilities: Provision of electricity, lighting, heat, ventilation, and water.

1.02 ADMINISTRATIVE REQUIREMENTS

- A. Where necessary, engage appropriate local utility companies to install temporary service or connect to existing service. Where utility company provides only part of service, provide remainder with matching, compatible materials and equipment. Comply with utility company's recommendations.
1. Comply with industry standards and applicable laws and regulations of authorities having jurisdiction.
 2. Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.
 3. Arrange with utility company and existing users for time when service can be interrupted, where necessary, to make connections for temporary services.
 4. Provide adequate capacity at each stage of construction. Before temporary utility availability, provide trucked-in services.
 5. Obtain construction easements necessary to bring temporary and/or permanent utilities to site.
 6. Use qualified personnel for installation and maintenance of temporary facilities. Locate temporary utilities where they will serve Project adequately and result in minimum interference with the Work of Owner or other Contractors on Project Site. Relocate and modify temporary utilities as required.
 7. Pay cost and use charges for temporary and permanent utilities until Substantial Completion has been granted by Owner.
- B. Prepare schedule indicating dates for implementation and termination of each temporary utility. At earliest feasible time, change over from use of temporary service to use of permanent service.
- C. Keep temporary utilities clean and neat in appearance. Operate in safe and efficient manner. Take necessary fire prevention measures. Do not overload utilities, or allow them to interfere with progress of The Work. Do not allow hazardous, dangerous or unsanitary conditions, or public nuisances to develop or persist on Project site.
- D. Limit availability of temporary utilities to essential and intended uses to reduce waste and abuse.
- E. Maintain temporary utilities in good operating condition until removal. Protect from damage by freezing temperatures and similar elements.
1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on 24-hour day basis where required to achieve indicated results and to avoid possibility of damage.
 2. Prevent water filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.
- F. Remove each temporary utility and control when need has ended, or when replaced by permanent utility, but not later than Substantial Completion. Complete permanent construction that may have been delayed because of interference with temporary utility. Repair damaged work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
- G. Materials and facilities that make up temporary utilities are property of Contractor.
1. By Substantial Completion, clean and renovate permanent utilities used during construction period, including but not limited to:
 - a. Replace air filters and clean inside of ductwork and housings.
 - b. Replace significantly worn parts and parts subjected to unusual operating conditions.

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- c. Replace lamps that are burned out or noticeably dimmed by substantial hours of use.

1.03 TEMPORARY ELECTRICITY

- A. Cost: By Contractor.
- B. Provided weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period.

1.04 TEMPORARY FIRE PROTECTION

- A. Cost: By Contractor.
- B. Install and maintain temporary fire protection facilities of types needed to protect against predictable and controllable fire losses. At a minimum, provide and maintain in working order two Standard UL Labeled ABC all-purpose 10 lb fire extinguishers. Do not incorporate these extinguishers into final Project.
 - 1. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one extinguisher.
 - 2. Store combustible materials in containers in fire-safe locations.
 - 3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways, and other access routes for fighting fires.
 - 4. Provide supervision of welding operations, combustion type temporary heating units, and similar sources of fire ignition.
 - 5. At earliest feasible date in each area of Project, complete installation of permanent fire protection facility, including connected services, and place into operation and use. Instruct key personnel on use of facilities.

1.05 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

- A. Install and operate temporary lighting that will provide adequate illumination for construction operations and traffic conditions.
- B. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required.
- C. Maintain lighting and provide routine repairs.
- D. Permanent building lighting may be utilized during construction.

1.06 TEMPORARY HEATING AND COOLING

- A. Cost of Energy: By Contractor.
- B. Install and operate temporary heating, cooling, and ventilating units including fuel, temporary piping, fittings, wiring, and connections necessary to provide environmental conditions specified for various portions of the Work. Coordinate ventilation requirements to produce ambient conditions required and reduce consumption of energy.
- C. Repair damage to building and contents caused by cold, heat, dampness, and/or heating, cooling, and ventilating equipment. Select equipment that will not have harmful effect on completed installations or on elements being installed.
- D. Provide heating and cooling devices and heat as needed to maintain specified conditions for construction operations.
 - 1. Operate equipment according to equipment manufacturer's instructions.
 - 2. Provide fresh air ventilation required by equipment manufacturer.
 - 3. Keep temperature of fuel containers stabilized.
 - 4. Secure fuel containers from overturning.
 - 5. Operate equipment away from combustible materials.
- E. Maintain minimum ambient temperature of between 50 and 80 degrees F in areas where construction is in progress, unless indicated otherwise in specifications.
- F. Existing facilities shall not be used.

- G. Prior to operation of permanent equipment for temporary heating purposes, verify that installation is approved for operation, equipment is lubricated and filters are in place. Provide and pay for operation, maintenance, and regular replacement of filters and worn or consumed parts.
- H. Do not operate system when work causing air-borne dust is occurring or when dust caused by such work is present without installation of temporary filtering system approved by Architect.
- I. Operate system at no cost to Owner, including cost of fuel.
- J. Assume all responsibility and risk for operation of system.
- K. Return permanent mechanical equipment to 'like-new' condition for Substantial Completion Inspection.

1.07 TEMPORARY WATER SERVICE

- A. Cost of Water Used: By Contractor.
- B. Connect to existing water source.
 - 1. Exercise measures to conserve water.
 - 2. Provide separate metering and reimburse Owner for cost of water used.
- C. Extend branch piping with outlets located so water is available by hoses with threaded connections. Provide temporary pipe insulation to prevent freezing.

1.08 TEMPORARY TELEPHONES

- A. Contractor will, at a non-reimbursable cost and expense, provide temporary telephone service for all personnel engaged in construction activities, throughout construction period.
- B. Contractor will pay for Local calls. Party making call will pay for long-distance and toll calls.
- C. At each telephone, post list of important telephone numbers.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

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**SECTION 01 5813
TEMPORARY PROJECT SIGNAGE**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Project identification sign.

1.02 QUALITY ASSURANCE

- A. Design sign and structure to withstand 50 miles/hr wind velocity.

1.03 SUBMITTALS

- A. Shop Drawing: Show content, layout, lettering, color, foundation, structure, sizes and grades of members.

PART 2 PRODUCTS

2.01 PROJECT IDENTIFICATION SIGN

- A. Provide a temporary project Identification sign:
 - 1. Sign may be free-standing or attached to temporary field office or storage shed.
 - 2. No other signs or advertisements are allowed on building site.
 - 3. Sign will be no larger than 4 feet by 8 feet and include following information:
 - a. Project Name as shown in Contract Documents.
 - b. Contractor's name.
 - c. Architectural firm name.
 - 4. Owner reserves the right to remove and/or take possession of any project identification sign.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install project identification sign within 30 days after date fixed by Notice to Proceed.
- B. Erect at designated location.
- C. Erect supports and framing on secure foundation, rigidly braced and framed to resist wind loadings.
- D. Install sign surface plumb and level, with butt joints. Anchor securely.
- E. Paint exposed surfaces of sign, supports, and framing.

3.02 MAINTENANCE

- A. Maintain signs and supports clean, repair deterioration and damage.

3.03 REMOVAL

- A. Remove signs, framing, supports, and foundations at completion of Project and restore the area.

END OF SECTION

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**SECTION 01 6000
PRODUCT REQUIREMENTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General product requirements.
- B. Re-use of existing products.
- C. Transportation, handling, storage and protection.
- D. Product option requirements.
- E. Substitution limitations.

1.02 SUBMITTALS

- A. As indicated in technical sections in accordance with Section 01 3000.

PART 2 PRODUCTS

2.01 EXISTING PRODUCTS

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

2.02 NEW PRODUCTS

- A. Provide new products unless specifically required or permitted by Contract Documents.
- B. Provide products complete with accessories, trim, finish, safety guards, and other devices and details needed for complete installation and for intended use and effect.
- C. Provide interchangeable components of the same manufacturer for components being replaced.
- D. Except for required labels and operating data, do not attach or imprint manufacturer's or producer's nameplates or trademarks on surfaces of products that will be exposed to view in occupied spaces or on building exterior.
 - 1. Locate required product labels and stamps on concealed surface or, where required for observation after installation, on accessible surface that is not conspicuous.
 - 2. Provide permanent nameplates on items of service-connected or power-operated equipment. Locate on easily accessible surface that is inconspicuous in occupied spaces. Nameplate will contain following information and other essential operating data:
 - a. Name of product and manufacturer.
 - b. Model and serial number.
 - c. Capacity.
 - d. Speed.
 - e. Ratings.

2.03 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.
- B. Where Specifications require compliance with performance requirements, provide products that comply with these requirements and are recommended by manufacturer for application described. General overall performance of product is implied where product is specified for specific application. Manufacturer's recommendations may be contained in published product literature, or by manufacturer's certification of performance.

- C. Where specifications only require compliance with an imposed code, standard, or regulation, select product that complies with standards, codes or regulations specified.
- D. Where Specifications require matching an established Sample, Architect's decision will be final on whether proposed product matches satisfactorily. Where no product available within specified category matches satisfactorily nor complies with other specified requirements, refer to Architect.
- E. Where specified product requirements include phrase "...as selected from manufacturer's standard colors, patterns, textures..." or similar phrase, select product and manufacturer that comply with other specified requirements. Architect will select color, pattern, and texture from product line selected.
- F. Remove and replace products and materials not specified in Contract Documents but installed in the Work with specified products and materials at no additional cost to Owner and for no increase in Contract time.
- G. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.
- H. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

PART 3 EXECUTION

3.01 SUBSTITUTION LIMITATIONS

- A. Product selection is governed by Contract Documents and governing regulations, not by previous Project experience. Procedures governing product selection include:
 - 1. Substitutions and Equal Products:
 - a. Substitutions for specified products and systems, as defined in the Uniform Commercial Code, are not acceptable. However, equal products may be approved upon compliance with Contract Document requirements.
 - b. Approved Products / Manufacturers / Suppliers / Distributors / Fabricators / Installers:
 - 2. Acceptable Products / Manufacturers / Suppliers / Installers:
 - a. Use 'Equal Product Approval Request Form' to request approval of equal products, manufacturers, or suppliers before bidding or before installation, as noted in individual Sections.
 - 3. Quality / Performance Standard Products / Manufacturers:
 - a. Products / manufacturers used shall conform to Contract Document requirements.
 - 4. Comparable Product Requests:
 - a. Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles:
 - 1) Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
 - 2) Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
 - (a) Form of Approval: As specified in Division 01 Section "Submittal Procedures."
 - (b) Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.
 - 3) Submit five copies of each required submittal unless otherwise required. Architect will return three copies marked with action taken and with corrections or modifications required.

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- 4) Submit electronic files: PDF. Architect will return a PDF copy marked with action taken and with corrections or modifications required.

3.02 TRANSPORTATION AND HANDLING

- A. Package products for shipment in manner to prevent damage or theft; for equipment, package to avoid loss of factory calibration.
- B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.
- C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
- D. Schedule delivery to reduce long-term storage at site and to prevent overcrowding of construction spaces.
- E. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
- F. Transport and handle products in accordance with manufacturer's instructions.
- G. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.
- H. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- I. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.
- J. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.03 STORAGE AND PROTECTION

- A. Provide protection of stored materials and products against theft, casualty, or deterioration.
- B. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication. See Section 01 7419.
- C. Store and protect products in accordance with manufacturers' instructions.
- D. Store with seals and labels intact and legible.
- E. Arrange storage of materials and products to allow for visual inspection for the purpose of determination of quantities, amounts, and unit counts. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.
- F. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.
- G. Store heavy materials away from Project structure so supporting construction will not be endangered.
- H. For exterior storage of fabricated products, place on sloped supports above ground.
- I. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.
- J. Comply with manufacturer's warranty conditions, if any.
- K. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- L. Prevent contact with material that may cause corrosion, discoloration, or staining.
- M. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

3.04 NON-CONFORMING WORK

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- A. Non-conforming work as covered in General Conditions applies, but is not limited, to use of non-specified products or manufacturers.

END OF SECTION

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**SECTION 01 7000
EXECUTION AND CLOSEOUT REQUIREMENTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Examination, preparation, and general installation procedures.
- B. Surveying for laying out the work.
- C. Cleaning and protection.
- D. General requirements for maintenance service.

1.02 RELATED REQUIREMENTS

- A. Section 01 7800 - Closeout Submittals: Project record documents, operation and maintenance data, warranties, and bonds.

1.03 QUALIFICATIONS

- A. For surveying work, employ a land surveyor registered in the State in which the Project is located and acceptable to Architect. Submit evidence of surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate. Employ only individual(s) trained and experienced in collecting and recording accurate data relevant to ongoing construction activities,

1.04 PROJECT CONDITIONS

- A. Use of explosives is not permitted.
- B. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
- C. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.
- D. Perform dewatering activities, as required, for the duration of the project.
- E. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- F. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.
 - 1. Provide dust-proof enclosures to prevent entry of dust generated outdoors.
 - 2. Provide dust-proof barriers between construction areas and areas continuing to be occupied by Owner.
- G. Erosion and Sediment Control: Plan and execute work by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
 - 1. Minimize amount of bare soil exposed at one time.
 - 2. Provide temporary measures such as berms, dikes, and drains, to prevent water flow.
 - 3. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.
 - 4. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.
- H. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.
 - 1. At All Times: Excessively noisy tools and operations will not be tolerated inside the building at any time of day; excessively noisy includes jackhammers.
 - 2. Outdoors: Limit conduct of especially noisy exterior work to [].
 - 3. Indoors: Limit conduct of especially noisy interior work to [].

- I. Pest and Rodent Control: Provide methods, means, and facilities to prevent pests and insects from damaging the work.
 - 1. Pest Control Service: [] treatments.
- J. Rodent Control: Provide methods, means, and facilities to prevent rodents from accessing or invading premises.
- K. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

PART 2 PRODUCTS

2.01 PATCHING MATERIALS

- A. New Materials: As specified in product sections; match existing products and work for patching and extending work.
- B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.
- C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.
- B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or mis-fabrication.
- E. Verify that utility services are available, of the correct characteristics, and in the correct locations.
- F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 LAYING OUT THE WORK

- A. Verify locations of survey control points prior to starting work.
- B. Promptly notify Architect of any discrepancies discovered.
- C. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
- D. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.
- E. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.
- F. Utilize recognized engineering survey practices.

- G. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
 - 1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations; and [_____].
 - 2. Grid or axis for structures.
 - 3. Building foundation, column locations, ground floor elevations, and [_____].
- H. Periodically verify layouts by same means.
- I. Maintain a complete and accurate log of control and survey work as it progresses.

3.04 GENERAL INSTALLATION REQUIREMENTS

- A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations to extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents. Notify Architect of conflicts between Manufacturer's installation instructions and Contract Document requirements.
- B. Provide attachment and connection devices and methods necessary for securing Work. Secure work true to line and level. Anchor each product securely in place, accurately located, and aligned with other Work. Allow for expansion and building movement.
- C. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
- D. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
- E. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
- F. Visual Effects: Provide uniform joint widths in exposed work. Arrange joints in exposed work to obtain best visual effect. Refer questionable choices to Architect for final decision.
- G. Install each component during weather conditions and Project status that will ensure best possible results. Isolate each part of completed construction from incompatible material as necessary to prevent deterioration.
- H. Coordinate temporary enclosures with required inspections and tests, to reduce necessity of uncovering completed construction for that purpose.
- I. Mounting Heights: Where mounting heights are not shown, install individual components at standard mounting heights recognized within the industry or local codes for that application. Refer questionable mounting height decisions to Architect for final decision.

3.05 CUTTING AND PATCHING

- A. Whenever possible, execute the work by methods that avoid cutting or patching.
- B. Perform whatever cutting and patching is necessary to:
 - 1. Complete the work.
 - 2. Fit products together to integrate with other work.
 - 3. Provide openings for penetration of mechanical, electrical, and other services.
 - 4. Match work that has been cut to adjacent work.
 - 5. Repair areas adjacent to cuts to required condition.
 - 6. Repair new work damaged by subsequent work.
 - 7. Remove samples of installed work for testing when requested.
 - 8. Remove and replace defective and non-complying work.
- C. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.
- D. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.

- E. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
- F. Restore work with new products in accordance with requirements of Contract Documents.
- G. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- H. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 07 8400, to full thickness of the penetrated element.
- I. Patching:
 - 1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
 - 2. Match color, texture, and appearance.
 - 3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

3.06 PROGRESS CLEANING

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
- C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
- D. Keep site and adjoining streets reasonably clean. If necessary, sprinkle rubbish and debris with water to suppress dust.
- E. During handling and installation, protect construction in progress and adjoining materials in place. Apply protective covering where required to ensure protection from soiling, damage, or deterioration until Substantial Completion.
- F. Clean and maintain completed construction as frequently as necessary throughout construction period. Adjust and lubricate operable components to ensure ability to operate without damaging effects.
- G. Organ Chamber:
 - 1. Clean debris from inside Organ Chamber and leave dust free before organ speakers are installed.
- H. Supervise construction activities to ensure that no part of construction completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during construction period.
- I. Before and during application of painting materials, clear area where such work is in progress of debris, rubbish, and building materials that may cause dust. Sweep floors and vacuum as required and take all possible steps to keep area dust free.
- J. Clean exposed surfaces and protect as necessary to avoid damage and deterioration.
- K. Place extra materials of value remaining after completion of associated work have become Owner's property as directed by Owner or Architect.
- L. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

3.07 PROTECTION OF INSTALLED WORK

- A. Protect installed work from damage by construction operations.
- B. Provide special protection where specified in individual specification sections.

- C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- G. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.08 ADJUSTING

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.

3.09 FINAL CLEANING

- A. Execute final cleaning after Substantial Completion but before making final application for payment.
 - 1. Clean areas to be occupied by Owner prior to final completion before Owner occupancy.
- B. Use cleaning materials that are nonhazardous.
- C. Comply with individual manufacturer's cleaning instructions.
- D. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
- E. Clean each surface or unit to condition expected in normal, commercial building cleaning and maintenance program, including but not limited to:
 - 1. Interior Cleaning:
 - a. Exercising care not to scratch glass.
 - b. Remove marks, stains, fingerprints and dirt.
 - c. Clean and polish woodwork and finish hardware.
 - d. Clean plumbing fixtures and tile work. Remove spots, soil or paint.
 - e. Clean surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean light fixtures and lamps.
 - f. Clean other fixtures and equipment and remove stains, paint, dirt, and dust.
 - g. Remove temporary floor protection and clean floors.
 - 2. Exterior Cleaning:
 - a. Exercising care not to scratch glass.
 - b. Remove marks, stains, and dirt from exterior surfaces.
 - c. Clean and polish finish hardware.
 - d. Remove temporary protection systems.
 - e. Clean dirt, mud, and other foreign material from paving and sidewalks.
 - f. Clean drop inlets, through-curb drains, and other drainage structures.
 - g. Remove trash, debris, and foreign material from landscaped areas.
- F. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.
- G. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
- H. Clean filters of operating equipment.
- I. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, drainage systems, and [].
- J. Clean site; sweep paved areas, rake clean landscaped surfaces.

- K. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.10 CLOSEOUT PROCEDURES

- A. Closeout process consists of three specific project closeout inspections. Contractor shall plan sufficient time in construction schedule to allow for required inspections before expiration of Contract Time.
- B. Contractor shall conduct his own inspections of The Work and shall not request closeout inspections until The Work of the contract is reasonably complete and correction of obvious defects or omissions are complete or imminent.
- C. Date of Substantial Completion shall not occur until completion of construction work, unless agreed to by Architect and included on Certificate of Substantial Completion.
- D. Make submittals that are required by governing or other authorities.
 - 1. Provide copies to Architect and Owner.
- E. Preliminary Closeout Review:
 - 1. When Architect, Owner and Contractor agree that project is ready for closeout, Pre-Substantial Inspection shall be scheduled. Preparation of floor substrate to receive carpeting and any work which could conceivably damage or stain carpet must be completed, as carpet installation will be scheduled immediately following this inspection.
 - 2. Prior to this inspection, completed test and evaluation reports for HVAC system and font, where one occurs, are to be provided to Project Manager, Architect, and applicable consultants.
 - 3. Architect and his appropriate consultants, together with Contractor and mechanical, plumbing, fire protection, and electrical sub-contractors shall conduct a space by space and exterior inspection to review materials and workmanship and to demonstrate that systems and equipment are operational.
 - a. Punch list of items requiring completion and correction will be created.
 - b. Time frame for completion of punch list items will be established, and date for Substantial Completion Inspection shall be set.
- F. Substantial Completion Inspection:
 - 1. When Architect, Owner and Contractor agree that project is ready for Substantial Completion, an inspection is held. Punch list created at Pre-Substantial Inspection is to be substantially complete.
 - 2. Prior to this inspection, Contractor shall discontinue or change over and remove temporary facilities from the site, along with construction tools, mock-ups and similar elements.
 - 3. Architect, Owner and Contractor review completion of punch list items. When Owner and Architect confirm that Contractor has achieved Substantial Completion of The Work, Owner, Architect and Contractor will execute Certificate of Substantial Completion that contains:
 - a. Date of Substantial Completion.
 - b. Punch List Work not yet completed, including seasonal and long lead items.
 - c. Amount to be withheld for completion of Punch List Work.
 - d. Time period for completion of Punch List Work.
 - e. Amount of liquidated damages set forth in Supplementary Conditions to be assessed if Contractor fails to complete Punch List Work within time set forth in Certificate.
 - 4. Contractor shall present Closeout Submittals to Architect and place tools, spare parts, extra stock, and similar items required by Contract Documents in locations as directed by Facilities Manager.
- G. Final Acceptance Meeting:
 - 1. When punch list items except for any seasonal items or long lead items which will not prohibit occupancy are completed, Final Acceptance Meeting is held.

2. Owner, Architect and Contractor execute Owner's Project Closeout - Final Acceptance form, and verify:
 - a. All seasonal and long lead items not prohibiting occupancy, if any, are identified, with committed to completion date and amount to be withheld until completion.
 - b. Owner's maintenance personnel have been instructed on all system operation and maintenance as required by the Contract Documents.
 - c. Final cleaning requirements have been completed.
3. If applicable, once any seasonal and long lead items are completed, Closeout Inspection is held where Owner and Architect verify that The Work has been satisfactorily completed, and Owner, Architect and Contractor execute Closeout portion of the Project Closeout - Final Acceptance form.
4. When Owner and Architect confirm that The Work is satisfactorily completed, Architect will authorize final payment.

3.11 MAINTENANCE

- A. Provide service and maintenance of components indicated in specification sections.
- B. Maintenance Period: As indicated in specification sections or, if not indicated, not less than one year from the Date of Substantial Completion or the length of the specified warranty, whichever is longer.
- C. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.
- D. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.
- E. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the Owner.

END OF SECTION

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**SECTION 01 7419
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL**

PART 1 GENERAL

1.01 WASTE MANAGEMENT REQUIREMENTS

- A. Owner requires that this project generate the least amount of trash and waste possible.
- B. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.
- C. Methods of trash/waste disposal that are not acceptable are:
 - 1. Burning on the project site.
 - 2. Burying on the project site.
 - 3. Dumping or burying on other property, public or private.
 - 4. Other illegal dumping or burying.
- D. Regulatory Requirements: Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

1.02 DEFINITIONS

- A. Asphalt Pavement, Brick, and Concrete (ABC) Rubble: Rubble that contains only weathered (cured) asphalt pavement, clay bricks and attached mortar normally used in construction, or concrete that may contain rebar. The rubble shall not be mixed with, or contaminated by, another waste or debris.
- B. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.
- C. Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.
- D. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- E. Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.
- F. Salvage: To remove a waste material from the project site to another site for resale or reuse by others.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.

PART 3 EXECUTION

2.01 WASTE MANAGEMENT PLAN IMPLEMENTATION

- A. Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.
- B. Meetings: Discuss trash/waste management goals and issues at project meetings.
 - 1. Prebid meeting.
 - 2. Preconstruction meeting.
 - 3. Regular job-site meetings.
- C. Facilities: Provide specific facilities for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by all contractors and installers.
 - 1. Provide containers as required.
 - 2. Provide adequate space for pick-up and delivery and convenience to subcontractors.
 - 3. Keep recycling and trash/waste bin areas neat and clean and clearly marked in order to avoid contamination of materials.

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- D. Hazardous Wastes: Separate, store, and dispose of hazardous wastes according to applicable regulations.
- E. Reuse of Materials On-Site: Set aside, sort, and protect separated products in preparation for reuse.

END OF SECTION

**SECTION 01 7800
CLOSEOUT SUBMITTALS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Project record documents.
- B. Operation and maintenance data.
- C. Warranties and bonds.
- D. Maintenance materials.

1.02 RELATED REQUIREMENTS

- A. Section 01 3000 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.
- B. Individual Product Sections: Specific requirements for operation and maintenance data.
- C. Individual Product Sections: Warranties required for specific products or Work.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PROJECT RECORD DOCUMENTS

- A. Do not use record documents for construction purposes:
 - 1. Protect from deterioration and loss in secure, fire-resistive location.
 - 2. Provide access to record documents for Architect's reference during normal working hours.
- B. Maintain clean, undamaged set of Drawings:
 - 1. Mark set to show actual installation where installation varies from the Work as originally shown.
 - 2. Give particular attention to concealed elements that would be difficult to measure and record at a later date.
 - 3. Mark record sets with red erasable pencil. Use other colors to distinguish between variations in separate categories of the Work.
 - 4. Mark new information that is important to Owner, but was not shown on Drawings.
 - 5. Note related Change Order numbers where applicable.
- C. As Built Record Drawings:
 - 1. As required in agreement with the Owner:
 - a. Architect will provide two full-size sets of prints of the As Built Record Drawings to the Facilities Management Office, printed from the updated AutoCAD drawing files or updated Revit model files, as specified by Owner, that have been modified to show actual dimensions and location of equipment, material, utility lines, and other work as actually constructed, based upon information provided by Contractor. Architect will submit updated As Built Record Drawings in PDF (ISO32000 format) to Owner.
 - b. Architect will submit following:
 - 1) Updated AutoCAD as built record drawing files with associated plot style tables or Revit as built record model files, as specified by Owner.
 - 2) Revit Model O&M lifecycle requirements to be tracked by Facility Manager.
- D. Maintain on site one set of the following record documents; record actual revisions to the Work:
 - 1. Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change Orders and other modifications to the Contract.
 - 5. Reviewed shop drawings, product data, and samples.
 - 6. Manufacturer's instruction for assembly, installation, and adjusting.

- E. Ensure entries are complete and accurate, enabling future reference by Owner.
- F. Store record documents separate from documents used for construction.
- G. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
 - 1. Manufacturer's name and product model and number.
 - 2. Product substitutions or alternates utilized.
 - 3. Changes made by Addenda and modifications.

3.02 OPERATION AND MAINTENANCE DATA

- A. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.
- B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
- C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.
- D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.
- E. General:
 - 1. Include closeout submittal documentation as required by Contract Documentation.
 - 2. Include workmanship bonds, final certifications, equipment check-out sheets, and similar documents.
 - 3. Releases enabling Owner unrestricted use of The Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 - 4. Include Project photographs, damage or settlement survey, and similar record information required by Contract Documents.
 - 5. Submittal Format:
 - a. Digital copies unless otherwise noted, required for each individual specification section that include 'Closeout Submittals'.
 - b. Include only closeout submittals as defined in individual specification section as required in Contract Documents.
- F. Project Manual:
 - 1. Copy of complete Project Manual including Addenda, Modifications as defined in General Conditions, and other interpretations issued during construction:
 - a. Mark these documents to show variations in actual Work performed in comparison with text of specifications and Modifications.
 - b. Show substitutions, selection of options, and similar information, particularly on elements that are concealed or cannot otherwise be readily discerned later by direct observation.
- G. Maintenance Contracts:
 - 1. Digital format only.
- H. Operations and Maintenance Data:
 - 1. Digital format only:
 - a. Cleaning instructions.
 - b. Maintenance instructions.
 - c. Operations instructions.
 - d. Equipment list.
 - e. Parts list.
- I. Warranty Documentation:
 - 1. Digital format of final, executed warranties.
- J. Record Documentation:

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1. Digital format only.
 - a. Certificate of Occupancy
 - b. Certifications.
 - c. Color and pattern selections
 - d. Design Data.
 - e. Geotechnical Evaluation Reports (soils reports).
 - f. Manufacture Reports.
 - g. Manufacturer's literature or cut sheets.
 - h. Shop Drawings.
 - i. Source Quality Control.
 - j. Special Procedures.
- K. Testing and Inspection Agency Reports.
 1. Testing and Inspection Reports.
- L. Software:
 1. Audio and Video System software, programming and set-files.
- M. Irrigation Plan.
 1. Laminated and un-laminated reduced sized hard copies.
- N. Landscape Management Plan (LMP):
 1. Irrigation Section:
 - a. Submittal Format: Digital format and hard copy of each.
 - b. Documentation required by sections under 32 8000 Heading: 'Irrigation'.
 2. Landscaping Section:
 - a. Submittal Format: Digital format and hard copy of each.
 - b. Documentation required by sections under 32 9000 Heading: 'Planting'.

3.03 WARRANTIES AND BONDS

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

3.04 MAINTENANCE MATERIAL SUBMITTALS

Helena Distribution Store – Project # 89018312501	01 7800 - 3	Closeout Submittals
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- A. Submit item(s) required by Section 01 3000 - Administrative Requirements and as defined in individual specification sections if required in Contract Documents. Items may be provided at completion of Work or with Closeout Submittals.

END OF SECTION

Helena Distribution Store – Project # 89018312501	01 7800 - 4	Closeout Submittals
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**SECTION 06 1000
ROUGH CARPENTRY**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Structural dimension lumber framing.
- B. Nonstructural dimension lumber framing.
- C. Rough opening framing for doors, windows, and roof openings.
- D. Sheathing.
- E. Roof-mounted curbs.
- F. Roofing nailers.
- G. Preservative treated wood materials.
- H. Miscellaneous framing and sheathing.
- I. Communications and electrical room mounting boards.
- J. Concealed wood blocking, nailers, and supports.
- K. Miscellaneous wood nailers, furring, and grounds.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Setting anchors in concrete.
- B. Section 05 5000 - Metal Fabrications: Miscellaneous steel connectors and support angles for wood framing.
- C. Section 06 1733 - Wood I-Joists.
- D. Section 06 1753 - Shop-Fabricated Wood Trusses.
- E. Section 06 1800 - Glued-Laminated Construction.
- F. Section 09 2116 - Gypsum Board Assemblies: Gypsum-based sheathing.
- G. Section 31 3116 - Termite Control: Field-applied termiticide and mildewcide for wood materials.

1.03 REFERENCE STANDARDS

- A. ASTM D2559 - Standard Specification for Adhesives for Bonded Structural Wood Products for Use Under Exterior Exposure Conditions 2012a (Reapproved 2018).
- B. ASTM F1667 - Standard Specification for Driven Fasteners: Nails, Spikes, and Staples 2021.
- C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.
- D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2022.
- E. ASTM C557 - Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing 2003 (Reapproved 2017).
- F. ASTM D3498 - Standard Specification for Adhesives for Field-Gluing Wood Structural Panels (Plywood or Oriented Strand Board) to Wood Based Floor System Framing 2019a.
- G. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials 2022a.
- H. ICC-ES AC38 - Acceptance Criteria for Water-Resistive Barriers 2016, with Editorial Revision (2019).
- I. ICC-ES AC380 - Acceptance Criteria for Termite Physical Barrier Systems 2014, with Editorial Revision (2017).
- J. PS 1 - Structural Plywood 2009 (Revised 2019).

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- K. PS 2 - Performance Standard for Wood Structural Panels 2018.
- L. PS 20 - American Softwood Lumber Standard 2021.
- M. SPIB (GR) - Grading Rules 2014.
- N. WCLIB (GR) - Standard Grading Rules for West Coast Lumber No. 17 2018.
- O. WWPA G-5 - Western Lumber Grading Rules 2021.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide technical data on wood preservative materials and application instructions.
- C. Manufacturer's literature on framing anchors and powder-actuated fasteners.
 - 1. Submit diameter and lengths of fasteners proposed for use on Project. If length of diameter of proposed fasteners differ from specified fasteners, also include technical and engineering data for proposed fasteners including, but not limited to:
 - a. Adjusted fastener spacing where using proposed fasteners and,
 - b. Adjusted number of fasteners necessary to provide connection capacity equivalent to specified fasteners.
 - 2. Submit on powder-actuated fasteners other than those specified in Contract Documents, show design criteria equivalents at each location.
 - 3. Show type, quantity and installation location of framing anchors. Where necessary, reference Drawing details, etc, for installation locations.
- D. Structural Composite Lumber: Submit manufacturer's published structural data including span tables, marked to indicate which sizes and grades are being used; if structural composite lumber is being substituted for dimension lumber or timbers, submit grading agency structural tables marked for comparison.
- E. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
 - 1. Protect lumber and sheathing and keep under cover in transit and at job site.
 - 2. Do not deliver material unduly long before it is required.
- B. Storage And Handling Requirements:
 - 1. Store lumber and sheathing on level racks and keep free of ground to avoid warping.
 - 2. Stack to insure proper ventilation and drainage.

1.06 QUALITY ASSURANCE

- A. Pre-Installation Conference:
 - 1. Participate in MANDATORY pre-installation conference.
 - a. Schedule pre-installation conference immediately before beginning framing work.
 - b. In addition to agenda items specified in Section 01 3100, review following:
 - 1) Equipment and gypsum board blocking in wood framed walls.
 - 2) Operable partition headers.
 - 3) Rough opening.
 - 4) Shear walls and struts.
 - 5) Nails and nailing requirements.
 - 6) Truss installation.
 - 7) Connections.
 - 2. Participate in pre-installation conference held jointly with Section 08 4113.
 - a. Schedule pre-installation conference for one (1) week before scheduled installation of storefront system.
 - b. In addition to agenda items specified in Section 01 3100, review following:

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- 1) Rough opening requirements.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Suppliers:
 1. Builders First Choice, West Jordan, UT. www.BLDR.com. Contact Dan Egelund.
 - a. Office: (801) 224-0541.
 - b. Mobile: (801) 376-2385.
 - c. E-Mail: Dan.Egelund@bldr.com
 2. J. M. Thomas Forest Products, Ogden, UT. www.thomasforest.com. Contact Tom Karren:
 - a. Office: (800) 962-8780.
 - b. FAX: 801-782-9652.
 - c. E-Mail: tom@thomasforest.com.
 3. Shelter Products, Inc., Portland, OR www.shelter-products.com. Contact Grant Buchanan or Andy Beltz:
 - a. Office: (800) 662-3612.
 - b. Cell: NA.
 - c. FAX: (503) 238-2663.
 - d. E-Mail: gbuchanan@shelter-products.com.
 - e. E-mail: abeltz@shelter-products.com.
 4. Alternate Supplier:
 - a.
 - b.
- B. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
 1. Species: Douglas Fir-Larch, unless otherwise indicated.
 2. If no species is specified, provide species graded by the agency specified; if no grading agency is specified, provide lumber graded by grading agency meeting the specified requirements.
 3. Grading Agency: Grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee at www.alsc.org, and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.
 4. Design Criteria:
 - a. Meet requirements of PS 20 and National Grading Rules for softwood dimension lumber.
 - b. Bear grade stamp of WWSA, SPIB, or other association recognized by American Lumber Standards Committee identifying species of lumber by grade mark or by Certificate of Inspection.
 - c. Lumber 2 inches (50 mm) or less in nominal thickness shall not exceed 19 percent in moisture content at time of fabrication and installation and be stamped 'S-DRY', 'K-D', or 'MC15'.
 - d. Preservative Treated Plates / Sills:
 - 1) 2x4 (38 mm by 64 mm): Standard and better Douglas Fir, Southern Pine, or HemFir, or StrandGuard by iLevel by Weyerhaeuser Boise, ID www.ilevel.com. (LSL 1.3 E) or as indicated on Contract Drawings.
 - 2) 2x6 (38 mm by 140 mm) And Wider: No. 2 or MSR 1650f - 1.5e Douglas Fir, Southern Pine, HemFir, or StrandGuard by iLevel by Weyerhaeuser, Boise, ID www.ilevel.com. (LSL 1.3 E) or as indicated on Contract Drawings.
 5. Lumber of other species or grades is acceptable provided structural and appearance characteristics are equivalent to or better than products specified.
- C. Posts, Beams, And Timbers 5 Inches by 5 Inches (125 mm by 125 mm) And Larger:
 1. Design Criteria:

- a. No. 1 or better Douglas Fir or Southern Pine unless noted otherwise by Contract Drawings.
- D. Lumber Ledgers:
 - 1. Design Criteria:
 - a. No. 1 Douglas Fir-Larch, or Southern Pine unless noted otherwise by Contract Drawings.

2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

- A. Sizes: Nominal sizes as indicated on drawings, S4S.
- B. Moisture Content: S-dry or MC19.
- C. Stud Framing:
 - 1. Species: Any allowed under referenced grading rules, or as noted by contract drawings.
 - 2. Grade: No. 2, or as noted by Contract Drawings.
- D. Joist, Rafter, and Small Beam Framing:
 - 1. Machine stress-rated (MSR) as follows:
 - a. Fb-single (minimum extreme fiber stress in bending): 1350 psi, or as noted by Contract Drawings.
 - b. E (minimum modulus of elasticity): 1,300,000 psi, or as noted by contract drawings.
 - 2. Species and Grades: As indicated on drawings for various locations.
- E. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
 - 1. Lumber: S4S, No. 2 or Standard Grade.
 - 2. Boards: Standard or No. 3.

2.03 STRUCTURAL COMPOSITE LUMBER

- A. At Contractor's option, structural composite lumber may be substituted for concealed dimension lumber and timbers.
- B. Materials shall be tested and evaluated in accordance with ASTM D5456.
- C. Materials shall have current ICC-ES Evaluation Report, report approved by International Codes Council, or report issued by Architect approved model code evaluation service and shall comply with requirements of report.
- D. Identify materials by stamp or stamps indicating manufacturer's name, product trade name, grade, species (if applicable), evaluation report number, plant number, and name or logo of independent inspection agency.
- E. Adhesive: Meet requirements of ASTM D2559.
- F. Factory fabricated beams, headers, and columns, of sizes and types indicated on drawings; structural capacity as published by manufacturer.
 - 1. Columns: Use laminated veneer lumber, laminated strand lumber, or parallel strand lumber with manufacturer's published modulus of elasticity, E: 1,800,000 psi, minimum.
 - 2. Beams: Use laminated veneer lumber, laminated strand lumber, or parallel strand lumber with manufacturer's published modulus of elasticity, E: 1,800,000 psi, minimum.
 - 3. Headers Not Longer Than 48 inches: Use laminated veneer lumber, laminated strand lumber, or parallel strand lumber.
 - 4. Products:
 - a. Boise Cascade Company: www.bc.com/#sle.
 - b. Weyerhaeuser Company: www.weyerhaeuser.com/#sle.
 - c. Jager Industries Inc, Calgary, AB www.jagerbuildingsystems.com 4. Louisiana Pacific Corp, Portland, OR www.lpcorp.com.
 - d. Roseburg Forest Products, Roseburg, OR www.roseburg.com.
 - e. Trus Joist Corp, Div Weyerhaeuser, Boise, ID www.tjm.com or Surrey, BC (604) 588-7878.
 - f. Web Joist, Chehalis, WA www.webjoist.com.

2.04 CONSTRUCTION PANELS (WOOD SHEATHING)

- A. See Contract Drawings for required thicknesses, span ratings and attachment requirements.
- B. Sheathing: Meet requirements of PS 1, PS 2, or PRP-133 (TECO). Except where plywood is specifically indicated on Contract Drawings, oriented strand board (OSB) is acceptable.
- C. Sheathing shall bear grade stamp from American Plywood Association (APA) or equal grading organization.
- D. Sheathing shall not exceed 18 percent moisture content when fabricated or more than 19 percent when installed in Project.
- E. Sheathing used for same purpose shall be of same thickness. In all cases, thickness specified is minimum required regardless of span rating.
- F. Minimum span ratings for given thicknesses shall be as follows:
 - 1. Thickness = Span Rating
 - a. 3/8 inch = 24 / 0
 - b. 7/16 inch nominal = 24 / 16
 - c. 15/32 inch actual = 32 / 16
 - d. 1/2 inch nominal = 32 / 16
 - e. 19/32 inch actual = 40 / 20
 - f. 5/8 inch nominal = 40 / 20
 - g. 23/32 inch actual = 48 / 24

2.05 ACCESSORIES

- A. Fasteners and Anchors:
 - 1. General:
 - a. Fasteners for preservative treated and fire-retardant-treated wood shall be of hot dipped zinc-coated galvanized steel, stainless steel, silicon bronzed, or copper. Coating weights for zinc-coated fasteners shall be in accordance with ASTM A153/A153M.
 - 2. Blocking:
 - a. Sound lumber without splits, warps, wane, loose knots, or knots larger than 1/2 inch.
 - b. Utility or better
 - 3. Nails:
 - a. Meet requirements of ASTM F1667.
 - b. Unless noted otherwise, nails listed on Drawings or in Specifications shall be common nail diameter, except 16d nails, which shall be box diameter.
 - 4. SDS Screws:
 - a. Category Four Approved Products. See Section 01 6200 for definitions of categories.
 - b. SDS Screws by Simpson Strong Tie Co, Dublin, CA www.strongtie.com.
 - 5. Powder-Actuated Fasteners:
 - a. Type One Quality Standard: Hilti X-DNI 62P8.
 - b. Manufacturers:
 - 1) Hilti, Tulsa, OK www.us.hilti.com.
 - 2) Redhead Division of ITW, Wood Dale, IL www.itw-redhead.com and Markham, ON www.itwconstruction.ca.
 - 6. Drywall Screws: Bugle head, hardened steel, power driven type, length three times thickness of sheathing.
 - 7. Framing Anchors:
 - a. Framing anchors and associated fasteners in contact with preservative hot dipped zinc coated galvanized steel or stainless steel. Do not use stainless steel items with galvanized items.
 - b. Acceptable Products:
 - 1) KC Metals Inc, San Jose, CA www.kcmetals.com.
 - 2) Simpson Strong Tie Co, Dublin, CA www.strongtie.com.

- 3) United Steel Products Co Inc (USP), Montgomery, MN www.uspconnectors.com.
 - 4) Equals as approved by Architect through shop drawing submittal before installation.
- B. Joist Hangers: Hot dipped galvanized steel, sized to suit framing conditions.
1. For contact with preservative treated wood in exposed locations, provide minimum G185 galvanizing complying with ASTM A653/A653M.
- C. Sill Gasket on Top of Foundation Wall: 1/4 inch thick, plate width, closed cell plastic foam from continuous rolls.
- D. Termite-Resistant Sill Plate Barrier: Self-adhesive, film-backed barrier with release sheet; adheres to concrete substrates and blocks termite access.
1. Thickness: 68 mil, 0.068 inch.
 2. Termite Resistance: 100 percent when tested in accordance with ICC-ES AC380.
- E. Subfloor Adhesives: Gap-filling construction adhesive for bonding wood structural panels to wood-based floor system framing; complying with ASTM D3498.
- F. Construction Adhesives: Adhesives complying with ASTM C557 or ASTM D3498.
1. Manufacturers:
 - a. Meet requirements of 'APA-The Engineered Wood Association' Specification AFG-01 or ASTM D3498.
 - b. Use phenol-resorcinol type for use on pressure treated wood products.

PART 3 EXECUTION

3.01 PREPARATION

- A. Use preservative treated wood for wood members in contact with concrete or masonry, including wall, sill and ledger plates, door and window subframes and bucks, etc.
- B. Install sill gasket under sill plate of framed walls bearing on foundations; puncture gasket cleanly to fit tightly around protruding anchor bolts.
- C. Coordinate installation of rough carpentry members specified in other sections.

3.02 INSTALLATION - GENERAL

- A. Select material sizes to minimize waste.
- B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.
- C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.03 FRAMING INSTALLATION

- A. Basketball Standards:
 1. See Basketball Equipment Specification for installation instructions and template.
 - a. Use Basketball Manufacturer's template for location of basketball hanger brackets.
 - b. Verify field dimension of brackets.
- B. Furring Strips:
 1. On Wood or Steel: Nail or screw as required to secure firmly.
 2. At ceilings:
 - a. Attach furring strips to the underside of structural elements with #8 wood screws, of length to penetrate wood framing 1 inch minimum.
- C. Floor Framing:
 1. Place with crown side up.
 2. Install structural blocking and bridging as necessary and as described in Contract Drawings.

3. Provide accurately fitted header and trimmer joist of same size as regular joists around floor openings, unless detailed otherwise and support by steel joist hangers.
 4. Double joists under partitions that parallel run of joists.
- D. Roof and Ceiling Framing:
1. Place with crown side up.
 2. Install structural blocking and bridging as necessary and as described in Contract Drawings.
 3. Special Requirements:
 - a. Roof and Ceiling Joists: Lap joints 4 inches minimum and secure with code approved framing anchors.
 - b. Roof Rafters and Outlookers:
 - 1) Cut level at wall plate and provide at least 2-1/2 inches bearing where applicable. Spike securely to plate with three 10d nails.
 - 2) Attach to trusses or other end supports with framing anchors described in Contract Drawings.
 - 3) Provide for bracing at bearing partitions.
- E. Installation of Wood Trusses:
1. Handle, erect, and brace wood trusses in accordance with TPI/WTCA Booklet BCSI.
 2. Do not install damaged or broken wood trusses. Replace wood trusses that are broken, damaged, or have had members cut out during course of construction.
 3. Provide construction bracing from trusses in accordance with TPI DSB-89.
 4. Provide continuous 2x4 horizontal web bracing as shown on truss shop drawings.
 - a. Secure bracing to each truss with two 10d or 16d nails.
 - b. Lap splice bracing by placing bracing members side by side on common web member. Butt splices are not acceptable.
 5. Unless directed or shown otherwise, provide diagonal 2x4 bracing between trusses at each line of horizontal web bracing.
 - a. This diagonal bracing shall be continuous and extend from junction of web and top chord of one truss to junction of web and bottom chord of different truss.
 - b. Install bracing at approximately 45 degree angle. Bracing will extend over three trusses minimum or more as determined by height of trusses and 45 degree installation angle.
 - c. Install brace on side of web opposite horizontal web bracing and nail to each web with two 10d or 16d nails.
 - d. Install one brace every 20 feet as measured from top of brace to top of next brace.
- F. Wall Framing:
1. Openings: Single, bearing stud supporting header and on adjacent (king) stud continuous between top and bottom plates, unless show otherwise.
 2. Corners And Partition Intersections: Triple Studs.
 3. Top Plates in Bearing Partitions/Walls: Doubled or tripled and lapped, unless shown otherwise. Stagger joints at least 48 inches.
- G. Installation of GlueLams:
1. Install work in accordance with Fabricator's instructions and GlueLam Erection Safety Practices.
 2. Adequately support and brace work until tied into building structure to insure against collapse due to wind or other forces.
 3. Maintain protection of beams until roofing has been installed.
- H. Installation of Structural Composite Lumber:
1. Install temporary horizontal and cross bracing to hold members plumb and in safe condition until permanent bracing is installed.
 2. Install permanent bracing and related components before application of loads to members.

- I. Installation of Wood Web Joists (I-Joists):
 1. Handle, erect, and brace sheathing wood web joists in accordance with Manufacturer's instructions.
 2. Do not install damaged or broken wood web joists.
 3. Install temporary horizontal and cross bracing to hold members plumb and in safe condition until permanent bracing is installed.
 4. Cut holes through webs at locations or of sizes shown on Drawings and as recommended by Manufacturer.
- J. Firestops:
 1. Horizontal or vertical concealed spaces in walls, light coves, soffits, drop ceilings, and other features over 10 feet in length or height, and at stairs, ceiling levels, floor levels, and other junctures of horizontal to vertical concealed spaces.
 2. Within concealed spaces of exterior wall finishes and exterior architectural elements, such as trims, cornices or projections, at maximum intervals of 20 feet, length or height.
- K. Sill Plates:
 1. Shear Walls and Bearing Walls (structural walls):
 - a. Provide specified anchor 12 inches maximum and 4 inches minimum from each end of each plate.
 - b. Fasten with anchor bolts embedded in concrete or with post-installed anchors as noted in Contract Drawings.
 2. Non-Structural Walls: Fasten with powder actuated fasteners.
 3. In addition to requirements of paragraphs '1' and '2' above, set sill plates of interior walls measuring less than 36 inches in length in solid bed of specified construction adhesive, except where sill sealer is used.
 4. Install specified seal sealer under sill plates of exterior walls and of acoustically insulated interior walls.
- L. Posts And Columns:
 1. Unless shown otherwise, nail members of multiple member columns together with 16d at 6 inches on center from each side.
- M. Beams And Girders:
 1. Built-Up Members:
 - a. Stagger individual members of multiple span beams and girders so, over any one support, no more than half the members will have a joint. In all cases, however, joints shall occur over supports.
 - b. Unless shown otherwise on Contract Drawings, nail two-ply built-up members with 10d nails 12 inches on center top and bottom, staggered on opposite sides. Nail three-ply built-up ,members with 16d nails at 12 inches on center, top and bottom, staggered, on opposite sides. Set with crown edge up with full bearing at ends and intermediate supports.
 2. Pre-Fabricated Members:
 - a. Solid glue-lam, LVL, LSL or PSL members may be used in place of built-up 2x framing members. Size shall be same as built-up member.
 - b. Solid LVL or PSL members may be used in place of built-up LVL members. Size shall be same as sum of built-up members.
 3. Wood shims are not acceptable under ends.
 4. Do not notch framing members unless specifically shown in Drawing detail.
- N. Nailing:
 1. Use nails and nail spacings required by Contract Drawings and:
 - a. Top plates: Spiked together, 16d, 16 inches on center.
 - b. Top plates: Laps, lap members 48 inches minimum and nail with 16d nails 4 inches on center
 - c. Top plates: Intersections, three 16d

- d. Backing and blocking: Three 8d, each end.
- e. Corner studs and angles: 16d, 16 inches on center.
- O. Set structural members level, plumb, and true to line. Discard pieces with defects that would lower required strength or result in unacceptable appearance of exposed members.
- P. Make provisions for temporary construction loads, and provide temporary bracing sufficient to maintain structure in true alignment and safe condition until completion of erection and installation of permanent bracing.
- Q. Install structural members full length without splices unless otherwise specifically detailed.
- R. Comply with member sizes, spacing, and configurations indicated, and fastener size and spacing indicated, but not less than required by applicable codes, AWC (WFCM) Wood Frame Construction Manual, and [_____].
- S. Install horizontal spanning members with crown edge up and not less than 1-1/2 inches of bearing at each end.
- T. Construct double joist headers at floor and ceiling openings and under wall stud partitions that are parallel to floor joists; use metal joist hangers unless otherwise detailed.
- U. Provide bridging at joists in excess of 8 feet span as detailed. Fit solid blocking at ends of members.
- V. Frame wall openings with two or more studs at each jamb; support headers on cripple studs.

3.04 BLOCKING, NAILERS, AND SUPPORTS

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.
- B. In framed assemblies that have concealed spaces, provide solid wood fire blocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to code authorities may be used in lieu of solid wood blocking.
- C. In metal stud walls, provide continuous blocking around door and window openings for anchorage of frames, securely attached to stud framing.
- D. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.
- E. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.
- F. Provide the following specific nonstructural framing and blocking:
 - 1. Cabinets and shelf supports.
 - 2. Wall brackets.
 - 3. Handrails.
 - 4. Grab bars.
 - 5. Towel and bath accessories.
 - 6. Wall-mounted door stops.
 - 7. Chalkboards and marker boards.
 - 8. Wall paneling and trim.
 - 9. Joints of rigid wall coverings that occur between studs.

3.05 ROOF-RELATED CARPENTRY

- A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.
- B. Provide wood curb at each roof opening except where prefabricated curbs are specified and where specifically indicated otherwise; form corners by alternating lapping side members.

3.06 INSTALLATION OF CONSTRUCTION PANELS (WOOD SHEATHING)

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- A. Floor Sheathing: 1 Layer Sheathing (floors accessible to public): Glue and nail to framing.
 - 1. Apply bead of glue to structural supports. Lay face grain / strength axis across supports and with panel continuous over two supports minimum.
 - 2. Allow expansion gap of at least 1/2 inch at walls.
 - 3. Tongue and Groove.
 - 4. Nail Spacing.
 - a. As indicated on Contract Drawings.
 - 5. Thickness:
 - a. As indicated on Contract Drawings.
 - 6. Do not install any piece of bottom layer floor sheathing with shortest dimension of less than 24 inches.
- B. Subflooring: 2 Layers Sheathing:
 - 1. Bottom layer:
 - a. Tongue and Groove.
 - b. Glue subflooring layers together along lines of structural supports.
 - c. Leave 1/32 inch gap at side and end joints.
 - d. Thickness and Nailing: As indicated on Contract Drawings.
 - e. Do not install any piece of single layer floor sheathing with shortest dimension of less than 24 inches (600 mm).
 - 2. Top layer:
 - a. Tongue and Groove.
 - b. Stagger joints of second layer subflooring so they do not line up with joints of first layer subflooring, but do align with intermediate structural member (for example, align with field nailing of bottom subflooring layer).
 - c. Glue subflooring layers together along lines of structural supports.
 - d. Leave 1/32 inch gap at side and end joints.
 - e. Nail at 6 inch centers on ends and 12 inch centers on intermediate structural members.
 - f. Thickness and Nailing: As indicated on Contract Drawings.
 - g. Do not install any piece of single layer floor sheathing with shortest dimension of less than 24 inches.
- C. Roof Sheathing: Secure panels with long dimension perpendicular to framing members, with ends staggered and over firm bearing.
 - 1. At long edges use sheathing clips ("H" clips) where joints occur between roof framing members.
 - 2. At long edges provide solid edge blocking where joints occur between roof framing members where roof is blocked. Refer to Contract Drawings.
 - 3. Nail panels to framing; staples are not permitted.
 - 4. Placing:
 - a. Lay face grain at right angles to supports. Provide blocking for support if framing turns at roof overhang.
 - b. Provide 1/8 inch (3 mm) space between sheets at end and side joints.
 - c. Stagger panel end joints.
 - d. Sheathing shall be continuous of two spans minimum.
 - 5. Edge Bearing and Blocking:
 - a. As indicated on Contract Drawings.
 - 6. Nail Spacing:
 - a. As indicated on Contract Drawings.
 - b. Place nails at least 3/8 inch (9.5 mm) in from edge.
 - 7. Thickness:
 - a. As indicated on Contract Drawings.
 - 8. Do not install any piece of roof sheathing with shortest dimension of less than 24 inches (600 mm) unless support is provided under all edges.

- D. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using nails, screws, or staples.
 - 1. Use plywood or other acceptable structural panels at building corners, for not less than 96 inches, measured horizontally.
 - 2. Provide inlet diagonal bracing at corners.
 - 3. Place water-resistive barrier horizontally over wall sheathing, weather lapping edges and ends.
 - 4. Spacing:
 - a. Provide 1/8 inch (3 mm) space between sheets at end and edge joints.
 - 5. Edge Bearing And Blocking:
 - a. Panel edges shall bear on framing members and butt along their center lines.
 - b. Back block panel edges, which do not bear on framing members, with 2 inch nominal (45 mm) framing.
 - 6. Nail Spacing:
 - a. As indicated on Contract Drawings.
 - b. Place nails not less than 3/8 inch (9.5 mm) in from edge.
 - 7. Thickness:
 - a. As indicated on Contract Drawings.
- E. Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches on center on all edges and into studs in field of board.
 - 1. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.
 - 2. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
 - 3. Install adjacent boards without gaps.
 - 4. Size: 48 by 96 inches, installed horizontally at ceiling height.
 - 5. Size and Location: As indicated on drawings.

3.07 TOLERANCES

- A. Framing Members: 1/4 inch from true position, maximum.
- B. Surface Flatness of Floor: 1/8 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.
- C. Variation from Plane, Other than Floors: 1/4 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

3.08 FIELD QUALITY CONTROL

- A. Field Inspections:
 - 1. Sheathing:
 - a. General:
 - 1) Owner is responsible for Quality Assurance. Quality assurance performed by Owner will be used to validate Quality Control performed by Contractor.
 - 2) Quality Control is sole responsibility of Contractor as specified in Section 01 4523 'Testing And Inspection Services'.
 - b. For walls and roof areas where nail spacing is 4 inches and less on center, Inspector shall verify wood panel sheathing, grade, thickness and nominal size of framing members, adjoining panel edges, nail size and spacing, bolting and other fastening of other components.

END OF SECTION

Helena Distribution Store – Project # 89018312501	06 1000 - 11	Rough Carpentry
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Helena Distribution Store – Project # 89018312501	06 1000 - 12	Rough Carpentry
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**SECTION 06 2000
FINISH CARPENTRY**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Finish carpentry items.
- B. Wood door frames, glazed frames.
- C. Wood shelving.
- D. Wood casings and moldings.
- E. Miscellaneous plastic fabrications.
- F. Hardware and attachment accessories.
- G. Fire-rated door frames.

1.02 RELATED REQUIREMENTS

- A. Section 09 9113 - Exterior Painting: Painting of finish carpentry items.
- B. Section 09 9123 - Interior Painting: Painting of finish carpentry items.
- C. Section 09 9300 - Staining and Transparent Finishing: Staining and transparent finishing of finish carpentry items.

1.03 REFERENCE STANDARDS

- A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition 2014, with Errata (2016).
- B. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards 2021, with Errata.
- C. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood 2020.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with plumbing rough-in, electrical rough-in, and installation of associated and adjacent components.
- B. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

1.05 SUBMITTALS

- A. Product Data:
 - 1. Provide manufacturer's product data, color selection, storage and handling instructions for factory-fabricated units.
 - 2. Provide data on fire retardant treatment materials and application instructions.
 - 3. Provide instructions for attachment hardware and finish hardware.
- B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
 - 1. Scale of Drawings: 1-1/2 inch to 1 foot, minimum.
 - 2. Provide information as required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).
- C. Samples:
 - 1. Interior Hardwood for Transparent Finish:
 - a. Before performing work of this Section, prepare Control Sample, to match sample available from Owner, to be used as finishing standard for interior clear finished hardwood as specified in Section 09 9324.
 - b. Design Criteria:
 - 1) Provide 8 inch by 10 inch (200 mm by 255 mm) sample of Red Oak to match Owner provided stain color selected for Project.
 - 2) Control Sample will be used as performance standard for evaluating finish provided.

2. Source Quality Control Submittals:
 - a. Samples:
 - 1) Interior Hardwood for Transparent Finish:
 - (a) Owner will provide Control Sample for finish.
3. Samples: Submit two samples of finish plywood, ____ x ____ inch in size illustrating wood grain and specified finish.
4. Samples: Submit two samples of wood trim [____] inch long.

1.06 QUALITY ASSURANCE

- A. Fabricators:
 1. Anderson Cabinet and Millwork, 198 North 4700 East, Rigby, ID 83442.
 - a. Contact Information: Matt Miller phone (208) 538-7415 cell (208) 317-7412 e-mail matt@andersoncabinet.net.
 2. Michael Seiter & Co., Inc., P.O. Box 315 Heber City, UT 84032.
 - a. Contact Information: Mark Seiter phone (435) 654-0601 fax (435) 654-0613 e-mail mark@msandcoinc.com.
 3. Thompson and Sons Cabinets, 11834 N. 3400 West, Deweyville, UT 84309.
 - a. Contact Information: David Thompson cell (435) 230-0876 office (435) 257-7152 e-mail zcabinets@comcast.net.
- B. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.
 1. Company with at least one project within the past 5 years with value of woodwork within 20 percent of cost of woodwork for this project.
 2. Accredited participant in the specified certification program prior to the commencement of fabrication and throughout the duration of the project.
 - 3.
 4. Single Source Responsibility: Provide and install this work from single fabricator.

1.07 WARRANTY

- A. Manufacturer Extended Warranty:
 1. Approved Fabricator's written guarantee that all Goods and Services will be free from defects in materials and workmanship for a period of five (5) years from date of substantial completion.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Protect from moisture damage.

PART 2 PRODUCTS

2.01 DESIGN CRITERIA

- A. Design Criteria:
 1. General:
 - a. AWS Custom Grade is minimum acceptable standard, except where explicitly specified otherwise, for materials, construction, and installation of architectural woodwork.
 2. Materials:
 - a. Lumber:
 - 1) Grade:
 - (a) No defects in boards smaller than 600 sq in.
 - (b) One defect per additional 150 sq inches in larger boards.
 - (c) Select pieces for uniformity of grain and color on exposed faces and edges.
 - (d) No mineral grains accepted.
 - 2) Allowable Defects:
 - (a) Tight knots not exceeding 1/8 inch in diameter. No loose knots permitted.

- (b) Patches (dutchmen) not apparent after finishing when viewed beyond 18 inches.
 - (c) Checks or splits not exceeding 1/32 inch by 3 inches and not visible after finishing when viewed beyond 18 inches.
 - (d) Stains, pitch pockets, streaks, worm holes, and other defects not mentioned are not permitted.
 - (e) Normal grain variations, such as cats eye, bird's eye, burl, curl, and cross grain are not considered defects.
 - 3) Use maximum lengths possible, but not required to exceed 10 feet without joints. No joints shall occur closer than 72 inches in straight runs exceeding 18 feet. Runs between 18 feet and 10 feet may have no more than one joint. No joints shall occur within 72 inches of outside corners nor within 18 inches of inside corners.
 - 4) Moisture content shall be six (6) percent maximum at fabrication. No opening of joints due to shrinkage is acceptable.
- B. Fabrication:
- 1. Follow Architectural Woodwork Standards (AWS) for fabrication of Architectural Woodwork.
 - 2. Tolerances:
 - a. No planer marks (KCPI) allowed. Sand wood members and surfaces with 100 grit or finer.
 - b. Maximum Gap: None allowed.
 - c. Flushness Variation: 0.015 inch maximum.
 - d. Sanding Cross Scratches: 1/4 inch maximum.
 - e. Plug screw holes. Screw locations not to be visible beyond 18 inches.
 - 3. Fabricate work in accordance with measurements taken on job site.
 - 4. 'Ease' sharp corners and edges of exposed members to promote finishing and protect users from splinters. Radius of 'easing' shall be uniform throughout Project and between 1/32 and 1/16 of an inch.
 - 5. Fabricate so veneer grain is vertical.
 - 6. Joints:
 - a. Use lumber pieces with similar grain pattern when joining end to end.
 - b. Compatibility of grain and color from lumber to panel products is required.
 - 7. Install hardware in accordance with Manufacturer's directions. Leave operating hardware operating smoothly and quietly.
 - 8. Remove or repair damaged surface of or defects in exposed finished surfaces of architectural woodwork to match adjacent similar undamaged surface.

2.02 FINISH CARPENTRY ITEMS

- A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS), unless noted otherwise.
- B. Interior Woodwork Items:
 - 1. Moldings, Bases, Casings, and Miscellaneous Trim: Clear white pine; prepare for paint finish.
 - 2. Casings, stops, handrails, and jambs.
 - 3. Chair rails.
 - 4. Fixed shelving not part of casework.
 - 5. Folding panel partition hardwood jambs and trim.
 - 6. Hardwood base.
 - 7. Hardwood handrail at Rostrum Riser and/or Rostrum Ramp.
 - 8. Hardwood trim at light coves, speaker cabinets, etc.
 - 9. Hardwood trim for wall covering.
 - 10. Pass-through window wood trim.

11. Wood trim at ceiling trim.
- C. Wood Stair: Materials:
 1. Treads:
 - a. 5/4 inch clear Douglas Fir or Southern Pine, or 1-1/8 inch thick high density particle board preformed stair tread.
 - b. Treads to have 1/2 inch radius at top outside edge.
 2. Risers: 4/4 inch clear Douglas Fir or Southern Pine, or 3/4 inch plywood.

2.03 LUMBER MATERIALS

- A. Performance / Design Criteria: Conform to requirements of Section 06 4001 'Common Architectural Woodwork Requirements'.
 1. Glue: Waterproof and of best quality.
 2. Factory-finish to match Owner selected sample as specified in Section 09 9324.
- B. Architectural Woodwork Wood Trim:
 1. Interior Hardwood For Transparent Finish:
 2. Design Criteria:
 - a. Solid wood shall be plain sawn Red Oak.
 - b. Paneling shall be panel product with plain sliced Red Oak veneer.
 - c. Finish to match Owner selected sample as specified in Section 09 9300.
 - 1) Color:
 - (a) Color Oak 95.
 - (b) Color Cherry.
- C. Interior Wood For Opaque, Painted Finish:
 1. Applies to ceiling trim only.
 2. Solid wood shall be any species allowed by AWS Custom grade.

2.04 SHEET MATERIALS

- A. Hardwood Plywood: Face species as indicated, plain sawn, book matched, medium density fiberboard core; HPVA HP-1 Front Face Grade AA, Back Face Grade 1, glue type as recommended for application.
 1. For Transparent Finish:
 - a. Paneling shall be panel product with plain sliced Red Oak veneer.
 - 1) Color Oak 95.
 - 2) Color Cherry

2.05 PLASTIC MATERIALS

- A. Materials:
 1. Acrylic Solid Surface:
 - a. Approved Manufacturers. See Section 01 6000.
 - 1) Corian by DuPont Co, Wilmington, DE. Contact Steve Finch at (314) 941-5179 or email stephen.m.finch@dupont.com.
 - 2) Staron Solid Surfacing by Cheil Industries / Samsung Chemical USA, La Mirada, CA www.staron.com.
 - 3) Hanex Solid Surfaces by Hanwha L&C Surfaces US HQ, Atlanta, GA www.hanwhasurfaces.com.
 - 4) LG Hi-Macs Solid Surfacing by LG Solid Source LLC, Peoria, AZ www.lgcreate.com.
 - 5) 'Gibraltar Solid Surface' by Wilsonart International Inc, Temple, TX www.wilsonart.com.
 2. Acrylic Solid Surface Window Stools:
 - a. Design Criteria:
 - 1) Meet requirements of ANSI/ICPS SS-1.
 - b. General:
 - 1) 1/2 inch thick 100 percent acrylic polymer.

- c. Approved Colors: As selected by Architect from Manufacturer's standard solid (white or off white only) colors.
 - 1) Glacier White by Corian.
 - 2) Bisque by Corian.
 - 3) Cameo White by Corian.
 - 4) Vanilla by Corian.
- 3. High Density Polyethylene (HDPE):
 - a. Acceptable Products:
 - 1) Comtec Industries, Moosic, PA www.comtecindustries.com.
 - 2) PSISC, Columbia, SC www.psisc.com.
 - b. High Density Polyethylene (HDPE) Bench Seat:
 - 1) 1-1/2 inches thick.
 - 2) Color selected to closely match color of toilet partitions.

2.06 FASTENINGS

- A. Adhesive for Purposes Other Than Laminate Installation: Suitable for the purpose; not containing formaldehyde or other volatile organic compounds.

2.07 HARDWARE

- A. Manufacturer Contact List:
 - 1. Blum Inc, Stanley, NC www.blum.com.
 - 2. Bommer Industries, Landrum, SC www.bommer.com.
 - 3. ClosetMaid, a division of Emerson Electric, Ocala, Florida www.closetmaid.com
 - 4. CompX National, Mauldin, SC www.nclnet.com.
 - 5. Dow Chemical, Midland, MI www.dow.com.
 - 6. Flynn & Enslow, San Francisco, CA www.flynnenslow.com.
 - 7. Grass America Inc, Kernersville, NC www.grassusa.com.
 - 8. Hafele America Co., Archdale, NC hafele.com.
 - 9. Hillside Wire Cloth Co., Inc., Bloomfield, NJ www.hillsidewirecloth.com.
 - 10. Ives, Indianapolis, IN www.iveshardware.com.
 - 11. Knappe & Vogt, Grand Rapids, MI www.knappeandvogt.com or Knappe & Vogt Canada, Mississauga, ON (905) 676-8972.
 - 12. Olympus Lock Co, Seattle, WA www.olympus-lock.com.
 - 13. Owens Corning, Toledo, OH www.owens-corning.com.
 - 14. Salice America Inc, Charlotte, NC www.saliceamerica.com.
 - 15. SOSS Door Hardware (Division of Universal Industrial Products Company) Pioneer OH www.soss.com.
 - 16. Stanley, New Britain, CT www.stanleyhardware.com or Oakville, ON (800) 441-1759.
 - 17. TWP Inc., Berkley, CA www.twpinc.com.
 - 18. Wire Cloth Manufacturers Inc., Mine Hill, NJ www.wireclothman.com.
- B. Coat and Hat Hook: No. 405, A92 finish, by Ives.
- C. Wardrobe Hooks (Coat and Hat Hooks) (mounted below Coat and Hat Rack): 581 by Ives.
- D. Shelf Standards: 87WH extra heavy duty standard by Knappe & Vogt.
- E. Decoration Anchors:
 - 1. Bright zinc plated lag eyebolts, wire size 4, 3-7/8 inches minimum total length.
 - 2. 8414 by Stanley.
- F. Shelf Brackets: 187WH extra heavy duty brackets by Knappe & Vogt. Size according to shelf width, end of bracket to be within 2 inches (50 mm) of front edge of shelf.

2.08 FABRICATION

- A. Shop assemble work for delivery to site, permitting passage through building openings.
- B. General Architectural Woodwork Installation:

1. Fabricate work in accordance with measurements taken on Project site.
 2. Scribe, miter, and join accurately and neatly to conform to details.
 3. Exposed surfaces shall be machine sanded, ready for finishing.
 4. Allow for free movement of panels.
 5. Countersink nails. Countersink screws and plug those exposed to view.
 6. Attach custom casework as specified in Sections under 06 4000 Heading: 'Furnishing of Architectural Woodwork' to wall blocking with #10 x 3 inch minimum Cabinet Screws. Attach wall cabinets with screws equally spaced horizontally not to exceed 12 inches O.C. with 3 inch maximum spacing at cabinet edges.
- C. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.
- D. Shelves:
1. Design Criteria:
 - a. Conform to applicable requirements of Sections 06 4001.
 - b. Fabricate the work of this section to AWS 'Custom Grade'.
 - c. Species as acceptable for AWS 'Custom Grade'.
 2. Material:
 - a. Panel Product:
 - 1) Glues (adhesives) used in manufacture and fabrication of panel products shall be Type I or II.
 - 2) Moisture content shall be same as specified for lumber.
 - 3) Cores:
 - (a) All Other: Industrial grade particle board with minimum density of 45 lbs per cu ft.
 - 4) Facings:
 - (a) All facings shall be Melamine or Kortron.
 - 5) Thickness:
 - (a) 30 Inch Span And Less: 3/4 inch thick.
 - (b) Spans Over 30 Inches To 42 Inches: One inch thick.
 - (c) Spans Over 42 inches: One inch thick and provide equal center supports.
 - b. Edgings:
 - 1) Use 3/4 inch Kortron or Melamine faced Panel Product with hot glued 3 mm thick PVC with eased edges. Apply banding on all four edges of adjustable shelving and on exposed edges of fixed shelving, with one-inch return onto unexposed edges.
 - 2) Edge banding color to match Panel Product.
 - c. Shelf Supports In Storage Building: 1x4 solid stock Pine, C or better, S4S.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify adequacy of backing and support framing.
- B. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

3.02 INSTALLATION

- A. AWS Custom Grade is minimum acceptable standard, except where explicitly specified otherwise, for installation of architectural woodwork.
- B. Install custom fabrications in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade indicated.
- C. Install hardware in accordance with manufacturer's written instructions.

3.03 INSTALLATION OF ACCESSORIES

- A. Coat and Hat Hooks:

1. Mount coat hook on Office side of Office doors in center of door, 54 inches from finish floor to top of hook base.
- B. Wardrobe Hooks (Coat and Hat Hooks) (mounted below Coat and Hat Rack):
 1. As shown in Contract Drawings.

3.04 SITE APPLIED WOOD TREATMENT

- A. Apply preservative treatment in accordance with manufacturer's instructions.

3.05 PREPARATION FOR SITE FINISHING

- A. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.
- B. Site Finishing: See Section 09 9113 and 09 9123.
- C. Before installation, prime paint surfaces of items or assemblies to be in contact with cementitious materials.

3.06 TOLERANCES

- A. Maximum Variation from True Position: 1/16 inch.
- B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.

END OF SECTION

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**SECTION 06 4100
ARCHITECTURAL WOOD CASEWORK**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Specially fabricated cabinet units.
- B. Countertops.
- C. Hardware.
- D. Preparation for installing utilities.

1.02 RELATED REQUIREMENTS

- A. Section 08 8000 - Glazing: Glass for casework.

1.03 REFERENCE STANDARDS

- A. {RSTEMP#10000043}
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2022.
- C. ASTM E162 - Standard Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source; 2022.
- D. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition; 2014, with Errata (2016).
- E. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards; 2021, with Errata.
- F. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood; 2020.
- G. KCMA A161.1 - Performance and Construction Standard for Kitchen and Vanity Cabinets; 2017.
- H. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.
- I. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.
- J. WDMA I.S. 6A - Interior Architectural Wood Stile and Rail Doors; 2021, with Errata (2022).

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the efforts of the various trades affected by the Work of this Section.
 - 2. Coordinate completion of 2x6 (50mm x 100mm) wall blocking for custom casework.
 - 3. Coordinate completion of custom casework.

1.05 SUBMITTALS

- A. Certificates:
 - 1. Provide Manufacturer's certification of compliance to ANSI/NEMA LD 3.
- B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
 - 1. Scale of Drawings: 1-1/2 inch to 1 foot, minimum.
 - a. Include plan and elevation views, materials used, standing and running trim profiles, assembly methods, joint details, fastening methods, accessories, and hardware.
 - 2. Provide the information required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).
 - 3. Fabricator First Submittal:
 - a. Provide 1/4 inch (or larger) scale building layout and/or description of required room walls required for field dimension for Field Quality Control Submittal. Provide submittal before rough framing is completed.
 - 4. Fabricator Second Submittal:

- a. Provide shop drawings for cabinet and casework that are included for project showing details, casework locations and layout and required dimensions based on Field Quality Control Submittals for compliance to Contract Drawings for approval to Project Architect.
- C. Product Data: Provide data for hardware accessories.
- D. Samples: Submit actual samples of architectural cabinet construction, minimum 12 inches square, illustrating proposed cabinet, countertop, and shelf unit substrate and finish.
- E. Samples: Submit actual sample items of proposed pulls, hinges, shelf standards, and locksets, demonstrating hardware design, quality, and finish.
 - 1. Before performing work of this Section, prepare Control Sample, to match sample available from Owner, to be used as finishing standard for interior clear finished hardwood as specified in Section 09 9324.
 - 2. Provide 8 inch by 10 inch (200 mm by 255 mm) sample(s) of Red Oak to match Owner provided stain color selected for Project.
 - 3. Control Sample will be used as performance standard for evaluating finish provided.
- F. Closeout Submittals:
 - 1. Record Documentation:
 - a. Manufacturer's literature for plastic laminate.
 - b. Color selections.

1.06 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
 - 1. Fire-Test-Response Characteristics: Provide plastic laminate with surface burning characteristics as determined by testing identical products by qualified testing agency.
 - a. Surface-Burning Characteristics:
 - 2. Plastic Laminate shall have Class A flame spread rating in accordance with ASTM E84 or UL 723 Type 1.
 - a. Class A (Flame spread index 0-25; Smoke-developed index 0-450).
 - b. Flash point: None.
- B. Mockups:
 - 1. Before fabrication of complete casework package, submit section or sections of cabinetry containing typical drawer, shelving, cabinet door panel, and hardware.
 - 2. Match Owner provided selected sample finish specified in Section 09 9324.
 - 3. Mockups may be installed in Project after approval.
- C. Approved Fabricators:
- D. Approval subject to agreement process approval.
 - 1. Blue Mountain Millwork and Cabinetry, 198 North 4700 East, Rigby, ID 83442.
 - a. Contact Information: Chris Newson or Gabe Ceja phone (208) 538-7415; e-mail bids@BluMtnMillwork.com
 - 2. Michael Seiter & Co., Inc., P.O. Box 315 Heber City, UT 84032.
 - a. Contact Information: Mark Seiter phone (435) 654-0601 fax (435) 654-0613 e-mail mark@msandcoinc.com.
 - 3. Thompson and Sons Cabinets, 11834 N 3400 West, Deweyville, UT 84309.
 - a. Contact Information: David Thompson cell (435) 230-0876 office (435) 257-7152 e-mail zcabinets@comcast.net
- E. Alternate Fabricator:
 - 1. <Insert Alternate Fabricator and contact information>
- F. Fabricator Qualifications
 - 1. Company specializing in fabricating the products specified in this section with minimum five years of documented experience.

2. Company with at least one project in the past 5 years with value of woodwork within 20 percent of cost of woodwork for this Project.
3. Accredited participant in the specified certification program prior to the commencement of fabrication and throughout the duration of the project.
4. Firm experience in supplying products indicated for this Project.
5. Firm with sufficient production capacity to produce required units.
6. Firm will comply with specifications and Contract Documents for this Project.
7. Minimum five (5) years experience in Woodwork installations.
8. Minimum five (5) satisfactorily completed installations in past three (3) years of projects similar in size, scope, and installation procedures required for this project before bidding.
9. Upon request by Architect or Owner, submit documentation.

1.07 MOCK-UPS

- A. Provide mock-up of typical base cabinet, wall cabinet, and countertop, including hardware, finishes, and plumbing accessories.
- B. Mock-up may remain as part of the work.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Protect units from moisture damage.
- B. Delivery And Acceptance Requirements:
 1. Fabricator Responsibility:
 - a. Assemble architectural woodwork at Architectural Woodwork Fabricator's plant and deliver ready for erection insofar as possible.
 - b. Protect architectural woodwork from moisture and damage while in transit to job site.
 2. General Contractor Responsibility:
 - a. Report damaged materials received within two (2) days from delivery at project site.
- C. Storage And Handling Requirements:
 1. General Contractor Responsibility:
 - a. Unload and store in place where it will be protected from moisture and damage and convenient to use.

1.09 WARRANTY

- A. Manufacturer Extended Warranty:
 1. Approved Fabricator's written guarantee that all Goods and Services will be free from defects in materials and workmanship for a period of five (5) years from date of substantial completion.

PART 2 PRODUCTS

2.01 DESIGN CRITERIA

- A. Design Criteria:
 1. General:
 - a. AWS Custom Grade is minimum acceptable standard, except where explicitly specified otherwise, for materials, construction, and installation of architectural woodwork.
 2. Materials:
 - a. Lumber:
 - 1) Grade:
 - (a) No defects in boards smaller than 600 sq in.
 - (b) One defect per additional 150 sq inches in larger boards.
 - (c) Select pieces for uniformity of grain and color on exposed faces and edges.
 - (d) No mineral grains accepted.
 - 2) Allowable Defects:
 - (a) Tight knots not exceeding 1/8 inch in diameter. No loose knots permitted.

- (b) Patches (dutchmen) not apparent after finishing when viewed beyond 18 inches.
 - (c) Checks or splits not exceeding 1/32 inch by 3 inches and not visible after finishing when viewed beyond 18 inches.
 - (d) Stains, pitch pockets, streaks, worm holes, and other defects not mentioned are not permitted.
 - (e) Normal grain variations, such as cats eye, bird's eye, burl, curl, and cross grain are not considered defects.
 - 3) Use maximum lengths possible, but not required to exceed 10 feet without joints. No joints shall occur closer than 72 inches in straight runs exceeding 18 feet. Runs between 18 feet and 10 feet may have no more than one joint. No joints shall occur within 72 inches of outside corners nor within 18 inches of inside corners.
 - 4) Moisture content shall be six (6) percent maximum at fabrication. No opening of joints due to shrinkage is acceptable.
- B. Fabrication:
- 1. Follow Architectural Woodwork Standards (AWS) for fabrication of Architectural Woodwork.
 - 2. Tolerances:
 - a. No planer marks (KCPI) allowed. Sand wood members and surfaces with 100 grit or finer.
 - b. Maximum Gap: None allowed.
 - c. Flushness Variation: 0.015 inch maximum.
 - d. Sanding Cross Scratches: 1/4 inch maximum.
 - e. Plug screw holes. Screw locations not to be visible beyond 18 inches.
 - 3. Fabricate work in accordance with measurements taken on job site.
 - 4. 'Ease' sharp corners and edges of exposed members to promote finishing and protect users from splinters. Radius of 'easing' shall be uniform throughout Project and between 1/32 and 1/16 of an inch.
 - 5. Fabricate so veneer grain is vertical.
 - 6. Joints:
 - a. Use lumber pieces with similar grain pattern when joining end to end.
 - b. Compatibility of grain and color from lumber to panel products is required.
 - 7. Install hardware in accordance with Manufacturer's directions. Leave operating hardware operating smoothly and quietly.
 - 8. Remove or repair damaged surface of or defects in exposed finished surfaces of architectural woodwork to match adjacent similar undamaged surface.

2.02 COMPONENTS

- A. Design Criteria:
- 1. General:
 - a. Except as noted otherwise, fabricate the work of this section according to AWS - 'Custom Grade' is the minimum acceptable standard.
 - 1) Cabinet door wood grain direction shall run vertically and all doors shall be set matched.
 - 2) Cabinet drawer front wood grain direction may run vertically or horizontally, with same direction maintained on all cabinet or elevation of cabinets.
 - b. Casework Construction Type:
 - 1) Type B: Face-frame construction where front edge of cabinet body components are overlaid with frame.
 - c. Door interface style:
 - 1) Type B Construction: Flush Overlay.
 - 2. Solid Stock:
 - a. Exposed: Plain sawn Red Oak.

- b. Semi-exposed And Concealed: Species as acceptable for AWS 'Custom Grade'.
- 3. Panel Product:
 - a. Glues (adhesives) used in manufacture and fabrication of panel products shall be Type I or II.
 - b. Moisture content shall be same as specified for lumber.
 - c. Cores:
 - 1) Cabinet Doors: Medium density fiberboard (MDF) with minimum density of 48 lbs per cu ft.
 - 2) All Other: Industrial grade particle board with minimum density of 45 lbs per cu ft.
 - d. Facings:
 - 1) Hardwood veneer facings shall be plain sliced Red Oak AWS Grade A, or equal by HPVA, WDMA, or APA.
 - 2) All other facings shall be Melamine or Kortron.
 - e. Edgings:
 - 1) Cabinet Doors And Drawer Fronts Higher Than 8 Inches (200 mm):
 - (a) 3/4 inch by 1/8 to 1/4 inch (19 mm by 3 to 6 mm) edge-banding of wood species matching hardwood face veneer.
 - 2) Shelves And Exposed Panel Product Edges:
 - (a) Hot-glued, 3 mm thick, PVC edge-banding. Wood-grain, except color matching Melamine or Kortron surface at shelf edges.
 - 3) Semi-Exposed Panel Product Edges:
 - (a) Hot-glued, 3 mm thick, wood grained PVC edge-banding.
- 4. Casework Doors:
 - a. Face Veneer:
 - 1) Design Criteria:
 - (a) Plain sliced Red Oak meeting requirements of AWS Grade A, 1/50 inch (0.5 mm) thick minimum immediately before finishing.
 - (b) Face veneers shall be running book matched.
 - b. Doors under 1-3/8 inch (35 mm) thick: Panel Product.
 - c. Doors 1-3/8 inch (35 mm) or more thick:
 - 1) Door Grade: AWS Custom hollow-core.
 - 2) Stiles:
 - (a) 1-1/4 inches (32 mm) deep minimum before fitting.
 - (b) 1/4 inch (6 mm) minimum of stile face to be hardwood matching face veneer material.
 - 3) Rails:
 - (a) 1-1/8 inches (28.5 mm).
 - (b) Mill option material.

2.03 CABINETS

- A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
- B. Components:
 - 1. Design Criteria:
 - a. General:
 - 1) Except as noted otherwise, fabricate the work of this section according to AWS 'Custom Grade'.
 - (a) Cabinet door wood grain direction shall run vertically and all doors shall be set matched.
 - 2) Casework Construction Type:
 - (a) Type B: Face-frame construction where front edge of cabinet body components are overlaid with frame.

- 3) Door interface style:
 - (a) Type B Construction: Flush Overlay.
- b. Solid Stock:
 - 1) Exposed: Plain sawn Red Oak.
 - 2) Semi-exposed And Concealed: Species as acceptable for AWS 'Custom Grade'.
- c. Panel Product:
 - 1) Glues (adhesives) used in manufacture and fabrication of panel products shall be Type I or II.
 - 2) Moisture content shall be same as specified for lumber.
 - 3) Cores:
 - (a) Cabinet Doors: Medium density fiberboard (MDF) with minimum density of 48 lbs per cu ft (769 kg per cu meter).
 - (b) All Other: Industrial grade particle board with minimum density of 45 lbs per cu ft (721 kg per cu meter).
 - 4) Facings:
 - (a) Hardwood veneer facings shall be plain sliced Red Oak AWS Grade A, or equal by HPVA, WDMA, or APA.
 - (b) All other facings shall be Melamine or Kortron.
 - 5) Edgings:
 - (a) Cabinet Doors And Drawer Fronts Higher Than 8 Inches (200 mm):
 - (1) 3/4 inch by 1/8 to 1/4 inch (19 mm by 3 to 6 mm) edge-banding of wood species matching hardwood face veneer.
2. Shelves And Exposed Panel Product Edges:
 - (1) Hot-glued, 3 mm thick, PVC edge-banding. Wood-grain, except color matching Melamine or Kortron surface at shelf edges.
 - (b) Semi-Exposed Panel Product Edges:
 - (1) Hot-glued, 3 mm thick, wood grained PVC edge-banding.
- b. Casework Doors:
 - 1) Face Veneer:
 - (a) Design Criteria:
 - (1) Plain sliced Red Oak meeting requirements of AWS Grade A, 1/50 inch (0.5 mm) thick minimum immediately before finishing.
 - (2) Face veneers shall be running book matched.
 - 2) Doors under 1-3/8 inch (35 mm) thick: Panel Product.
 - 3) Doors 1-3/8 inch (35 mm) or more thick:
 - (a) Door Grade: AWS Custom hollow-core.
 - (b) Stiles:
 - (1) 1-1/4 inches (32 mm) deep minimum before fitting.
 - (2) 1/4 inch (6 mm) minimum of stile face to be hardwood matching face veneer material.
 - (c) Rails:
 - (1) 1-1/8 inches (28.5 mm).
 - (2) Mill option material.
- C. Fabrication:
 1. Fabricators:
 - a. Approved Fabricators. See Section 06 4001 for Category Three Approved Fabricators.
 2. Cabinet Body:
 - a. Use AWS Flush Overlay construction on cabinet bodies.
 - b. If used, install Rail System adjustable shelf supports recessed.
 3. Drawers:
 - a. Fabricate with separate, screw-attached drawer front.
 - b. Joints shall be dowel and pressure-glued, or lock shoulder, glued, and pin nailed.

- c. Set bottoms into sides, backs, and subfront with 1/4 inch (6 mm) deep groove with 3/8 inch (9.5 mm) minimum standing shoulder.
 - d. Every drawer shall have specified drawer guides and pull installed. Install drawer guides with 'Euroscrews', and pulls with through-bolts passing through both front and sub-front.
 - 4. Cabinet Doors:
 - a. Full height, panel product cabinet doors may be fabricated in two pieces and joined on back with metal backplate. Backplate shall match interior door surface color.
 - b. Hinges: Install hinges using plastic insertion dowels for hinges and 'Euroscrews' for baseplates.
 - c. Every cabinet door shall have specified pull installed.
 - 5. Cabinet Component Thickness And Material:
 - a. Use hardwood veneer facing on panel product, except on following surfaces:
 - 1) Where Kortron or Melamine shall be used.
 - 2) Cabinet exposed interiors surfaces (not including cabinet doors) and shelving faces behind cabinet doors in all rooms.
 - 3) Cabinet semi-exposed surfaces.
 - 4) Cabinet concealed surfaces.
 - 5) Cabinet exposed exteriors permanently concealed (not exposed to view).
 - 6) Drawer sides, backs, bottoms, and subfronts.
 - b. Ends, Divisions, Bottoms, Tops: 3/4 inch (19 mm) thick panel product.
 - c. Rails: 3/4 inch (19 mm) thick panel product.
 - d. Shelves:
 - 1) Panel product.
 - 2) Thickness:
 - (a) 30 Inch (750 mm) Span And Less: 3/4 inch (19 mm) thick.
 - (b) Spans Over 30 Inches (750 mm) To 42 Inches (1 050 mm): One inch (25 mm) thick.
 - (c) Spans Over 42 inches (1 050 mm): One inch (25 mm) thick and provide Hafele or equal center supports.
 - e. Backs: 1/4 inch (6 mm) thick panel product.
 - f. Doors: 3/4 inch (19 mm) thick panel product.
 - g. Drawer Sides, Backs, And Subfronts: 1/2 inch (12.7 mm) thick minimum panel product.
 - h. Drawer Bottoms: 1/4 inch (6 mm) thick panel product.
 - i. Separate Drawer Front:
 - 1) 8 Inches (200 mm) High And Less: 3/4 inch (19 mm) thick solid hardwood.
 - 2) More Than 8 Inches (200 mm) High: 3/4 inch (19 mm) panel product.
 - j. Hardboard Dividers: 1/4 inch (6 mm) thick panel product.
 - k. Hardboard Shelves: 1/8 inch (3 mm) thick hardboard, smooth both sides.
 - 6. Cabinet and Drawer Locks:
 - a. Install only on cabinets and drawers as shown on Contract Documents.
 - 7. Install plastic grommets in cable access holes in countertops located as located on Contract Documents.
 - 8. Install Hardware Cloth as shown on Contract Drawings at Scripture Cabinet kick space used as return air grille.
- D. Finishes:
- 1. Factory Finishing:
 - a. Design Criteria:
 - 1) Applied before leaving factory.
 - 2) Factory-finish to match Owner selected sample as specified in Section 09 9324.
 - b. Color:
 - 1) OAK 95.

2) Cherry.

E. Plastic Laminate Faced Architectural Cabinets:

1. Manufacturers:

a. Manufacturer Contact List:

- 1) Accuride, Santa Fe Springs, CA www accuride.com.
- 2) Blum Inc, Stanley, NC www blum.com.
- 3) CompX National, Mauldin, SC www nclnet.com.
- 4) Formica, Cincinnati, OH www formica.com.
- 5) Grass America Inc, Kernerville, NC www grassusa.com.
- 6) Hafele America Co., Archdale, NC hafele.com.
- 7) Ives, Indianapolis, IN www iveshardware.com.
- 8) Knappe & Vogt, Grand Rapids, MI www knapeandvogt.com.
- 9) Nevamar, Odenton, MD www nevamar.com.
- 10) Olympus Lock Co, Seattle, WA www olympus-lock.com.
- 11) Salice America Inc, Charlotte, NC (800) 222-9652 or (704) 841-7810
www saliceamerica.com.
- 12) Stanley, New Britain, CT www stanleyhardware.com.

2. Components:

a. Design Criteria:

- 1) General:
 - (a) Except as noted otherwise, fabricate the work of this section to AWS 'Custom Grade'.

b. Panel Product:

- 1) Glues (adhesives) used in manufacture and fabrication of panel products shall be Type I or II.
- 2) Moisture content shall be same as specified for lumber.
- 3) Cores:
 - (a) Cabinet Doors: Medium density fiberboard (MDF) with minimum density of 48 lbs per cu ft (769 kg per cu meter).
 - (b) All Other: Industrial grade particle board with minimum density of 45 lbs per cu ft (721 kg per cu meter).
- 4) Edgings:
 - (a) Shelves and Exposed Panel Product Edges:
 - (b) Hot-glued, 2 mm thick minimum, PVC edge-banding.
 - (c) Wood-grained or solid color to match cabinet, except color matching Melamine or Kortron surface at shelf edges.
 - (d) Semi-Exposed Panel Product Edges:
 - (e) Hot-glued, 0.018 inch (0.46 mm) thick minimum, PVC edge-banding, wood grained or solid color to match cabinet.
 - (f) PVC with 5/32 inch (3.97 mm) slot.
 - (g) Color: Black.
 - (h) Size: 1-1/2 inches (38 mm).
 - (i) Type Two Acceptable Products:
 - (1) Model 4542 by Charter Industries.
 - (2) Equal as approved by Architect before installation. See Section 01 6000.

c. Cabinet Component Thickness and Material:

- 1) Use plastic laminate facing on panel product, except on following surfaces, where Kortron or Melamine shall be used.
 - (a) Cabinet interiors and shelving faces behind cabinet doors in all rooms.
 - (b) Cabinet interiors and shelving faces always open to view.
 - (c) Cabinet exteriors permanently concealed.
 - (d) Drawer sides, backs, bottoms, and subfronts.

2.04 LAMINATE MATERIALS

- A. Regulatory Agency Sustainability Approvals:
 - 1. Fire-Test-Response Characteristics: Provide plastic laminate with surface burning characteristics as determined by testing identical products by qualified testing agency.
 - a. Surface-Burning Characteristics:
 - 1) Plastic Laminate shall have Class A flame spread rating in accordance with ASTM E84 or UL 723 Type 1.
 - (a) Class A (Flame spread index 0-25; Smoke-developed index 0-450).
 - (b) Flash point: None.
- B. Manufacturers:
 - 1. Formica Corporation: www.formica.com/#sle.
 - 2. Panolam Industries International, Inc; _____: www.panolam.com/#sle.
 - 3. Wilsonart LLC: www.wilsonart.com/#sle.
 - 4. Pionite Decorative Surfaces, Auburn, ME www.pionite.com
 - 5. Equal as approved by Architect before bidding. See Section 01 6200.

2.05 COUNTERTOPS

- A. Design Criteria:
 - 1. Countertops:
 - a. Post-formed front edge and backsplash, except where detailed otherwise, with plastic laminate meeting requirements of ANSI/NEMA LD 3: PF 42.
 - 1) Vertical Applications: GP 28.
 - 2) Horizontal (other than countertops): GP 38.
 - b. No raised lip on front edge.
 - 2. Balancing Material: BK 20.
 - 3. AWS Quality Grade: Premium.
- B. Assemblies:
 - 1. Countertops shall meet requirements of KCMA A161.1.
 - 2. Adhesives for other than post-formed types shall be spray grade, high heat resistant, neoprene contact adhesive.
- C. Approved Colors. See Section 01 6200 for definition of Categories:
 - 1. Color Scheme: All Areas (Select color that best coordinates with porcelain floor and ceramic wall tile combination selected for project.)
 - a. Cherry / Blue: Nevamar MR7001 or Nevamar MR7002.
 - b. Cherry / Green: Wilsonart 4783-60 or Wilsonart 4170-60.
 - c. Cherry / Red: Pionite SG208 or Pionite AT650.
 - d. OAK 95 / Blue: Nevamar MR7001 or Nevamar MR7002.
 - e. OAK 95 / Green: Wilsonart 4783-60 or Wilsonart 4170-60.
 - f. OAK 95 / Red: Pionite SG208 or Pionite AT650

2.06 ACCESSORIES

- A. Manufacturer Contact List for Accessories:
 - 1. Accuride, Santa Fe Springs, CA www accuride.com.
 - 2. Anybumper, Amite, LA www Anybumper.com.
 - 3. Blum Inc, Stanley, NC www blum.com.
 - 4. CompX National, Mauldin, SC www nclnet.com.
 - 5. Flynn & Enslow, San Francisco, CA www flynnenslow.com.
 - 6. Glynn Johnson, Chicago, IL www glynn-johnson.com.
 - 7. Grass America Inc, Kernerville, NC www grassusa.com.
 - 8. Hafele America Co., Archdale, NC hafele.com.
 - 9. Hillside Wire Cloth Co., Inc., Bloomfield, NJ www hillsidewirecloth.com.
 - 10. Ives, Indianapolis, IN www iveshardware.com.

11. Knappe & Vogt, Grand Rapids, MI www.knappeandvogt.com or Knappe & Vogt Canada, Mississauga, ON (905) 676-8972.
 12. Salice America Inc, Charlotte, NC www.saliceamerica.com.
 13. Stanley, New Britain, CT www.stanleyhardware.com.
 14. TWP Inc., Berkley, CA www.twpinc.com.
 15. Wire Cloth Manufacturers, Inc., Mine Hill, NJ www.wireclothman.com.
- B. Support Post:
1. Acceptable Product:
 - a. Model TL28R-390 by Doug Mockett & Company, Inc. Torrance, CA www.mockett.com.
 - b. Description:
 - 1) Round support post for removable countertop as shown in Contract Documents.
 - c. Design Criteria:
 - 1) Size: 28-1/2 inch (724 mm) table leg, 3 inch (76 mm) diameter.
 - 2) Recessed glide leveler.
 - 3) Cold rolled steel.
 - 4) Polished and painted.
 - 5) Color: Polished chrome.
 - d. Equal as approved by Architect before installation. See Section 01 6000.
- C. Pass-Through Window Track Assembly:
1. Aluminum track with nylon or ball bearing steel rollers. Bottom track is not to extend above surface of counter when installed.
 2. Acceptable Products:
 - a. Standard Installation Ezy-Roll Aluminum Track Number P1092 ANOD by Knappe and Vogt, which includes:
 - 1) 1085 vinyl glides: Four (4) each.
 - 2) 1093 upper channel: One (1) each.
 - 3) 1095 shoe: Two (2) each.
 - 4) 1097 rollers: Four (4) each.
 - 5) 1099 lower track: One (1) each.
 - b. Equal as approved by Architect before bidding. See Section 01 6000.
- D. Sliding Window Lock:
1. Provide with 4 keys.
 2. Quality Standard: Number 965 NP Ratchet Lock by Knappe & Vogt.

2.07 HARDWARE

- A. Cabinet Hardware:
1. Cabinet And Drawer Pulls:
 - a. Satin Chromium Plated brass / bronze core bow handles, 4 inches (100 mm) long minimum.
 - b. Acceptable Products:
 - 1) 4484 by Stanley.
 2. Cabinet And Drawer Locks:
 - a. General:
 - 1) Pin tumbler type suitable for location.
 - 2) Keying: Key each cabinet and drawer individually as shown on Contract Documents except as follows:
 - (a) Key each cabinet and drawer within each Office alike.
 - (b) Crosskey knife drawer in Serving Area so all other cabinet and drawer keys will open drawer.
 - 3) Stamp keys with Room number and cabinet designation as shown on Signage Plan of Contract Drawings.
 - 4) Provide six (6) keys per cabinet.

- b. Design Criteria:
 - 1) Barrel diameter: 7/8 inch (22 mm).
 - 2) Cylinder length: 7/8 inch (22 mm).
 - 3) Key removable in locked or unlocked position.
 - 4) Meet ANSI/BHMA A156.11 Grade 2 requirements.
 - c. Acceptable Manufacturers:
 - 1) Advantage Plus cam lock by CompX National Lock.
 - 2) 100DR/200DW N Series door and drawer lock by Olympus Lock Inc.
 - 3) Equal as approved by Architect before installation. See Section 01 6200.
 - 3. Cabinet Adjustable Shelf Supports:
 - a. Either of following systems are acceptable, at Fabricator's option:
 - 1) 32mm System: Casework Fabricator's standard.
 - 2) Traditional System:
 - (a) Quality Standards: 255 and 256 by Knappe & Vogt.
- B. Cabinet Door Bumpers:
 - 1. Description:
 - a. Polyurethane bumper to protect gypsum board from cabinet handle damage where cabinet handles hit gypsum wallboard surface.
 - 2. Design Criteria:
 - a. Clear.
 - b. Peel adhesion.
 - c. Size: 3/8 inch (9.5 mm diameter x 1/8 inch (3 mm) thick.
 - 3. Acceptable Products:
 - a. WS-34 Cylindrical Soft Durometer Cabinet Bumper by Anybumper.
- C. Scripture Cabinet Hardware Cloth (at kick space used as return air grille):
 - 1. Hardware (Wire) Cloth:
 - a. Design Criteria:
 - 1) Plain Weave Wire Cloth.
 - 2) Metal Type: Galvanized after welded.
 - 3) 1/2 inch (12.7 mm) x 1/2 inch (12.7 mm) Mesh.
 - 4) Wire Gauge: 16.
 - b. Quality Standard Manufacturers:
 - 1) Flynn & Enslow.
 - 2) Hillside Wire Cloth.
 - 3) TWP.
 - 4) Wire Cloth Manufacturers.
- D. Material Center Gate Hardware:
 - 1. Acceptable Products:
 - a. Hinges: Two (2) required.
 - 1) BB 1279 by Hager Companies.
 - 2) TB 2714 by McKinney.
 - 3) FBB 179 by Stanley.
 - b. Gate Latch: One (1) required:
 - 1) Secret Gate Latch 989 by Knappe & Vogt.
 - c. Silencers: Two (2) required:
 - 1) GJ 65 by Glynn Johnson.
 - 2) 308D by Hager Companies.
 - 3) 21 by Ives.
 - 4) 1229 B by Trimco.

PART 3 EXECUTION

3.01 EXAMINATION

Helena Distribution Store – Project # 89018312501	06 4100 - 11	Architectural Wood Casework
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- A. Verify adequacy of backing and support framing.
- B. Verify location and sizes of utility rough-in associated with work of this section.
- C. Inspections:
- D. Clear Finished Hardwood:
- E. Color matches Owner provided sample specified in Section 09 9324.

3.02 INSTALLATION

- A. Install work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade indicated.
- B. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.
- C. Use fixture attachments in concealed locations for wall mounted components.
- D. Use concealed joint fasteners to align and secure adjoining cabinet units.
- E. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.
- F. Secure cabinets to floor using appropriate angles and anchorages.
- G. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.
- H. Site glaze glass materials using Interior Dry method; see Section 08 8000.

3.03 ADJUSTING

- A. Adjust installed work.
- B. Adjust moving or operating parts to function smoothly and correctly.

3.04 CLEANING

- A. Clean casework, counters, shelves, hardware, fittings, and fixtures.

END OF SECTION 06 4100

**SECTION 07 2100
THERMAL INSULATION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Board insulation.
- B. Batt insulation.
- C. Batt insulation for filling perimeter window and door shim spaces and crevices in exterior wall and roof.

1.02 RELATED REQUIREMENTS

- A. Section 07 2600 - Vapor Retarders: Separate vapor retarder materials.
- B. Section 07 2700 - Air Barriers: Separate air barrier materials.

1.03 REFERENCE STANDARDS

- A. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation 2022.
- B. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing 2017.
- C. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board 2022a.
- D. ASTM C764 - Standard Specification for Mineral Fiber Loose-Fill Thermal Insulation 2019.
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.
- F. ASTM E136 - Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750 °C 2022.

1.04 SUBMITTALS

- A. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
- B. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.

1.05 QUALITY ASSURANCE

- A. Pre-Installation Conferences:
 - 1. Participate in pre-installation conference as specified in Section 01 3100:
 - a. Schedule pre-installation conference prior to commencement of installing insulation with Installer and Manufacturer's Representative if available.
 - b. In addition to agenda items specified in Section 01 3100, review following:
 - 1) Review installation procedures.
 - 2) Review coordination of work with related and adjacent work.
 - 3) Review special details and flashing.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Thermal Insulation Manufacturers:
 - 1. Certaineed Corp, Valley Forge, PA www.certaineed.com.
 - 2. FiberTEK, Salt Lake City, UT www.fibertekinsulation.com.
 - 3. Guardian Fiberglass, Greer, SC www.guardianbp.com.
 - 4. Johns Manville, Denver, CO www.jm.com.
 - 5. Knauf Fiber Glass, Shelbyville, IN www.knaufusa.com.
 - 6. Owens-Corning Fiberglass Corporation, Toledo, OH www.owens-corning.com.
 - 7. Thermafiber, Wabash, IL www.thermafiber.com.

2.02 FOAM BOARD INSULATION MATERIALS

- A. Type 2 Insulation:
 - 1. Extruded Polystyrene (XPS) Board Insulation: Comply with ASTM C578 with either natural skin or cut cell surfaces.
 - a. Type and Compressive Resistance: Type X, 15 psi (104 kPa), minimum.
 - b. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
 - c. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
- B. Type 1 & Type 3 Insulation:
 - 1. Polyisocyanurate (ISO) Board Insulation: Rigid cellular foam, comply with ASTM C1289.
 - a. Classifications:
 - 1) Type I: Faced with aluminum foil on both major surfaces of the core foam.
 - (a) Class 2 - Glass fiber reinforced or non-reinforced core foam.
 - b. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
 - c. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
 - d. Board Edges: Square.
 - e. Products:
 - 1) (Type 3 Insulation) Dow Chemical Company; THERMAX
(ci): www.dowbuildingsolutions.com/#sle.
 - (a) Provide Weathermate flashing tape at all joints by Dow Chemical.
 - 2) (Type 3 Insulation) Dow Chemical Company THERMAX Heavy Duty:
www.dowbuildingsolutions.com/#sle.

2.03 MINERAL FIBER BLANKET INSULATION MATERIALS

- A. Order insulation by 'R' value rather than 'U' value, rating, or thickness, either 16 or 24 inches wide according to framing spacing.
- B. Flexible Glass Fiber Blanket Thermal Insulation: Preformed insulation, complying with ASTM C665; friction fit.
 - 1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
 - 2. Smoke Developed Index: 50 or less, when tested in accordance with ASTM E84.
 - 3. Combustibility: Non-combustible, when tested in accordance with ASTM E136, except for facing, if any.
 - 4. Thermal Resistance: R-value in accordance with the following:
 - a. Acoustically Insulated Ceilings:
 - 1) Enclosed Spaces: Fill framed cavity with batt of appropriate thickness.
 - 2) Unenclosed Spaces: R-19.
 - 3) Unenclosed Spaces above Offices and Restrooms: R-30.
 - b. Thermally Insulated Ceilings / Roof:
 - 1) R-38C Cathedral / High Density: At 2x12 (50x300 mm) Overbuild Framing.
 - 2) R-38 Standard: All Other. (R-49 in Climate Zones 6, 7, and 8).
 - c. Wood Wall Stud Framing:
 - 1) (R-11) 3-1/2 inches deep
 - 2) (R-19) 5-1/2 inches deep
 - 3) (R-25) 7-1/4 inches deep
 - 4) (R-30) 9-1/4 inches deep
 - 5) (R-38) 11-1/4 inches deep
 - d. Metal Wall Stud Framing:
 - 1) (R-11) 3-1/2 inches deep
 - 2) (R-13) 3-5/8 inches deep
 - 3) (R-15) 4 inches deep

- 4) (R-19) 5-1/2 inches deep
- 5) (R-22) 6 inches deep
- 6) (R-25) 7-1/4 inches deep
- 7) (R-25) 8 inches deep
- 8) (R-30) 9-1/4 inches deep
- 9) (R-30) 10 inches deep
- 10) (R-38) 11-1/2 inches deep
- 11) (R-38) 12 inches deep
- e. Structural Composite Lumber (SCL) Wall Framing:
 - 1) (R-11) 3-1/2 inches deep
 - 2) (R-19) 5-1/2 inches deep
 - 3) (R-25) 7-1/4 inches deep
 - 4) (R-30) 9-1/2 inches deep
 - 5) (R-38) 11-7/8 inches deep
- f. Framed Speaker Enclosures: R-11.
- 5. Kraft faced meeting requirements of ASTM C665, Type II, Class C.
- 6. Foil faced meeting requirements of ASTM C665, Type III.
 - a. Class A: Exposed insulation.
 - b. Class B: Enclosed insulation.
- 7. Unfaced Insulation: Meet requirements of ASTM C665, Type I.
- 8. Support at trussed rafters:
 - a. Provide support at trussed rafters where insulation is not enclosed by structure or drywall.
 - b. Provide stings/wires which run perpendicular to framing and attach at each trussed rafter and to framing at 32 inches O.C. minimum and where batt ends adjoin each other.
 - c. Class Two Quality Standard: Simpson Strong Tie IS Insulation Supports with 14 gauge carbon steel, spring wire and mitered tips for 16 inch O.C. and 24 inch O.C. spacing.

2.04 BLOWN INSULATION

- A. Blown Insulation: Fiber glass. Comply with requirements of ASTM C764, Type I or II, non-combustible when tested in accordance with ASTM E136.
- B. 'R' Factor Required:
 - 1. Order insulation by 'R' factor rather than 'U' factor, rating, or thickness.
 - a. Unenclosed Spaces: R38 minimum.

2.05 ACCESSORIES

- A. Sheet Vapor Retarder: See Section 07 2600.
- B. Attic Baffles:
 - 1. Design Criteria:
 - a. Baffle can be used with spray foam, loose-fill, fiberglass, or other insulation materials.
 - 2. Acceptable Manufacturers:
 - a. SB24 SmartBaffle by DCI Products, Inc., Clifton Heights, PA www.dciproducts.com.
 - b. Equal as approved by Architect before bidding. See Section 01 6000.
- C. Spindle-Type Anchors:
 - 1. Description:
 - a. Spindle welded to plate and including self-locking washer.
 - b. Perforated, galvanized carbon-steel plate 0.030 inch (0.762 mm) thick by 2 inches (50 mm) square plate with copper-coated, low carbon steel, fully annealed, 0.105 inch (2.67 mm) diameter spindle, length to suit depth of insulation.
 - 2. Acceptable Products:

- a. Series T TACTOO Insul-hangers, RC150 or SC150 washers, and TACTOO Adhesive by AGM Industries, Brockton, MA www.agmind.com.
- b. Stic-Klip Type N Fasteners and Stic-Klip Type S Adhesive by Eckel Industries of Canada Ltd, Morrisburg, ON www.eckel.ca.
- c. Spindle Anchor, Dome-cap, R-150, or S-150 washer, Clutch-clip, and Tuff Bond Hanger Adhesive by GEMCO, Danville, IL www.gemcoinsulation.com.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.
- B. Verification Of Conditions:
 - 1. Inspection:
 - a. Examine substrate and verify framing is suitable for installation of insulation:
 - b. Verify that mechanical and electrical services have been installed and tested.
 - c. Notify Architect of unsuitable conditions in writing.
 - d. Do not install insulation over unsuitable conditions:
 - 1) Commencement of Work by installer is considered acceptance of substrate.

3.02 BOARD INSTALLATION AT FOUNDATION PERIMETER

- A. Remove ties and concrete protrusions that would keep insulation from fully contacting foundation wall face.
- B. Install against interior side of perimeter foundation walls extending downward from top of slab 48 inches or to top of footing, whichever is less. Install using 3/8 inch beads of adhesive at 12 inches on center vertically and at each vertical and horizontal joint to completely seal insulation.
- C. Install horizontally for 48 inches under building slab continuously around building perimeter and between slab and foundation wall for full depth of slab.

3.03 BOARD INSTALLATION AT EXTERIOR WALLS

- A. Type 3 Insulation:
 - 1. Attachment to CMU wall.
 - a. Attach insulation board to interior face of CMU wall as per manufacturer's installation instructions to provide continuous insulation over entire surface at locations shown on Construction Documents on Z furring with mechanical fasteners and closure strips.
 - 2. Following Manufacturer Installation Instructions including the following:
 - a. Butt adjoining boards tightly together with all seams vertical.
 - b. Tape seams with Manufacturer's white foil tape to cover joints and seams between boards of insulation. Match tape color to board color.
 - c. Notch around wall members and other obstructions as closely as possible and seal with sealant.
- B. Rigid thermal insulation board is not a structural panel and may not be used as nailing base for other building products.

3.04 BATT INSTALLATION

- A. Install insulation and vapor retarder in accordance with manufacturer's instructions.
- B. If two layers of insulation are used to attain required 'R' value, only layer towards interior of building shall have facing.
- C. Provide minimum clearance around recessed lighting fixtures as approved by local code.
- D. Install in exterior wall and roof spaces without gaps or voids. Do not compress insulation.
- E. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
- F. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.

- G. Install with factory-applied vapor retarder membrane facing warm side of building spaces. Lap ends and side flanges of membrane over framing members.
- H. Staple or nail facing flanges in place at maximum 6 inches on center.
- I. Retain insulation batts in place with spindle fasteners at 12 inches on center.
- J. Tape seal butt ends, lapped flanges, and tears or cuts in membrane.
- K. At wood framing, place vapor retarder on warm side of insulation by stapling at 6 inches on center. Lap and seal sheet retarder joints over face of member.
- L. At metal framing, place vapor retarder on warm side of insulation; lap and seal sheet retarder joints over face of member
- M. Tape seal tears or cuts in vapor retarder.
- N. Extend vapor retarder tightly to full perimeter of adjacent window and door frames and other items interrupting the plane of the membrane; tape seal in place.
- O. Coordinate work of this section with requirements for vapor retarder, see Section 07 2600.
- P. Coordinate work of this section with construction of air barrier seal, see Section 07 2700.
- Q. Where insulation is not enclosed by structure or drywall, support in place with wire or other suitable material as approved by Architect before bid.
- R. Attic Baffles:
 - 1. Install in accordance with manufacturer's instructions.
 - 2. Install baffles between trusses or rafters and underside of roof sheathing as shown on Contract Drawings.
 - 3. Install baffles between trusses and rafters at ventilation spaces to prevent insulation from blocking airflow from soffit.
 - 4. Install baffles to prevent insulation from blocking ventilation airflow from soffit.
- S. Surface-Applied, Exposed on Masonry Walls:
 - 1. Install adhesively applied spindle-type anchors at 12 inches (305 mm) each way.
 - 2. After adhesive has dried, install insulation using foil-faced insulation only. Do not compress insulation below specified thickness and secure with specified washers.
 - 3. Apply capped washers to tips of spindles.

3.05 BLOWN INSULATION INSTALLATION

- A. General:
 - 1. Install in accordance with manufacturer's instructions.
 - 2. Install in insulation in sufficient depth to provide thermal value specified after settlement of insulation.
 - 3. Do not blow insulation into electrical devices and vents.
 - 4. Provide minimum clearance around recessed lighting fixtures as approved by local code.

3.06 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements for additional requirements.
- B. Field Tests And Inspections:
 - 1. Upon completion of installation, visually inspect each insulated area and verify that all insulation is complete and properly installed.
- C. Non-Conforming Work: Non-conforming work as covered in the General Conditions applies, but is not limited to the following:
 - 1. Correct any work found not complying with contract document requirements at no additional cost to the Owner.

3.07 PROTECTION

- A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION

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SECTION 07 9200 JOINT SEALANTS

PART 1 GENERAL

1.01 SUMMARY

- A. Includes But Not Limited To:
 - 1. Furnish and install sealants not specified to be furnished and installed under other Sections.
 - 2. Quality of sealants to be used on Project not specified elsewhere, including submittal, material, and installation requirements.
- B. Related Requirements:
 - 1. Removing existing sealants specified in Sections where work required.
 - 2. Furnishing and installing of sealants is specified in Sections specifying work to receive new sealants.
 - 3. Section 07 2400: Sealants for EIF Systems.
- C. Products Furnished But not Installed Under This Section:
 - 1. Interior Ceramic Tile Joint Sealants:
- D. Related Requirements:
 - 1. Section 09 3000: 'Tiling'.

1.02 REFERENCES

- A. Reference Standards:
 - 1. ASTM International:
 - a. ASTM C920-14a, 'Standard Specification for Elastomeric Joint Sealants'.
 - b. ASTM C1193-16, 'Standard Guide for Use of Joint Sealants'.
 - c. ASTM C1330-02(2013), 'Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants'.
 - d. ASTM C1481-12(2017) 'Standard Guide for Use of Joint Sealants with Exterior Insulation & Finish Systems (EIFS)'.
 - e. ASTM D5893/D5893M-16, 'Standard Specification for Cold Applied, Single Component, Chemically Curing Silicone Joint Sealant for Portland Cement Concrete Pavements'.

1.03 REFERENCE STANDARDS

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency current edition.
- B. ASTM C1193 - Standard Guide for Use of Joint Sealants 2016.
- C. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants 2018.
- D. ASTM C1481 - Standard Guide for Use of Joint Sealants with Exterior Insulation and Finish Systems (EIFS) 2012.
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.
- F. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements 2009 (Reapproved 2016).
- G. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials Current Edition, Including All Revisions.
- H. ASTM C834 - Standard Specification for Latex Sealants 2017.
- I. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications 2022.
- J. ASTM C920 - Standard Specification for Elastomeric Joint Sealants 2018.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Scheduling:
 - 1. Schedule work so waterproofing, water repellents and preservative finishes are installed after sealants, unless sealant manufacturer approves otherwise in writing.
 - 2. Ensure sealants are cured before covering with other materials.

1.05 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data:
 - a. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
 - b. Manufacturer's literature for each Product.
 - c. Schedule showing joints requiring sealants. Show also backing and primer to be used.
- B. Informational Submittals:
 - 1. Certificates:
 - a. Manufacturer's Certificate:
 - 1) Certify products are suitable for intended use and products meet or exceed specified requirements.
 - 2) Certificate from Manufacturer indicating date of manufacture.
 - 2. Manufacturers' Instructions:
 - a. Manufacturer's installation recommendations for each Product.
 - b. Manufacturer's installation for completing sealant intersections when different materials are joined.
 - c. Manufacturer's installation for removing existing sealants and preparing joints for new sealant.

1.06 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturer: Company specializing in manufacturing products specified in this section with minimum ten (10) years documented experience.
 - 2. Applicator Qualifications:
 - a. Company specializing in performing work of this section.
 - b. Provide if requested, reference of projects with minimum three (3) years documented experience, minimum three (3) successfully completed projects of similar scope and complexity, and approved by manufacturer.
 - c. Designate one (1) individual as project foreman who shall be on site at all times during installation.
- B. Preconstruction Testing:
 - 1. Pre-construction testing is not required when sealant manufacturer can furnish data acceptable to Architect based on previous testing for materials matching those of the Work.
- C. Mockups:
 - 1. Provide mockups including sealant and joint accessories to illustrate installation quality and color if requested by Architect or Project Manager.
 - a. Incorporate accepted mockup as part of Work.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Delivery and Acceptance Requirements:
 - 1. Deliver and keep in original containers until ready for use.
 - 2. Inspect for damage or deteriorated materials.
- B. Storage and Handling Requirements:

1. Handle, store, and apply materials in compliance with applicable regulations and material safety data sheets (MSDS).
2. Handle to prevent inclusion of foreign matter, damage by water, or breakage.
3. Store in a cool dry location, but never under 40 deg F (4 deg C) or subjected to sustained temperatures exceeding 80 deg F (27 deg C) or as per Manufacturer's written recommendations.
4. Do not use sealants that have exceeded shelf life of product.

1.08 FIELD CONDITIONS

- A. Ambient Conditions:
 1. Do not install sealant during inclement weather or when such conditions are expected. Allow wet surfaces to dry.
 2. Follow Manufacturer's temperature recommendations for installing sealants.
 3. Ambient Conditions:
 - a. Do not apply caulking at temperatures below 40 deg F (4 deg C).

1.09 WARRANTY

- A. Manufacturer Warranty:
 1. Signed warranties against adhesive and cohesive failure of sealant and against infiltration of water and air through sealed joint for period of three (3) years from date of Substantial Completion.
 - a. Manufacturer's standard warranty covering sealant materials.
 - b. Applicator's standard warranty covering workmanship.

PART 2 PRODUCTS

2.01 SYSTEMS

- A. Manufacturers:
 1. Manufacturer Contact List:
 - a. Dow Corning Corp., Midland, MI www.dowcorning.com.
 - b. Franklin International, Inc. Columbus, OH www.titebond.com.
 - c. GE Sealants & Adhesives (see Momentive Performance Materials Inc.).
 - d. Laticrete International Inc., Bethany, CT www.laticrete.com.
 - e. Momentive Performance Materials Inc. (formally GE Sealants & Adhesives), Huntersville, NC www.ge.com/silicones.
 - f. Sherwin-Williams, Cleveland, OH www.sherwin-williams.com.
 - g. Sika Corporation, Lyndhurst, NJ www.sikaconstruction.com or Sika Canada Inc, Pointe Claire, QC www.sika.ca.
 - h. Tremco, Beachwood, OH www.tremcosealants.com or Tremco Ltd, Toronto, ON (800) 363-3213.
- B. Materials:
 1. Design Criteria:
 - a. Compliance: Meet or exceed requirements of these standards:
 - 1) ASTM C920: Elastomeric joint sealant performance standard.
 - 2) ASTM D5893/D5893M: Silicone Joint Sealant for Concrete Pavements.
 - b. Comply with Manufacturer's ambient condition requirements.
 - c. Sealants must meet Manufacturer's shelf-life requirements.
 - d. Sealants must adhere to and be compatible with specified substrates.
 - e. Sealants shall be stable when exposed to UV, joint movements, and environment prevailing at project location.
 - f. Primers (Concrete, stone, masonry, and other nonporous surfaces typically do not require a primer. Aluminum and other nonporous surfaces except glass require use of a primer. Installer Option to use Adhesion Test to determine if primer is required or use primer called out in related sections):
 - 1) Adhesion Test:

- (a) Apply silicone sealant to small area and perform adhesion test to determine if primer is required to achieve adequate adhesion. If necessary, apply primer at rate and in accordance with Manufacturer's instructions. See 'Field Quality Control' in Part 3 of this specification for Adhesive Test.
 - 2) If Primer required, shall not stain and shall be compatible with substrates.
 - 3) Allow primer to dry before applying sealant.
 - 2. Sealants At Exterior Building Elements:
 - a. Description:
 - 1) Weathersealing expansion, contraction, perimeter, and other movement joints which may include all or part of the following for project:
 - (a) Aluminum entrance perimeters and thresholds.
 - (b) Columns.
 - (c) Connections.
 - (d) Curtainwalls.
 - (e) Door frames.
 - (f) EIFS to metal joints.
 - (g) Joints and cracks around windows.
 - (h) Louvers.
 - (i) Masonry.
 - (j) Parapet caps.
 - (k) Wall penetrations.
 - (l) Other joints necessary to seal off building from outside air and moisture.
 - b. Design Criteria:
 - 1) Meet following standards for Sealant:
 - (a) ASTM C920: Type S, Grade NS, Class 50 Use NT, M, G, A.
 - 2) Limitations:
 - (a) Do not use below-grade applications.
 - (b) Do not use on surfaces that are continuously immersed or in contact with water.
 - (c) Do not use on wet, damp, frozen or contaminated surfaces.
 - (d) Do not use on building materials that bleed oils, plasticizers or solvents, green or partially vulcanized rubber gaskets or tapes.
 - 3) Color:
 - (a) Architect to select from Manufacturer's standard colors.
 - (b) Match building elements instead of window (do not use white that shows dirt easily).
 - c. Approved Products. See Section 01 6000:
 - 1) Dow Corning:
 - (a) Primer: 1200 Prime Coat.
 - (b) Sealant: 791 Silicone Weatherproofing Sealant.
 - 2) Momentive Performance Materials (formerly, GE Sealants & Adhesives):
 - (a) Primer: SS4044 Primer.
 - (b) Sealant: GE SCS2000 SilPruf Silicone Sealant & Adhesive.
 - 3) Tremco:
 - (a) Primer:
 - (1) Metal surface: No. 20 primer.
 - (2) Porous surfaces: No. 23 primer.
 - (b) Sealant: Spectrum 1 Silicone Sealant.
 - 3. Sealants At EIFS:
 - a. Description:
 - 1) Weatherproofing sealant for long term resistance to natural weathering, including: ultraviolet radiation, high and low temperatures and rain and snow,

with negligible change in elasticity. May be used for application to horizontal or vertical surfaces.

- b. Design Criteria:
 - 1) Meet following standards for Sealant:
 - (a) Used to seal EIFS to EIFS, not EIFS to other material.
 - (b) ASTM C920: Type S, Grade NS, Class 100/50 Use NT, A, G, O.
 - (c) ASTM C1481 guidelines for use of sealant with EIFS.
 - 2) Limitations:
 - (a) Do not use in structural glazing applications.
 - (b) Do not use on surfaces that are underwater or in continuous contact with water.
 - (c) Do not use on porous substrates.
 - (d) Do not use on wet, damp, frozen or contaminated surfaces.
 - (e) Do not use on surfaces where staining or discoloration may be concern, without prior testing.
 - (f) Do not use on excessively basic or acidic substrates.
 - 3) Color:
 - (a) Architect to select from Manufacturer's standard colors.
 - (b) Match building elements (do not use white that shows dirt easily).
 - c. Approved Products. See Section 01 6000:
 - 1) Dow Corning:
 - (a) Primer: 1200 Prime Coat.
 - (b) Sealant: 790 Silicone Building Sealant.
 - 2) Momentive Performance Materials (formerly, GE Sealants & Adhesives):
 - (a) Primer: SCP3195P Primer.
 - (b) Sealant: GE SCS2700 SilPruf LM Silicone Weatherproofing Sealant.
 - 3) Sika:
 - (a) Primer: Sikaflex Primer 429.
 - (b) Sealant: Sikaflex 2C NS Non-Sag Silicone Sealant.
 - 4) Tremco:
 - (a) Primer: Porous surfaces: No. 23 primer.
 - (b) Sealant: Spectrum 1 Silicone Sealant.
4. Sealants At Exterior Sheet Metal And Miscellaneous:
- a. Description:
 - 1) Weathersealing expansion, contraction, perimeter, and other movement joints which may include all or part of the following for project:
 - (a) Flashings.
 - (b) Gutters.
 - (c) Penetrations in soffits and fascias.
 - (d) Roof vents and flues.
 - (e) Lightning protection components.
 - b. Design Criteria:
 - 1) Meet following standards for Sealant:
 - (a) ASTM C920: Type S Grade NS, Class 25 (min) Use NT, M, G, A and O.
 - 2) Limitations:
 - (a) Do not use below-grade applications.
 - (b) Do not use on surfaces that are continuously immersed or in contact with water.
 - (c) Do not use on wet, damp, frozen or contaminated surfaces.
 - (d) Do not use on building materials that bleed oils, plasticizers or solvents, green or partially vulcanized rubber gaskets or tapes.
 - c. Approved Products. See Section 01 6000:
 - 1) Dow Corning: 790 Silicone Building Sealant.

- 2) Momentive Performance Materials (formerly, GE Sealants & Adhesives): GE SCS2350 Silicone Elastomeric Sealant.
- 3) Tremco: Tremsil 600 Silicone Sealant.
5. Sealants At Expansion Joints in Exterior Concrete (Aprons, Entryway Slabs, Mowstrips, Retaining Walls, Sidewalks):
 - a. Expansion Joints:
 - 1) Design Criteria:
 - (a) Meet following standards for Sealant:
 - (1) ASTM C920: Type S, Grade NS, Class 100/50 Use T, NT, M, G, A, and O.
 - 2) Sealant required at expansion for following areas:
 - (a) Between entryway slabs and building foundations.
 - (b) Between sidewalks and building foundations.
 - (c) Miscellaneous vertical applications.
 - 3) Sealant NOT required at expansion joints for following areas:
 - (a) Within aprons and where aprons abut building foundations and sidewalks.
 - (b) Within mowstrips and where mowstrips abut building foundations and sidewalks.
 - (c) Within sidewalks.
 - 4) Approved Products. See Section 01 6000:
 - (a) Dow Corning:
 - (1) Primer: 1200 Prime Coat.
 - (2) Sealant: 790 Silicone Building Sealant.
 - (b) Sika:
 - (1) Primer: Sikasil Primer-2100.
 - (2) Sealant: Sikasil-728 NS Non-Sag Silicone Sealant.
 - b. Penetrations thru Concrete Walls:
 - 1) Design Criteria:
 - (a) Meet following standards for Sealant:
 - (1) ASTM C920: Type S, Grade NS, Class 100/50 Use T, NT, M, G, A, and O.
 - 2) Approved Products. See Section 01 6000:
 - (a) Dow Corning:
 - (1) Primer: 1200 Prime Coat.
 - (2) Sealant: 790 Silicone Building Sealant.
 - (b) Sika:
 - (1) Primer: Sikasil Primer-2100.
 - (2) Sealant: Sikasil-728 NS Non-Sag Silicone Sealant.
6. Sealants At Control Joints in Exterior Concrete (Aprons, Entryway Slabs, Mowstrips, Retaining Walls, Sidewalks):
 - a. Control Joints:
 - 1) Design Criteria:
 - (a) Meet following standards for Sealant:
 - (1) ASTM C920, Type S, Grade P, Class 100/50; Use T, M, G, A, O.
 - 2) Sealant required at control joints in following areas:
 - (a) Retaining walls.
 - (b) Miscellaneous vertical applications.
 - 3) Sealant is NOT required at control joints, unless needed to protect moisture sensitive soils or by Contract Drawings, in following areas:
 - (a) Within aprons.
 - (b) Within mowstrips.
 - (c) Within sidewalks.
 - (d) Within entryway slabs.

- 4) Approved Products. See Section 01 6000:
 - (a) Dow Corning:
 - (1) Primer: 1200 Prime Coat.
 - (2) Sealant: 890-SL Silicone Building Sealant.
 - (b) Sika:
 - (1) Primer: Primer: Sikasil Primer-2100.
 - (2) Sealant: Sikasil-728 SL Self-leveling Silicone Sealant.
7. Sealants At Exterior Concrete Waterways - Flat Drainage Structures (Waterways:
 - a. Expansion Joints and Control Joints:
 - 1) Description:
 - (a) One component (part) self-leveling silicon material that cures to ultra-low modulus silicone rubber upon exposure to atmospheric moisture.
 - (b) Cured silicone rubber remains flexible over entire temperature range expected in pavement applications.
 - 2) Design Criteria:
 - (a) Sealant is required at following areas:
 - (1) Within flat drainage structures and at joints between flat drainage structures and other concrete elements.
 - (b) Meet following standards for Sealant: Self-leveling: ASTM D-5893; ASTM C920, Type S, Grade P, Class 100/50; Use T, M, G, A, O.
 - 3) Approved Products. See Section 01 6200:
 - (a) Dow Corning:
 - (1) Primer: 1200 Prime Coat.
 - (2) Sealant: 890-SL Silicone Building Sealant.
 - (b) Sika:
 - (1) Primer: Primer: Sikasil Primer-2100.
 - (2) Sealant: Sikasil-728 SL Self-leveling Silicone Sealant.
8. Sealants At Curbs And Gutters:
 - a. Expansion Joints and Control Joints:
 - 1) Description:
 - (a) Effective for sealing transverse contraction and expansion joints, longitudinal, center line and shoulder joints in Portland cement concrete.
 - (b) One component (part) non-sag silicone material that cures to low modulus, silicone rubber upon exposure to atmospheric moisture. May be applied over wide temperature range.
 - 2) Design Criteria:
 - (a) Expansion joint sealant is required in following areas:
 - (1) Within curbs and gutters at approved layout locations.
 - (b) Meet following standards for Sealant: Non-sag: ASTM C920: Type S, Grade NS, Class 100/50, Use T, NT.
 - 3) Approved Products. See Section 01 6000:
 - (a) Dow Corning:
 - (1) Primer: 1200 Prime Coat.
 - (2) Sealant: 888 Silicone Joint Sealant.
 - (b) Sika:
 - (1) Primer: Primer: Sikasil Primer-2100.
 - (2) Sikasil-728 NS Non-Sag Silicone Sealant.
9. Sealants At Concrete Paving:
 - a. Expansion Joints and Control Joints (as required in Section 32 1313):
 - 1) Description:
 - (a) One component (part) self-leveling silicon material that cures to ultra-low modulus silicone rubber upon exposure to atmospheric moisture.

- (b) Cured silicone rubber remains flexible over entire temperature range expected in pavement applications.
 - 2) Design Criteria:
 - (a) Sealant is required at approved layout locations.
 - (b) Meet following standards for Sealant: Self-leveling: ASTM C920, Type S, Grade P, Class 100/50; Use T.
 - 3) Approved Products. See Section 01 6000:
 - (a) Dow Corning:
 - (1) Primer: 1200 Prime Coat.
 - (2) Sealant: 890-SL Silicone Building Sealant.
 - (b) Sika:
 - (1) Primer: Primer: Sikasil Primer-2100.
 - (2) Sealant: Sikasil-728 SL Self-leveling Silicone Sealant.
- 10. Sealants At Precast Concrete Cap and Joint Covers (if Contractor Option ONE was selected in Section 03 4500):
 - a. Description:
 - 1) Soft lead strip, when set and bedded in sealant, form cap which assures permanent elastic seal for any masonry joint as specified in Section 03 4500.
 - b. Design Criteria:
 - 1) Meet following standards for Sealant:
 - (a) ASTM C920: Type S, Grade NS, Class 50 Use A, G, M.
 - (b) Strips should be of sufficient size to cover the joint width, plus percentage allowance for anticipated joint movement, plus 1/4 inch (6.4 mm).
 - c. Approved Products. See Section 01 6000:
 - 1) Dow Corning:
 - (a) Primer: 1200 Prime Coat.
 - (b) Sealant: 791 Silicone Weatherproofing Sealant.
 - 2) Momentive Performance Materials (formerly, GE Sealants & Adhesives):
 - (a) Primer: SS4044 Primer.
 - (b) Sealant: GE SCS2000 SilPruf Silicone Sealant & Adhesive.
 - 3) Sika:
 - (a) Primer: Sikasil Primer-2100.
 - (b) Sealant: Sikasil-728 NS Non-Sag Silicone Sealant.
 - 4) Tremco:
 - (a) Primer:
 - (1) Metal surface: No. 20 primer.
 - (2) Porous surfaces: No. 23 primer.
 - (b) Sealant: Spectrum 1 Silicone Sealant.
- 11. General Interior Sealants:
 - a. General:
 - 1) Inside jambs and heads of exterior door frames.
 - 2) Both sides of interior door frames.
 - 3) Inside perimeters of windows.
 - 4) Miscellaneous gaps between substrates.
 - b. Design Criteria:
 - 1) Meet ASTM C920, Type S, Grade NS, NT, and Class 25 test requirements.
 - 2) 100 percent silicone sealant.
 - c. VOC Content of Interior Sealants:
 - 1) Provide sealants and sealant primers for use inside the weatherproofing system that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - (a) Architectural Sealants: 250 g/L.
 - (b) Sealant Primers for Nonporous Substrates: 250 g/L.

- (c) Sealant Primers for Porous Substrates: 775 g/L.
 - d. Non-Paintable Sealant (Installer Option A):
 - 1) Approved Product. See Section 01 6000:
 - (a) Dow Corning: Tub, Tile, And Ceramic Silicone Sealant.
 - (b) Laticrete: Latasil Silicone Sealant.
 - (c) Momentive Performance Materials (formerly, GE Sealants & Adhesives): GE SCS2800 SilGlaze II Silicone Sealant.
 - (d) Sherwin Williams: White Lightning Silicone Ultra Low Odor Window and Door Sealant.
 - (e) Tremco: Tremsil 200 Silicone Sealant.
 - (f) Franklin International: Titebond 2601 (White) 2611 (Clear) 100% Silicone Sealant.
 - e. Paintable Sealant (Installer Option B):
 - 1) Approved Product. See Section 01 6000:
 - (a) Momentive Performance Materials (formerly, GE Sealants & Adhesives): GE SCS7000 Paintable Silicone Sealant.
- 12. Sealants For Interior Joints:
 - a. General:
 - 1) Countertops and backsplash to wall.
 - 2) Sinks and lavatories to countertops.
 - 3) Joints between plumbing fixtures and other substrates.
 - b. Interior Ceramic Tile Joints are furnished in Section 07 9200 and installed in Section 09 3000 - Tiling including the following:
 - 1) Ceramic tile inside corners.
 - 2) Ceramic tile and paver tile joints.
 - 3) Termination joints in font.
 - 4) Termination joints in showers and font.
 - c. Description:
 - 1) One-part acetoxycure silicone sealant with fungicides to resist mold and mildew.
 - d. Design Criteria:
 - 1) Meet ASTM C920, Type S, Grade NS, NT, and Class 25 test requirements.
 - 2) 100 percent silicone sealant.
 - e. VOC Content of Interior Sealants:
 - 1) Provide sealants and sealant primers for use inside the weatherproofing system that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - (a) Architectural Sealants: 250 g/L.
 - (b) Sealant Primers for Nonporous Substrates: 250 g/L.
 - (c) Sealant Primers for Porous Substrates: 775 g/L.
 - f. Color: As selected by Architect from Manufacturer's standard colors.
 - g. Approved Products. See Section 01 6000:
 - 1) Dow Corning: Tub, Tile, And Ceramic Silicone Sealant.
 - 2) Laticrete: Latasil Tile and Stone Silicone Sealant.
 - 3) Momentive Performance Materials (formerly, GE Sealants & Adhesives): GE SCS1700 Sanitary Silicone Sealant.
 - 4) Tremco: Tremsil 200 Silicone Sealant.
- C. Acoustical Joint Sealants:
 - 1. Design Criteria:
 - a. Meet requirements of ASTM C834.
 - b. Meet Class A flame spread rating.
 - 2. Approved Products. See Section 01 6000:

- a. OSI Pro-Series SC-175 Draft & Acoustical Sound Sealant by OSI Sealants Inc, Mentor, OH www.osisealants.com.
- b. QuietZone Acoustic Caulk by Owens Corning, Toledo, OH www.owenscorning.com.
- c. Acoustical Sealant by Tremco, Beachwood, OH www.tremcosealants.com or Toronto, ON (800) 363-3213.
- d. Acoustical Sound Sealant by Titebond.
- e. Acoustical Sealant by U S Gypsum, Chicago, IL www.usg.com.

2.02 ACCESSORIES

- A. Bond Breaker Tape:
 - 1. Pressure sensitive tape as by Sealant Manufacturer to suit application.
 - 2. Provide tape to prevent adhesion to joint fillers or joint surfaces at back of joint and allow sealant movement.
- B. Joint Backing:
 - 1. Comply with ASTM C1330.
 - 2. Flexible closed cell, non-gassing polyurethane or polyolefin rod or bond breaker tape as recommended by Sealant Manufacturer for joints being sealed.
 - 3. Oversized 25 to 50 percent larger than joint width.
- C. Joint Cleaner:
 - 1. Non-corrosive and non-staining type as recommended by Sealant Manufacturer, compatible with joint forming materials.
- D. Masking Tape:
 - 1. Non-staining, non-absorbent tape product compatible with joint sealants and adjacent joint surfaces.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification Of Conditions:
 - 1. Examine substrate surfaces and joint openings are ready to receive Work.
 - a. Verify each sealant is compatible for use with joint substrates.
 - b. Verify joint surfaces are clean and dry.
 - c. Ensure concrete surfaces are fully cured.
 - 2. Sealants provided shall meet Manufacturer's shelf-life requirements.
 - 3. Notify Architect of unsuitable conditions in writing.
 - a. Do not proceed until unsatisfactory conditions are corrected.
 - 4. Commencement of Work by installer is considered acceptance of substrate.

3.02 PREPARATION

- A. Surface Preparation:
 - 1. Surfaces shall be clean, dry, free of dust, oil, grease, dew, frost or incompatible sealers, paints or coatings that may interfere with adhesion. Prepare substrates in accordance with Manufacturer's instructions:
 - a. Porous surfaces: Clean by mechanical methods to expose sound surface free of contamination and laitance followed by blasting with oil-free compressed air.
 - b. Nonporous surfaces: Use two-cloth solvent wipe in accordance with ASTM C1193. Allow solvent to evaporate prior to sealant application.
 - c. High-pressure water cleaning: Exercise care that water does not enter through failed joints.
 - d. Primers:
 - 1) Primers enhance adhesion ability.
 - 2) Use of primers is not a substitution for poor joint preparation.
 - 3) Primers should be used always in horizontal application where there is ponding water.

2. Field test joints in inconspicuous location.
 - a. Verify joint preparation and primer required to obtain optimum adhesion of sealants to joint substrate.
 - b. When test indicates sealant adhesion failure, modify joint preparation primer, or both and retest until joint passes sealant adhesion test.
 3. Masking: Apply masking tape as required to protect adjacent surfaces and to ensure straight bead line and facilitate cleaning.
- B. Joints:
1. Prepare joints in accordance with ASTM C1193.
 - a. Clean joint surfaces of contaminants capable of affecting sealant bond to joint surface using Manufacturer's recommended instructions for joint preparation methods.
 - b. Remove dirt, dust, oils, wax, paints, and contamination capable of affecting primer and sealant bond.
 - c. Clean concrete joint surfaces to remove curing agents and form release agents.
- C. Protection:
1. Protect elements surrounding the Work of this section from damage or disfiguration.

3.03 APPLICATION

- A. General:
1. Apply silicone sealant in accordance with Manufacturer's instructions.
 2. Do not use damaged or deteriorated materials.
 3. Install primer and sealants in accordance with ASTM C1193 and Manufacturer's instructions.
 4. Apply primer where required for sealant adhesion.
 5. Install sealants immediately after joint preparation.
 6. Do not use silicone sealant as per the following:
 - a. Apply caulking/sealant at temperatures below 40 deg F (4 deg C).
 - b. Below-grade applications.
 - c. Brass and copper surfaces.
 - d. Materials bleeding oils, plasticizers, and solvents.
 - e. Structural glazing and adhesive.
 - f. Surfaces to be immersed in water for prolonged time.
- B. Joint Backing:
1. Install joint backing to maintain sealant joint ratios recommended by Manufacturer.
 2. Install without gaps, twisting, stretching, or puncturing backing material. Use gage to ensure uniform depth to achieve correct profile, coverage, and performance.
 3. Rod for open joints shall be at least 1-1/2 times width of open joint and of thickness to give solid backing. Backing shall fill up joint so depth of sealant bite is no more than 3/8 inch (9.5 mm) deep.
- C. Bond Breaker:
1. Install bond breaker where joint backing is not used or where backing is not feasible.
 - a. Apply bond-breaker tape in shallow joints as recommended by Sealant Manufacturer.
- D. Sealant:
1. Apply sealant with hand-caulking gun with nozzle of proper size to fit joints. Use sufficient pressure to insure full contact to both sides of joint to full depth of joint. Apply sealants in vertical joints from bottom to top.
 2. Fill joint opening to full and proper configuration.
 3. Apply in continuous operation.
 4. Tool joints immediately after application of sealant if required to achieve full bedding to substrate or to achieve smooth sealant surface. Tool joints in opposite direction from application direction, i.e., in vertical joints, from the top down. Do not 'wet tool' sealants.

5. Depth of sealant bite shall be 1/4 inch (6 mm) minimum and 1/2 inch (12.7 mm) maximum, but never more than one half or less than one fourth joint width.
- E. Install at perimeter joints and mechanical and electrical penetrations in sound insulated rooms. Apply sealant with hand-caulking gun with nozzle of proper size to fit joints. Use sufficient pressure to insure full contact to both sides of joint to full depth of joint.
- F. Tool joints immediately after application of sealant if required to achieve full bedding to substrate or to achieve smooth sealant surface.
- G. Caulk gaps between painted or coated substrates and unfinished or pre-finished substrates. Caulk gaps larger than 3/16 inch (5 mm) between painted or coated substrates.

3.04 TOLERANCES

- A. Provide joint tolerances in accordance with Manufacturer's printed instructions.

3.05 FIELD QUALITY CONTROL

- A. Inspection:
 1. Examine sealant joints to verify compliance with Contract Document requirements.
- B. Non-Conforming Work. Non-conforming work as covered in the General Conditions applies, but is not limited to the following:
 1. Sealant material found to be contaminated or damaged or inadequate preparation of substrate results in deficiencies in joint sealant adhesion is considered defective or not complying with Contract Document requirements.
 2. Correct any work found defective or not-complying with Contract Document requirements at no additional cost to Owner.
- C. Adhesion Test (Installer Option to use adhesion test to determine if primer is required).
 1. Perform adhesion tests in accordance with Manufacturer's instructions and ASTM C1193, Method A, Field-Applied Sealant joint Hand-Pull Tab:
 - a. Perform five (5) tests for first 1,000 linear feet (300 meters) of applied silicone sealant and one (1) test for each 1,000 linear feet (300 meters) seal thereafter or perform one (1) test per floor per building elevation minimum.
 - b. For sealants applied between dissimilar materials, test both sides of joints.
 2. Sealants failing adhesion test shall be removed, substrates cleaned, sealants re-installed, and re-testing performed.
 3. Maintain test log and submit report to Architect indicating tests, locations, dates, results, and remedial actions.

3.06 CLEANING

- A. Remove sealant from adjacent surfaces in accordance with Sealant Manufacturer and Substrate Manufacturer recommendations as work progresses.
- B. Remove masking tape and excess sealant.
- C. Clean adjacent materials, which have been soiled, immediately (before setting) as recommended by Manufacturer.
- D. Waste Management: Dispose of products in accordance with manufacturer's recommendation.

END OF SECTION

**SECTION 08 0671
HARDWARE GROUP AND KEYING SCHEDULES**

PART 1 GENERAL

1.01 SUMMARY

- A. Includes But Not Limited To:
 - 1. Furnish and install door hardware and keying as described in Contract Documents.

1.02 REFERENCES

- A. Definitions:
 - 1. Builders Hardware Manufacturer's Association (BHMA) Hardware Functions:
 - a. F75 Passage Latch: Latch bolt operated by lever from either side at all times.
 - b. F76 Privacy Lock: Latch bolt operated by lever from either side. Outside lever locked by push button inside and unlocked by emergency key from outside or rotating lever from inside.
 - c. F109 Office Door Lock: Dead locking latch bolt operated by lever from either side, except when outside lever is locked by turn button in inside lever. When outside lever is locked, latch bolt is operated by key in outside lever or by rotating inside lever. Turn button must be manually rotated to unlock outside lever.
 - d. F84 Classroom Deadlock: Dead locking latch bolt operated by lever from either side, except when outside lever is locked, latch bolt is operated by key in outside lever or by rotating inside lever.
 - e. F86 Utility Space Door Lock: Dead locking latch bolt operated by key in outside lever or by rotating inside lever. Outside lever is always fixed.
 - f. F91 Store Door Lock: Deadlocking latch operated by either lever. Key in either lever locks / unlocks both levers.
 - g. F109 Entrance Lock: Turn/push button locking: Pushing and turning button disengages outside lever, requiring using of key until button is manually unlocked. Push-button locking: Pushing button disengages outside lever until unlocked by key or by turning inside lever. Disengages outside spindle from latch when locked.
 - h. E2142 Deadbolt: Dead bolt operated by key from either side. Bolt automatically dead locks when fully thrown.
 - i. E2152 Deadbolt: Dead bolt operated by key from outside and turn unit from inside. Bolt automatically dead locks when fully thrown.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
 - 1. Materials shall be delivered in original, unopened packages with labels intact.

PART 2 HARDWARE GROUPS

2.01 INTERIOR DOORS

- A. Group 26:
 - 1. 1 set: Smoke Gaskets.
 - 2. 1 each: Acoustic Seal.
 - 3. 3 each: Hinges.
 - 4. 1 each: Lockset Function F109.
 - 5. 1 each: Stop.
- B. Group 32:
 - 1. 1 set: Smoke Gaskets.
 - 2. 1 each: Closer.
 - 3. 3 each: Hinges.
 - 4. 1 each: Lockset, Function F76.
- C. Group 50F:

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1. General:
 - a. 1 set: Smoke Gaskets.
2. Active Leaf:
 - a. 1 each: Deadbolt, Function E2152.
 - b. 3 each: Hinges.
 - c. 1 each: Stop.
3. Inactive Leaf:
 - a. 1 each: Astragal (font side of door).
 - b. 1 each: Dummy Latchset, (pull side only).
 - c. 1 each: Flush Bolt (top).

PART 3 KEYING SCHEDULE FOR FINISH HARDWARE

3.01 KEYING SCHEDULE

- A. Keying Schedule:
 1. Keying Schedule to be provided by Owner.
 2. Provide interior keying system that includes Master Key and Change Key levels. Pin locks so pins in Master Keys are two numbers minimum different between Master Keys and associated change keys. Provide six AA Master Keys.

END OF SECTION 08 0671

**SECTION 08 1113
HOLLOW METAL DOORS AND FRAMES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Non-fire-rated hollow metal doors and frames.
- B. Hollow metal frames for wood doors.
- C. Fire-rated hollow metal doors and frames.
- D. Thermally insulated hollow metal doors with frames.
- E. Sound-rated hollow metal doors and frames.
- F. Commercial security hollow metal doors and frames.
- G. Hurricane-resistant hollow metal doors and frames.
- H. Tornado-resistant hollow metal doors and frames.
- I. Accessories, including glazing, louvers, and matching panels.

1.02 DEFINITIONS

- A. Fire-rated: Fire-retardant particleboard with an Underwriters' Laboratory (UL) stamp for Class 1 fire rating (Flame Spread 20, Smoke Developed 25). Fire-rated doors are available with particleboard and mineral cores for ratings up to 1-1/2 hours.
- B. Fire-rated Door: A door made of fire-resistant material that can be closed to prevent the spread of fire and can be rated as resisting fire for 20 minutes (1/3 hour), 30 minutes (1/2 hour), 45 minutes (3/4 hour) (C), 1 hour (B), or 1-1/2 hours (B). The door must be tested and carry an identifying label from a qualified testing and inspection agency.

1.03 REFERENCE STANDARDS

- A. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors 2018.
- B. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames 2020.
- C. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100) 2017.
- D. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames 2020.
- E. ANSI/SDI A250.11 - Recommended Erection Instructions for Steel Frames 2022.
- F. ASTM A568/A568M - Standard Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for 2019a.
- G. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2022.
- H. ASTM C1036 - Standard Specification for Flat Glass 2021.
- I. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass 2018.
- J. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.
- K. NAAMM HMMA 810 - Hollow Metal Doors 2009.
- L. NAAMM HMMA 840 - Guide Specifications For Receipt, Storage and Installation of Hollow Metal Doors and Frames 2017.
- M. NAAMM HMMA 860 - Guide Specifications for Hollow Metal Doors and Frames 2018.
- N. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames 2014.

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- O. NFPA 80 - Standard for Fire Doors and Other Opening Protectives 2022.
- P. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies 2022.
- Q. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames 2019.
- R. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced standards/guidelines.
- B. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.
- C. Copy of SDI A250.11.

1.05 QUALITY ASSURANCE

- A. Maintain at project site copies of reference standards relating to installation of products specified.
- B. Pre-Installation Conference.
 - 1. Participate in pre-installation conference.
 - 2. In addition to agenda items specified in Section 01 3100, review following:
 - a. Schedule conference after hardware has been delivered to site and organized into hardware groups by door, but before installation of hardware.
 - b. Check for appropriate blocking and for correct hardware models and fasteners for substrates.
 - c. Review submittals and set of Manufacturer's installation, adjustment, and maintenance instructions submitted under Section 08 7101.
 - d. Review use of crowbar or other prying devices are not permitted to be used to set door frame into wall opening.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
- B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

PART 2 PRODUCTS

2.01 SUPPLIERS

- A. Architectural Building Supply, Salt Lake City, UT www.cookandboardman.com:
 - 1. Contact Information: Russ Farley: phone (800) 574-4369, fax 801-484-6817, or e-mail russf@absdoors.com.
- B. Beacon Metals Inc, Salt Lake City, UT www.beacon-metals.com:
 - 1. Contact Information: Jared Butler: phone (801) 486-4884, cell (435) 216-2297, FAX 801-485-7647, or e-mail Jared@beacon-metals.com.
- C. Midwest D-Vision Solutions, Salt Lake City, UT www.mwdsutah.com.
 - 1. Contact Information: Dan Mercer, office (801) 377-4355, cell (801) 618-9456, e-mail danm@mwdsutah.com.

2.02 MANUFACTURERS

- A. Hollow Metal Doors and Frames:
 - 1. Any current member of Steel Door Institute.

2.03 PERFORMANCE REQUIREMENTS

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- A. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.04 HOLLOW METAL DOORS

- A. Doors:
1. Meet one of following requirements:
 - a. Meet requirements of Steel Door Institute ANSI / SDI A250.8.
 - b. Commercial grade steel meeting requirements of ASTM A568/A568M, Class 1:
 - 1) Grade II for interior doors, Grade III for exterior doors.
 - 2) Model 1 Full Flush or Model 2 Seamless designs at Manufacturer's option.
 - 3) Type F and G as required.
 - 4) Finish:
 - (a) Interior doors primed or galvanized as per ASTM A653/A653M.
 - (b) Exterior doors galvanized and primed as per ASTM A653/A653M.
- B. Exterior Doors: Thermally insulated.
1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
 - a. Level 2 - Heavy-duty.
 - b. Physical Performance Level B, 500,000 cycles; in accordance with ANSI/SDI A250.4.
 - c. Model 1 - Full Flush or 2 - Seamless.
 - d. Zinc Coating: A60/ZF180 galvanized coating; ASTM A653/A653M.
 2. Door Core Material: Polystyrene 1 lbs/cu ft minimum density.
 - a. Foam Plastic Insulation: Manufacturer's standard board insulation with maximum flame spread index (FSI) of 75, and maximum smoke developed index (SDI) of 450 in accordance with ASTM E84, and completely enclosed within interior of door.
 3. Door Thermal Resistance: R-Value of 6.0 minimum, for installed thickness of polystyrene.
 4. Door Face Sheets: Flush.
 5. Door Finish: Factory primed and field finished.
- C. Interior Doors, Non-Fire-Rated:
1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
 - a. Level 1 - Standard-duty.
 - b. Physical Performance Level C, 250,000 cycles; in accordance with ANSI/SDI A250.4.
 - c. Model 1 - Full Flush.
- D. Interior Fire-Rated Doors:
1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
 - a. Level 1 - Standard-duty.
 - b. Physical Performance Level C, 250,000 cycles; in accordance with ANSI/SDI A250.4.
 - c. Model 1 - Full Flush.
 2. Fire Rating: As indicated on Door Schedule, tested in accordance with UL 10C and NFPA 252 ("positive pressure fire tests").
 3. Door Core Material: Manufacturers standard core material/construction in compliance with requirements.
 4. Door Thickness: 1-3/4 inches, nominal.
 5. Door Finish: Factory primed and field finished.
- E. Fabrication:
1. General:
 - a. Mortise and reinforce doors for hinges and locks.
 - b. Reinforce doors for closers and other surface applied hardware.
 - c. Drill and tap on job.
 - d. Seams along vertical edges of door need not be filled.

- e. Do not extend hinge cut out full width of door unless fill strip is inserted, weld filled, and ground smooth so no seam appears on back face plate.
- f. Double doors shall have overlapping rolled steel astragal.
- g. Fire Doors:
 - 1) Fire-rated doors shall be provided for those openings requiring fire protection and temperature rise ratings, as determined and scheduled by Architect.
 - 2) Construct UL fire doors and frames to meet UL's specific approval according to current procedure for door rating involved, Procedure No. R-3791 and R-3821 as listed by UL.
 - (a) Labeling shall be in accordance with NFPA 80, the listing authority's policies and label materials, and shall identify Manufacturer.

2.05 HOLLOW METAL FRAMES

- A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.
- B. Exterior Door Frames: Full profile/continuously welded type. Cold rolled furniture steel
 - 1. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with A40/ZF120 coating.
 - 2. Frame Metal Thickness: 14 gage, 0.067 inch, minimum.
 - 3. Frame Finish: Factory primed and field finished.
 - 4. Provide labeled frame to match fire rating of door.
 - 5. Anchors: 16 US ga (1.6 mm) minimum meeting UL or other code acceptable requirements for door rating involved.
- C. Interior Door Frames, Non-Fire Rated: Full profile/continuously welded type. Cold rolled furniture steel
 - 1. Prime surfaces with rust inhibiting primer.
 - 2. Frame Metal Thickness: 16 gage, 0.053 inch, minimum.
 - 3. Frame Finish: Factory primed and field finished.
 - 4. Provide labeled frame to match fire rating of door.
 - 5. Anchors: 16 US ga (1.6 mm) minimum meeting UL or other code acceptable requirements for door rating involved.
- D. Door Frames, Fire-Rated: Full profile/continuously welded type. Cold rolled furniture steel
 - 1. Fire Rating: Same as door, labeled.
- E. Frames for Wood Doors: Comply with frame requirements in accordance with corresponding door.
- F. Mullions for Pairs of Doors: Fixed, with profile similar to jambs.
- G. Transom Bars: Fixed, of profile same as jamb and head.
- H. Frames Wider than 48 inches: Reinforce with steel channel fitted tightly into frame head, flush with top.
- I. Fabrication:
 - 1. General Requirements:
 - a. Provide temporary spreader on each welded frame.
 - b. Provide Manufacturer's gauge label for each item.
 - c. Make breaks, arrises, and angles uniform, straight, and true. Accurately fit corners.
 - 2. Frame width dimension:
 - a. Fabricate frame 1/8 inch wider than finished wall thickness as described in Contract Documents.
 - 3. Provide mortar guards at strikes and hinges.
 - 4. Anchors:
 - a. Provide three jamb anchors minimum for each jamb. On hinge side, install one anchor at each hinge location. On strike side, install one anchor at strike level and

anchors at same level as top and bottom hinges. Tack weld anchors on frames intended for installation in framed walls.

- b. Frames installed before walls are constructed shall be provided with extended base anchors in addition to other specified anchors.
- c. Anchor types and configurations shall meet wall conditions.

2.06 FINISHES

- A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.
- B. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15 mil, 0.015 inch dry film thickness (DFT) per coat; provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.07 ACCESSORIES

- A. Factory Glazing at Non-Rated Openings Narrow Light: Clear sheet glass, tempered glazing meeting requirements of ASTM C1048, Kind FT, Condition A, Type I, Class I, Quality Q3, 1/4-inch thick, factory installed.
- B. Glazing at fire-rated openings: Factory installed fire rated glazing which allows door to maintain rating indicated with size of lite indicated. Thickness: 1/4 (6mm).

2.08 SOURCE QUALITY CONTROL

- A. Tests:
 - 1. Verification of Performance:
 - a. Label each door as conforming to above required standards.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Verify that finished walls are in plane to ensure proper door alignment.

3.02 PREPARATION

- A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

3.03 INSTALLATION

- A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.
- B. Install prefinished frames after painting and wall finishes are complete.
- C. Install fire rated units in accordance with NFPA 80.
- D. Coordinate frame anchor placement with wall construction.
- E. Set frame in location and level head.
 - 1. Use of crowbar or other prying device to set door frame into wall opening will damage door frames and are not permitted to be used.
- F. Equalize with adjustable floor anchor.
- G. Set spreaders and fasten jambs to floor and wall.
 - 1. Wood spreaders shall be square, fabricated from lumber one inch minimum thick, be same length as door opening at header, and same depth as frame.
 - 2. Cut notches for frame stops.
 - 3. Do not remove spreaders until frames are permanently anchored in wall.
 - 4. Use one spreader at base of frame and another at strike level.
 - 5. Do not use temporary spreaders welded to base of jambs during installation of frame.

- H. Fill gap between frame and framing with urethane foam or tightly-packed fiberglass insulation. If urethane foam is used, foam interior of frames before installing frame. Trim excess before installation of frame.
- I. Caulking:
 - 1. Caulk around both sides of frames of doors receiving acoustical seals with specified sealant.
 - 2. Caulk around both sides of frames installed in exposed masonry walls with specified sealant.
- J. Install door hardware as specified in Section 08 7100.
 - 1. Comply with recommended practice for hardware placement of doors and frames in accordance with ANSI/SDI A250.6 or NAAMM HMMA 861.
- K. Comply with glazing installation requirements of Section 08 8000.
- L. Coordinate installation of electrical connections to electrical hardware items.
- M. Touch up damaged factory finishes.

3.04 TOLERANCES

- A. Clearances Between Door and Frame: Comply with related requirements of specified frame standards or custom guidelines indicated in accordance with SDI 117 or NAAMM HMMA 861.
- B. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.
- C. Site Tolerances:
 - 1. Squareness: 1/16 inch from top edge to opposite top edge.
 - 2. Plumbness: 1/16 inch from top of jamb to bottom of jamb.
 - 3. Alignment: 1/16 inch from plane of left side face of jamb to right side face of jamb.
 - 4. Twist: 1/16 inch across throat of jamb plane measured across each face to plane of opposite jamb throat.
 - 5. Finished Clearance Between Door And Frame:
 - a. 1/16 inch at head and hinge jamb plus 1/16 inch maximum 2) 1/8 inch at strike jamb plus or minus 1/16 inch maximum.
 - b. 1/2 inch to top of finished floor surface or 1/4 inch to top of threshold, plus or minus 1/16 inch maximum.

3.05 ADJUSTING

- A. Adjust for smooth and balanced door movement.
- B. Adjust sound control doors so that seals are fully engaged when door is closed.
- C. Test sound control doors for force to close, latch, and unlatch; adjust as necessary in compliance with requirements.
- D. When Project is completed, doors shall not bind, stick, or be mounted so as to cause future hardware difficulties.
- E. Do not impair utility or structural strength of door in fitting of door, applying hardware, or cutting and altering door louvers, panels, or other special details.

3.06 FIELD QUALITY CONTROL

- A. Field Tests:
 - 1. Arrange to have keys brought to Project site and, in meeting attended by local representatives and Architect, test every new key and locking mechanism.
- B. Non-Conforming Work: Non-conforming work as covered in the General Conditions applies, but is not limited to the following:
 - 1. Correct any work found defective or not complying with contract document requirements at no additional cost to the Owner.
 - 2. Door frames:

- a. Door frames damaged by use of crowbar or other prying devices to set door frames shall be repaired or replaced at no additional cost to Owner.

3.07 CLOSEOUT ACTIVITIES

- A. Instruction of Owner:
 - 1. Using Owner's Operations And Maintenance Manual, explain keying systems at same time keys and locking mechanisms are tested.
- B. Key Delivery:
 - 1. Immediately before Final Acceptance Meeting, turn change keys over to Owner properly organized, tagged, and placed in new or existing key cabinet.

3.08 SCHEDULE

- A. Refer to Door and Frame Schedule on the drawings.

END OF SECTION

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**SECTION 08 1416
FLUSH WOOD DOORS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Flush wood doors; flush and flush glazed configuration; fire-rated, non-rated, and acoustical.

1.02 RELATED REQUIREMENTS

- A. Section 06 2000 - Finish Carpentry: Wood door frames.
- B. Section 08 1113 - Hollow Metal Doors and Frames.
- C. Section 08 7100 - Door Hardware.
- D. Section 08 8000 - Glazing.

1.03 REFERENCE STANDARDS

- A. References
- B. AAMA/WDMA/CSA 101/I.S.2/A440 - North American Fenestration Standard/Specification for Windows, Doors, and Skylights 2017.
- C. ASTM C1036 - Standard Specification for Flat Glass 2021.
- D. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition 2014, with Errata (2016).
- E. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards 2021, with Errata.
- F. CPA (Composit Panel Association) - Standard Publications 2016.
- G. CPSC (Consumer Products Safety Commission - Safety Standard for Architectural Glazing Materials 16 CFR, Part 1201 CAT 1 and 11.
- H. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood 2020.
- I. NFPA 101-2018 - Life Safety Code 2018.
- J. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies 2022.
- K. UL 10B - Standard for Fire Tests of Door Assemblies Current Edition, Including All Revisions.
- L. UL 9 - Standard for Fire Tests of Window Assemblies Current Edition, Including All Revisions.
- M. **Definitions**
 - 1. Book-Match: Matching between adjacent veneer leaves on one panel face. Every other piece of veneer is turned over so that the adjacent leaves are "opened" as two pages in a book. The fibers of the wood, slanting in opposite directions in the adjacent leaves, create a characteristic light and dark effect when the surface is seen from an angle.
 - 2. Fire-rated: Fire-retardant particleboard with an Underwriters' Laboratory (UL) stamp for Class 1 fire rating (Flame Spread 20, Smoke Developed 25). Fire-rated doors are available with particleboard and mineral cores for ratings up to 1-1/2 hours.
 - 3. Fire-rated Door: A door made of fire-resistant material that can be closed to prevent the spread of fire and can be rated as resisting fire for 20 minutes (1/3 hour), 30 minutes (1/2 hour), 45 minutes (3/4 hour) (C), 1 hour (B), or 1-1/2 hours (B). The door must be tested and carry an identifying label from a qualified testing and inspection agency.
 - 4. Grade: Unless otherwise noted, this term means Grade rules for Economy, Custom, and/or Premium Grade.
 - a. Custom Grade: Typically specified for and adequately covers most high-quality architectural woodwork, providing a well-defined degree of control over a project's quality of materials, workmanship, or installation.
 - b. Premium Grade: The highest Grade available in both material and workmanship where the highest level of quality, materials, workmanship, and installation is required.

5. Running Match: Each panel face is assembled from as many veneer leaves as necessary. Any portion left over from one panel may be used to start the next.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference.
 1. Participate in pre-installation conference.
 2. In addition to agenda items specified in Section 01 3000, review following:
 - a. Schedule conference after hardware has been delivered to site and organized into hardware groups by door, but before installation of hardware.
 - b. Check for appropriate blocking and for correct hardware models and fasteners for substrates.
 - c. Review submittals and set of Manufacturer's installation, adjustment, and maintenance instructions submitted under Section 008 7100.
 - d. Review use of crowbar or other prying devices are not permitted to be used to set door frame into wall opening.

1.05 SUBMITTALS

- A. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.
- B. Shop Drawings: Show doors and frames, elevations, sizes, types, swings, undercuts, beveling, blocking for hardware, factory machining, factory finishing, cutouts for glazing and other details.
 1. Provide information as required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).
 2. Indicate factory finish color and type.
- C. Certificate: Submit labels and certificates required by quality assurance and quality control programs.
- D. Samples:
 1. Interior Hardwood for Transparent Finish:
 - a. Approval subject to Annual Review:
 - 1) Prepare sample to match Control Sample available from Owner to be used as finishing standard for interior clear finished hardwood as specified in Section 09 9324.
 - 2) Approval of sample by Owner will establish performance standard of stain to be used until next annual review.
 - b. Design Criteria:
 - 1) Provide 8 inch by 10 inch (200 mm by 255 mm) sample of Red Oak to match stain Control Sample provided by Owner.
- E. Manufacturer's Installation Instructions: Indicate special installation instructions.
- F. Manufacturer's qualification statement.
- G. Warranty executed in Owner's name.
- H. Closeout Submittals:
 1. Include following information in Operations And Maintenance Manuals specified in Section 01 7800:
 - a. Record Documentation:
 - 1) Manufacturers Documentation:
 - (a) Manufacturer's product literature on doors and factory finish.
 - (b) Maintenance and repair instructions.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver in clean truck and, in wet weather, under cover.
- B. Deliver to building site only after plaster, cement, and taping compound are completed and dry and after interior painting operations have been completed.
- C. Individually wrap in polyethylene bags for shipment and storage.

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- D. Store doors in a space having controlled temperature and humidity range between 25 and 55 percent.
- E. Accept doors on site in manufacturer's packaging and inspect for damage.
- F. Store flat on a level surface in a dry, well ventilated building.
- G. Cover to keep clean but allow air circulation.
- H. Handle with clean gloves and do not drag doors across one another or across other surfaces.
- I. Do not subject doors to abnormal heat, dryness, or humidity or sudden changes therein.
- J. Condition doors to average prevailing humidity of locality before hanging.

1.07 WARRANTY

- A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.
- B. Interior Doors: Provide manufacturer's warranty for the life of the installation.
 - 1. Warranty shall include finishing, hanging, and installing hardware if manufacturing defect was discovered after door was finished and installed.
 - 2. Include coverage for delamination in any degree, warping or twisting of 1/4 inch or more in door panel at time of one-year warranty inspection, and telegraphing of core assembly: Variation of 1/100 inch or more in 3 inch span.

PART 2 PRODUCTS

2.01 SUPPLIERS

- A. Architectural Building Supply, Salt Lake City, UT www.cookandboardman.com:
 - 1. Contact Information: Russ Farley: phone (800) 574-4369, fax 801-484-6817, or e-mail russf@absdoors.com.
- B. Beacon Metals Inc, Salt Lake City, UT www.beacon-metals.com:
 - 1. Contact Information: Jared Butler: phone (801) 486-4884, cell (435) 216-2297, FAX 801-485-7647, or e-mail Jared@beacon-metals.com.
- C. Midwest D-Vision Solutions, Salt Lake City, UT www.mwdsutah.com.
 - 1. Contact Information: Dan Mercer, office (801) 377-4355, cell (801) 618-9456, e-mail danm@mwdsutah.com.

2.02 APPROVED MANUFACTURERS

- A. Wood Veneer Faced Doors:
 - 1. Graham Wood Doors, Mason City, IA.
 - 2. Marshfield Door Systems Inc, Marshfield, WI.
 - 3. VT Industries, Holstein, IA.

2.03 DOORS

- A. Wood Doors: 1-3/4 inches thick unless otherwise indicated; flush construction.
 - 1. Type: AWS PC-5ME or FD-5ME.
 - 2. Grade: AWS Premium, except face veneer.
 - 3. Fully Type I Construction: Adhere all glue lines with Type I adhesive, including veneer lay-up.
 - 4. Face Veneer:
 - a. Plain sliced Red Oak meeting requirements of AWS Grade A, 1/50 inch (0.5 mm) thick minimum immediately before finishing.
 - b. Face veneers shall be running book matched.
- B. Core:
 - 1. Fully bonded to stiles and rails and sanded as a unit before applying veneers.
 - 2. Non-Rated:
 - a. 32 lb density meeting requirements of ANSI A208.1 Mat Formed Wood Particle Board, Grade 1-L-1 minimum.
 - b. Stiles:

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- 1) 1-3/8 inches deep minimum before fitting.
 - 2) Stile face to be hardwood matching face veneer material, thickness manufacturer's standard.
- c. Rails:
 - 1) 1-1/8 inches
 - 2) Manufacturer's option.
3. Fire-rated, AWS FD 1/3:
 - a. 32 lb density meeting requirements of ANSI A208.1 Mat Formed Wood Particle Board, Grade 1-L-1 minimum.
 - b. Stiles:
 - 1) 1-3/8 inches deep minimum before fitting.
 - 2) Stile face to be hardwood matching face veneer material, thickness manufacturer's standard.
 - c. Rails:
 - 1) 1-1/8 inches
 - 2) Manufacturer's option.
4. Fire-Rated, AWS FD 3/4, 1, and 1-1/2:
 - a. Mineral as standard with approved Manufacturer with inner blocking, 5 inches (125 mm) wide minimum, for closers, flush bolts, and exit devices.
 - b. Stiles And Rails:
 - 1) Sizes of stiles and rails to be Manufacturer's standard meeting fire rating, and incorporating solid hardwood stile face.
 - 2) Stiles for pairs of mineral core doors shall be of material and configuration meeting required fire rating without use of metal astragal or edge.
- C. Glazing Configurations:
 1. Glazing (non-fire-rated openings): Tempered glazing meeting requirements of ASTM C1048, Kind FT, Condition A, Type I, Class I, Quality q3. Thickness 1/4 inch.
 2. Glazing (non-fire-rated and fire-rated openings): Wired glazing meeting requirements of ASTM C1036, Type II, Class I - Clear, Quality - q8 Glazing Select, Form I polished both sides, Mesh - m1 (diamond).
 - a. Meet US Consumer Product Safety Commission safety rating (CPSC 16 CFR 1201).
 - b. Thickness 1/4 inch
 3. Lite Kit:
 - a. Design Criteria: Pre-finished wood or wood veneer frames.
 4. Dimensions:
 - a. Meetinghouse Classroom Doors: 6 inch (150 mm) wide by 16 inches (400 mm) high clear opening) security view window with bottom of opening located 56 inches (1 420 mm) above finish floor and side located 6 inches (150 mm) from strike edge of door.
 5. Approved Product.
 - a. Profile M6G by Graham.
 - b. Profile W6 by Marshfield.
 - c. Profile VT1 by VT Industries.

2.04 DOOR CONSTRUCTION

- A. Cores Constructed with stiles and rails:
 1. Provide solid blocks at lock edge for hardware reinforcement.
 2. Provide solid blocking for other through bolted hardware.
- B. Where supplementary protective edge trim is required, install trim after veneer facing has been applied full-width.
- C. At exterior doors, provide aluminum flashing at the top and bottom rail and the sill of glazed openings for full thickness and width of door.
- D. Glazed Openings: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings.

- E. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.
- F. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.
- G. Cut and configure exterior door edge to receive recessed weatherstripping devices.
- H. Provide edge clearances in accordance with the quality standard specified.

2.05 FINISHES - WOOD VENEER DOORS

- A. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:
 - 1. Transparent:
 - a. Applied by Door Manufacturer before leaving factory.
 - b. Stain: To match control sample:
 - 1) OAK 95.
 - 2) Cherry.

2.06 SOURCE QUALITY CONTROL

- A. Inspections:
 - 1. Verification of Performance:
 - a. Doors shall have following information permanently affixed on top of door:
 - 1) Manufacturer:
 - 2) Door designation or model.
 - 3) Veneer species.
 - 4) Factory finish.
 - 2. Clear Finished Hardwood:
 - a. Color matches Owner provided sample in Section 09 9300.
 - b. Conform to National Fire Protection Standards, NFPA 80, for fire-rated doors.
 - 1) Required fire-rated doors shall bear approved labels of UL, Warnock Hersey International, or other code acceptable agency.
 - 2) Machining for hardware shall be complete before application of label.

PART 3 EXECUTION

3.01 CLOSEOUT ACTIVITIES

- A. Instruction of Owner:
 - 1. Using Owner's Operations and Maintenance Manual, explain keying systems at same time keys and locking mechanisms are tested.
- B. Key Delivery:
 - 1. Immediately before Final Acceptance Meeting, turn change keys over to Owner properly organized, tagged, and placed in new or existing key cabinet.

END OF SECTION

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**SECTION 08 3100
ACCESS DOORS AND PANELS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wall-mounted access units.
- B. Ceiling-mounted access units.
- C. Wall- and ceiling-mounted access units.

1.02 SUBMITTALS

- A. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.
- B. Shop Drawings: Indicate exact position of each access door and/or panel unit.
- C. Manufacturer's Installation Instructions: Indicate installation requirements.

PART 2 PRODUCTS

2.01 MANUFACTURED UNITS

- A. Acceptable Manufacturers:
 - 1. Babcock-Davis, Minneapolis, MN www.babcock-davis.com.
 - 2. The Bilco Company, New Haven, CT www.bilco.com or Bilco Canada, London, ON (519) 659-7331.
 - 3. Dur-Red Products, Cudahy, CA www.dur-red.com.
 - 4. Elmdor Stoneman, City of Industry, CA www.elmdorstoneman.com.
 - 5. Jensen Industries, Los Angeles, CA www.jensen-ind.com.
 - 6. Karp Associates Inc, Maspeth, NY www.karpinc.com.
 - 7. Larsen's Manufacturing Co, Minneapolis, MN www.larsensmfg.com.
 - 8. Mifab Manufacturing Co, Minneapolis, MN www.mifab.com.
 - 9. Milcor, Bensenville, IL www.milcorinc.com.
 - 10. Nystrom Inc, Brooklyn Park, MN www.nystrom.com.
 - 11. Williams Brothers Corporation of America, Reno, NV www.wbdoors.com.
 - 12. Equal as approved by Architect before bidding. See Section 01 6200.

2.02 ACCESS DOORS AND PANELS ASSEMBLIES

- A. Wall and Ceiling Mounted Units:
 - 1. Location: As indicated on drawings.
 - 2. Material: Steel; factory powder-coated prime finish.
 - 3. Door/Panel: Continuous piano hinged, standard duty, manually operated with single key-operated lock, interior latch release, and continuous piano hinge hardware.
 - 4. Wall Mounting Criteria: Provide surface-mounted face frame and door surface flush with frame surface.
- B. Non-Fire-Rated Access panel, Class Two Quality Standards:
 - 1. Acoustical Tile: DSC-210 by Karp.
 - 2. Plaster: DSC-210 PL by Karp.
 - 3. Drywall: KDW or Sesame (KSTDW or KSTE) by Karp.
 - 4. Masonry: DSC-214M by Karp.
- C. Non-Fire-Rated Insulated Door, Class Two Quality Standard:
 - 1. KRP-150 FR or KRP-350.FR by Karp.
- D. Fire-rated, Class Two Quality Standard:
 - 1. Insulated: KRP-150 FR or KRP-350.FR by Karp.
 - 2. Non-Insulated: KRP-250FR or KRP-450FR by Karp.
- E. Fire-Rated Upward Opening Access Doors:

1. Install at head of wall-mounted ladders.
2. Manually operated with 1/4 inch (6 mm) allen-head key-operated, self-closing latch and continuous piano hinge.
3. Factory prime finish.
4. Quality Standard:
 - a. FRU by Nystrom Inc.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install units in accordance with manufacturer's instructions.
- B. Install frames plumb and level in openings, and secure units rigidly in place.
- C. Position units to provide convenient access to concealed equipment when necessary.

END OF SECTION

**SECTION 08 7100
DOOR HARDWARE**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Hardware for wood, aluminum, hollow metal, and _____ doors.
- B. Hardware for fire-rated doors.
- C. Electrically operated and controlled hardware.
- D. Lock cylinders for doors that hardware is specified in other sections.
- E. Thresholds.
- F. Weatherstripping and gasketing.

1.02 RELATED REQUIREMENTS

- A. Section 07 9200 - Joint Sealants: Sealants for setting exterior door thresholds.
- B. Section 08 0671 - Door Hardware Schedule: Schedule of door hardware sets.

1.03 REFERENCE STANDARDS

- A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.
- B. BHMA A156.2 - Bored and Preamsembled Locks and Latches; 2017.
- C. BHMA A156.16 - Auxiliary Hardware; 2018.
- D. BHMA A156.28 - Standard for Recommended Practices for Mechanical Keying Systems; 2018.
- E. DHI (H&S) - Sequence and Format for the Hardware Schedule; 2019.
- F. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2022.
- G. NFPA 105 - Standard for Smoke Door Assemblies and Other Opening Protectives; 2022.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the manufacture, fabrication, and installation of products that door hardware is installed on.
- B. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.
- C. Furnish templates for door and frame preparation to manufacturers and fabricators of products requiring internal reinforcement for door hardware.
- D. Provide hardware templates to Sections 08 1213, 08 1313, and 08 1429 within fourteen (14) days after Architect approves hardware schedule.
- E. Supply necessary hardware installation templates to Section 06 2024 before pre-installation conference.
- F. Keying Requirements Meeting:
 - 1. Schedule meeting at project site prior to Contractor occupancy.
 - 2. Architect will schedule meeting at project site prior to Contractor occupancy.
 - 3. Owner will schedule meeting at project site prior to Contractor occupancy.
 - 4. Attendance Required:
 - a. Contractor.
 - b. Owner.
 - c. Architect.
 - d. Installer's Architectural Hardware Consultant (AHC).
 - e. Hardware Installer.
 - f. Owner's Security Consultant.
 - 5. Agenda:
 - a. Establish keying requirements.

- b. Verify locksets and locking hardware are functionally correct for project requirements.
- c. Verify that keying and programming complies with project requirements.
- d. Establish keying submittal schedule and update requirements.
- 6. Incorporate "Keying Requirements Meeting" decisions into keying submittal upon review of door hardware keying system including, but not limited to, the following:
 - a. Access control requirements.
 - b. Key control system requirements.
 - c. Schematic diagram of preliminary key system.
 - d. Flow of traffic and extent of security required.
- 7. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.
- 8. Deliver established keying requirements to manufacturers.

1.05 SUBMITTALS

- A. Product Data: Manufacturer's catalog literature for each type of hardware, marked to clearly show products to be furnished for this project, and includes construction details, material descriptions, finishes, and dimensions and profiles of individual components.
 - 1. Manufacturer's cut sheets.
 - 2. Two (2) copies of Manufacturer's installation, adjustment, and maintenance instructions for each piece of hardware. Include one (1) set in 'Operations And Maintenance Manual' and send one (1) set with hardware when delivered.
 - 3. Copy of hardware schedule.
 - 4. Written copy of keying system explanation.
- B. Shop Drawings - Door Hardware Schedule: Submit detailed listing that includes each item of hardware to be installed on each door. Use door numbering scheme as included in Contract Documents.
 - 1. Submit hardware schedule indicating hardware to be supplied.
 - 2. Schedule shall indicate details such as proper type of strikeplates, spindle lengths, hand, backset, and bevel of locks, hand and degree opening of closer, length of kickplates, length of rods and flushbolts, type of door stop, and other necessary information necessary to determine exact hardware requirements.
 - 3. Prepared by or under supervision of Architectural Hardware Consultant (AHC).
 - 4. Comply with DHI (H&S) using door numbers and hardware set numbers as indicated in construction documents.
 - a. Submit in vertical format; see Section 08 0671.
 - 5. List groups and suffixes in proper sequence.
 - 6. Provide complete description for each door listed.
 - 7. Provide manufacturer name, product names, and catalog numbers; include functions, types, styles, sizes and finishes of each item.
 - 8. Include account of abbreviations and symbols used in schedule.
- C. Shop Drawings - Electrified Door Hardware: Submit diagrams for power, signal, and control wiring for electrified door hardware that include details of interface with building safety and security systems. Provide elevations and diagrams for each electrified door opening as follows:
 - 1. Prepared by or under supervision of Architectural Hardware Consultant (AHC) and Electrified Hardware Consultant (EHC).
 - 2. Elevations: Submit front and back elevations of each door opening showing electrified devices with connections installed and an operations narrative describing how opening operates from either side at any given time.
 - 3. Diagrams: Submit point-to-point wiring diagram that shows each device in door opening system with related colored wire connections to each device.
- D. Closeout Submittals:
 - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
 - a. Operations and Maintenance Data:

- 1) Manufacturer's installation, adjustment, and maintenance instructions for each piece of hardware.
- b. Record Documentation:
 - 1) Manufacturers documentation:
 - (a) Manufacturer's literature and/or cut sheets.
 - (b) Include keying plan and bitting schedule.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing work of the type specified for commercial door hardware with at least three years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Neatly and securely package hardware items by hardware group and identify for individual door with specified group number and set number used on Supplier's hardware schedule.
- B. Include fasteners and accessories necessary for installation and operation of finish hardware in same package.

PART 2 PRODUCTS

2.01 SUPPLIERS

- A. Approved Suppliers.
 1. Architectural Building Supply, Salt Lake City, UT www.cookandboardman.com:
 - a. Contact Information: Russ Farley, phone (800) 574-4369, fax 801-484-6817, or e-mail russf@absdoors.com.
 2. Beacon Metals Inc, Salt Lake City, UT www.beacon-metals.com:
 - a. Contact Information: Jared Butler, phone (801) 486-4884, cell (435) 216-2297, or e-mail Jared@beaconcdl.com.
 3. Midwest D-Vision Solutions, Salt Lake City, UT www.mwdsutah.com.
 - a. Contact Information: Dan Mercer, office (801) 377-4355, cell (801) 618-9456, e-mail danm@mwdsutah.com.

2.02 DESIGN AND PERFORMANCE CRITERIA

- A. Fasteners:
 1. Provide fasteners of proper type, size, quantity, and finish that comply with commercially recognized standards for proposed applications.
 - a. Aluminum fasteners are not permitted.
 - b. Provide phillips flat-head screws with heads finished to match door surface hardware unless otherwise indicated.
 2. Provide machine screws for attachment to reinforced hollow metal and aluminum frames.
 - a. Self-drilling (Tek) type screws are not permitted.
 3. Provide stainless steel machine screws and lead expansion shields for concrete and masonry substrates.
 4. Provide wall grip inserts for hollow wall construction.
 5. Provide spacers or sex bolts with sleeves for through bolting of hollow metal doors and frames.
 6. Fire-Rated Applications: Comply with NFPA 80.
 - a. Provide wood or machine screws for hinges mortised to doors or frames, strike plates to frames, and closers to doors and frames.
 - b. Provide steel through bolts for attachment of surface mounted closers, hinges, or exit devices to door panels unless proper door blocking is provided.
 7. Concealed Fasteners: Do not use through or sex bolt type fasteners on door panel sides indicated as concealed fastener locations, unless otherwise indicated.

2.03 FINISHES

- A. Hardware Finishes:
 1. Finishes for brass or bronze hardware items shall be:

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- a. ANSI / BHMA Finish Code 626.
 - 1) Description: Satin Chromium Plated.
 - 2) Base Metal: Brass. Bronze.
2. Finishes for flat goods items may be:
 - a. ANSI / BHMA Finish Code 630.
 - 1) Description: Satin Stainless Steel.
 - 2) Base Metal: Stainless Steel (300 Series).
3. Materials other than steel, brass, or bronze shall be finished to match appearance satin chromium plated, except flat goods which shall be satin stainless steel.

2.04 HINGES

- A. Manufacturer Contact List:
 1. Hager Companies, St Louis, MO www.hagerhinge.com.
 2. Ives, New Haven, CT www.iveshardware.com.
 3. McKinney, Scranton, PA www.mckinneyhinge.com.
 4. PBB, Ontario, CA www.pbbinc.com.
 5. BEST (dormakaba Americas), Indianapolis IN www.BESTaccess.com.
- B. Hinges:
 1. Doors:
 - a. Sizes:
 - 1) Non-Fire-Rated Doors:
 - (a) 1-3/4 inch 44.5 mm non-fire-rated wood doors in wood frames: 4 inches by 4 inches.
 - (b) 1-3/8 inch 35 mm wood or metal doors: 3-1/2 inches by 3-1/2 inches.
 - 2) Fire-Rated Doors:
 - (a) 1-3/4 inch fire-rated doors in metal frames:
 - (b) Standard: 4-1/2 inches by 4-1/2 inches.
 - (c) Wide Throw: 4-1/2 inches by width required.
 2. Use non-removable pins on exterior opening doors.
 3. Hinges on exterior doors shall be solid brass, plated to achieve specified finish.
 4. Approved Products.
 - a. Interior:
 - 1) Hager: BB 1279.
 - 2) Ives: 5BBI.
 - 3) McKinney: TA 2714.
 - 4) MacPro / McKinney: MPB79.
 - 5) PBB: BB81.
 - 6) BEST: FBB 179.
 - b. Exterior:
 - 1) Hager: BB 1191.
 - 2) Ives: 5BBI.
 - 3) McKinney: TA 2314.
 - 4) PBB: BB21.
 - 5) BEST: FBB 191.

2.05 SECURING DEVICES

- A. Definitions:
 1. Grade 2 Standard Duty Key-In Lever Cylindrical Lockset:
 - a. Performance Features:
 - 1) Exceeds 400,000 ANSI cycles.
 - 2) Single motion egress provides easy emergency exit.
 - 3) Full 1 inch (25 mm) throwbolt with saw resistant hardened steel roller pin.
 - 4) Anti-drill design deadbolt. Two (2) ball bearings inserted to prevent drill attacks.

- 5) ADA-compliant thumbturn.
- B. Manufacturers:
1. Manufacturer List:
 - a. Precision Hardware, Romulus, MI www.precisionhardware.com.
 - b. Rockwood, Manufacturing Co, Rockwood, PA www.rockwoodmfg.com.
 - c. Sargent, New Haven, CT www.sargentlock.com.
 - d. Schlage, Colorado Springs, CO www.schlage.com.
 - e. Von Duprin, Indianapolis, IN www.vonduprin.com.
 - f. Yale Commercial Locks, Lenoir City, TN www.yalecommercial.com.
- C. General:
1. Backsets shall be 2-3/4 inches (70 mm).
- D. Flush Bolts:
1. Rod length: 12 inch minimum.
 2. Acceptable Products:
 - a. Manual Flush Bolts (Wood Doors):
 - 1) Hager 283D.
 - 2) Ives FB458.
 - 3) Rockwood 555.
 3. Dust Proof Strike:
 - a. Floor and/or threshold.
 - b. Acceptable Products:
 - 1) Hager: 280X.
 - 2) Ives: DP2.
 - 3) Rockwood 570.
 - 4) Equal as approved by Architect before installation. See Section 01 6200.
- E. Locksets And Latchsets:
1. Design Criteria:
 - a. Grade 1 Heavy Duty Key-In Lever Cylindrical Lockset:
 - 1) ANSI/BHMA A156.2 Series 4000 Grade 1.
 - 2) Meet UL 3 hour fire rating.
 - 3) Meet ADA Compliant ANSI A117.1 Accessibility Code.
 - 4) Door Lever:
 - (a) Meet California code for 1/2 inch (12.7 mm) or less return to door.
 - (b) Vandal-Resistant Lever with clutch.
 - 5) Deadlocking Latchbolt.
 - b. Grade 1 Heavy Duty Key-In Lever Cylindrical Locksets (Used only in Meetinghouse Module doors with CES Seminary and Institute additions):
 - 1) ANSI/BHMA A156.2 Series 4000 Grade 1.
 - 2) Meet UL 3 hour fire rating.
 - 3) Meet ADA Compliant ANSI A117.1 Accessibility Code.
 - 4) Door Lever:
 - (a) Meet California code for 1/2 inch (12.7 mm) or less return to door.
 - (b) Vandal-Resistant Lever with clutch.
 - 5) Deadlocking Latchbolt.
 - c. Grade 2 Standard Duty Key-In Lever Cylindrical Lockset:
 - 1) ANSI/BHMA A156.2 Series 4000 Grade 2.
 - 2) Meet UL 3 hour fire rating.
 - 3) Meet ADA Compliant ANSI A117.1 Accessibility Code.
 - 4) Door Lever:
 - (a) Meet California code for 1/2 inch (12.7 mm) or less return to door.
 2. Lever Operated:
 - a. Approved Products. See Section 01 6200:

- 1) Grade 1 Heavy Duty Key-In Lever Cylindrical Locksets (Used only in Meetinghouse Module doors with CES Seminary and Institute additions):
 - (a) 9K Series Best Lock with 15D Lever by BEST Access Solutions standard cylinders - (I/C cores may be used when authorized by AEC).
 - (b) 195 Series with American Lever by Marks USA.
 - (c) 10 Line Series with L Lever by Sargent.
 - (d) ND Series with Rhodes (RHO) Lever by Schlage.
 - 2) Grade 1 Heavy Duty Key-In Lever Cylindrical Locksets (Used only in Meetinghouse Module doors with CES Seminary and Institute additions):
 - (a) 9K Series Best Lock with 15D Lever by BEST Access Solutions standard cylinders - (I/C cores may be used when authorized by AEC).
 - (b) 195 Series with American Lever by Marks USA.
 - (c) 10 Line Series with L Lever by Sargent.
 - (d) ND Series with Rhodes (RHO) Lever by Schlage.
 - 3) Grade 2 Standard Duty Key-In Lever Cylindrical Locksets:
 - (a) 7K Series Best Lock with 15D Lever by BEST Access Solutions standard cylinders - (I/C cores may be used when authorized by AEC).
 - (b) 175 Series with American Lever by Marks USA.
 - (c) 7 Line Series with L Lever by Sargent.
 - (d) AL Series with Saturn (SAT) Lever by Schlage.
- F. Deadbolts:
1. Approved Products. See Section 01 6000:
 - a. Match manufacturer of locksets.
- G. Standard Cylinders:
1. Provide cylinders for interior exit devices requiring cylinders.
- H. Exit Devices:
1. Use operable lever trim.
 2. Provide labeled hardware where required by local code authority.
- I. Exit Devices:
1. Use operable lever trim.
 2. Provide labeled hardware where required by local code authority.
 3. Approved Products.
 - a. 2000 Series by BEST Precision.
 - b. 80 Series by Sargent.
 - c. 99 or 98 Series by Von Duprin.
 - d. 7100 Series by Yale.
- J. Padlocks:
1. Quality Standard: Abus 83 / 45 Series with cylinder to match locksets.
- K. Chains:
1. 3/16 inch (4.76 mm) diameter lightweight welded steel chain, case-hardened, zinc-plated, with flexible vinyl protective cover.
 2. Quality Standard: Master Lock No. 73 bike locking chain.

2.06 DOOR PULLS AND PUSH BARS

- A. Standard Door Push / Pulls:
1. Size: 15 inches (380 mm) by 3-1/2 inch (89 mm).
 2. Acceptable Products:
 - a. PS3515, PL3515 / 80301 by Glynn-Johnson, Indianapolis, IN www.glynn-johnson.com.
 - b. 39E, 30S by Hager, St Louis, MO www.hagerhinge.com.
 - c. 8200, 8302 by Ives, Wallingford, CT www.iveshardware.com.

- d. 70B, 105x70B by Rockwood Manufacturing Co, Rockwood, PA
www.rockwoodmfg.com.
- e. Equal as approved by Architect before installation. See Section 01 6000.

2.07 COORDINATORS

- A. Approved Products. See Section 01 6000:
 - 1. CO2 x FB1 by Glynn Johnson.
 - 2. 297D by Hager.
 - 3. Series 900 by Ives.
 - 4. 1600 Series by Rockwood.
- B. Meeting Stiles:
 - 1. Acceptable Products:
 - a. [Insert Product] by Hager.
 - b. 136N by NGP.
 - c. 369AS by Pemko.
- C. Astragals:
 - 1. Acceptable Products:
 - a. 835S by Hager.
 - b. 139 DKB by NGP.
 - c. 357D by Pemko.

2.08 CLOSERS

- A. Approved Manufacturers.
 - 1. 8900 Series by Dorma Architectural Hardware, Reamstown, PA www.dorma.com/usa.
 - 2. 1461 Series by LCN Closers, Princeton, IL www.lcnclosers.com.
 - 3. 8501 Series by Norton Door Controls, Charlotte, NC www.nortondoорcontrols.com.
 - 4. 1431 Series by Sargent, New Haven, CT www.sargentlock.com.
 - 5. HD7000 Series by BEST (dormakaba Americas), Indianapolis IN www.BESTAccess.com.
- B. Surface-Mounted Overhead Door Closers:
 - 1. Closers provided under this Section shall be from same Manufacturer.
 - 2. Provide parallel arms on closers unless door position in relation to adjacent wall requires otherwise. Provide covers.
 - 3. Door Closers on doors that swing 180 degree as shown on Contract Documents:
 - a. Closers shall allow for 180 degree opening without engaging stop function. Wall stop or Floor stop is specified in Door Schedule and Section 08 7108, 'Stops And Holders'.
 - b. Closers shall have following features:
 - 1) Adjustable sweep speed.
 - 2) Adjustable backcheck.
 - 3) Non-handed, non-sized.
 - 4) Hold open arm function (Friction Hold Open) (Non-Fire-Rated Corridors).
 - 5) Delayed action closing where noted on Door Schedule.
 - 4. Door Closers on doors that swing 90 degree as shown on Contract Documents:
 - a. Closers shall allow for 100 degree opening with engaging stop function.
 - b. Closers shall have following features:
 - 1) Adjustable sweep speed.
 - 2) Adjustable backcheck.
 - 3) Non-handed, non-sized.
 - 4) Hold open arm function with thumb turn or handle control (Cush And Hold) (Non-Fire- Rated Corridors).
 - 5) Delayed action closing where noted on Door Schedule.

2.09 KICK PLATES

- A. Acceptable Manufacturers:

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1. Glynn-Johnson, Indianapolis, IN www.glynn-johnson.com.
 2. Hager, St Louis, MO (800) 255-3590 or (314) 772-4400 www.hagerhinge.com.
 3. Ives, Wallingford, CT www.iveshardware.com.
 4. Rockwood Manufacturing Co, Rockwood, PA www.rockwoodmfg.com.
- B. Kick Plates: Provide along bottom edge of push side of every door with closer, except aluminum storefront and glass entry doors, unless otherwise indicated.
1. Material: 0.050 inch thick stainless steel.
 2. Size: 10 inch high by 2 inch less door width (LDW) on push side of door.

2.10 STOPS AND HOLDERS

- A. Manufacturers:
1. Manufacturer Contact List:
 - a. Glynn-Johnson, Indianapolis, IN www.glynn-johnson.com.
 - b. Hager, St Louis, MO www.hagerhinge.com.
 - c. Ives, Wallingford, CT www.iveshardware.com.
 - d. Rockwood Manufacturing Co, Rockwood, PA www.rockwoodmfg.com.
 - e. Sargent, New Haven, CT (800) 906-6606 or (203) 562-2151 www.sargentlock.com.
- B. Stops:
1. Use wall type stops unless indicated otherwise on Door Schedule.
 2. Provide model appropriate for substrate. Wall stops may be either cast or wrought.
 3. Acceptable Products:
 - a. Interior Wall Exterior Wall Floor Mount Overhead.
 - b. Hager 236W 255W 243F
 - c. Ives WS407CCV WS447 FS438
 - d. Rockwood 409 474 / 475 440 / 441
 - e. Glynn Johnson GJ 90S
 - f. Sargent 590S Series

2.11 ACCESSORIES

- A. Manufacturers:
1. Manufacturer Contact List:
 - a. Hager, St Louis, MO www.hagerhinge.com.
 - b. Ives, Wallingford, CT www.iveshardware.com.
 - c. NGP - National Guard Products, Memphis, TN www.ngpinc.com.
 - d. Pemko Manufacturing, Ventura, CA www.pemko.com.
- B. Acoustical Seals:
1. Color as selected by Architect.
 2. Acceptable Products:
 - a. Door Bottom Shoe for Wood Door:
 - 1) 13VDkB by NGP.
 - 2) 211DV by Pemko.
 - b. Door Bottom Shoe for Metal Door:
 - 1) 779S-A by Hager.
 - 2) 35EV by NGP.
 - 3) 217AV by Pemko.
- C. Smoke Gaskets:
1. Color as selected by Architect.
 2. Acceptable Products:
 - a. 726 by Hager.
 - b. 5050 by NGP.
 - c. PK 55 by Pemko.
- D. Sweepstrip (metal door bottom):

1. Clear anodized aluminum with black neoprene insert.
 2. Reduce infiltration of air, wind, dust, rain, and snow.
 3. Meet UL requirements.
 4. For use with saddle thresholds.
 5. Acceptable Products:
 - a. 750S CLR by Hager.
 - b. 198N A by NGP.
 - c. 321 CN by Pemko.
 - d. Equal as approved by Architect before bidding. See Section 01 6000.
- E. Thresholds:
1. Acceptable Products:
 - a. Design Criteria:
 - 1) Meet handicap accessibility requirements (ADA):
 - b. Interior Doors at Acoustic Seals, Approved Products:
 - 1) Carpet threshold (carpet to carpet):
 - (a) 505S DBA by Hager.
 - (b) 414 DKB by NGP.
 - (c) 236 D by Pemko.
 - 2) Carpet threshold (carpet to concrete, wood, synthetic, or resilient flooring):
 - (a) 417 DKB by NGP.
 - (b) 174 D by Pemko.
 - 3) Saddle threshold:
 - (a) 418S DBA by Hager.
 - (b) 411 DKB by NGP.
 - (c) 151 D by Pemko.
 - c. Out swinging metal exterior doors (from occupied rooms such as Serving Areas or Classrooms):
 - 1) 8426 by NGP.
 - 2) 253 x 3 FG by Pemko.
 - d. Out swinging metal exterior doors (exterior Utility Rooms only):
 - 1) 891 V by NGP.
 - 2) 185 V by Pemko.
- F. Latch Guards
1. Acceptable products
 - a. LG12 by Ives
 - b. NLP-110 by Donjo
- G. 154 Stabilizers
1. Acceptable Products
 - a. Von Duprin Model MT54

2.12 WEATHERSTRIPPING AND GASKETING

- A. Weatherstripping:
1. Acceptable Products:
 - a. Finish: clear anodized aluminum.
 - b. Perimeter:
 - 1) 800S by Hager.
 - 2) A625 A by NGP.
 - 3) 35041 CP by Pemko.
 - c. Equal as approved by Architect before bidding. See Section 01 6000.
 - d. Bottom (see Sweepstrip).

2.13 KEY CABINET

- A. Key Cabinet: Sheet steel construction, piano hinged door with key lock; BHMA A156.28.

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1. Mounting: Wall-mounted.
2. Capacity: 60 hooks minimum.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that doors and frames are ready to receive this work; labeled, fire-rated doors and frames are properly installed, and dimensions are as indicated on shop drawings.
- B. Verify that electric power is available to power operated devices and of correct characteristics.

3.02 INSTALLATION

- A. Install hardware in accordance with manufacturer's instructions and applicable codes.
- B. Install hardware on fire-rated doors and frames in accordance with applicable codes and NFPA 80.
- C. Install hardware for smoke and draft control doors in accordance with NFPA 105.
- D. Use templates provided by hardware item manufacturer.
- E. Do not install surface mounted items until application of finishes to substrate are fully completed.
- F. Door Hardware Mounting Heights: Distance from finished floor to center line of hardware item. As indicated in following list; unless noted otherwise in Door Hardware Schedule or on drawings.
 1. Mounting heights in compliance with ADA Standards:
 - a. Locksets: 40-5/16 inch.
 - b. Push Plates/Pull Bars: 42 inch.
 - c. Deadlocks (Deadbolts): 48 inch.
 - d. Exit Devices: 40-5/16 inch.
 - e. Door Viewer: 43 inch; standard height 60 inch.
- G. Install smoke gaskets and acoustical seals in manner to give continuous air-tight fit.
 1. Install smoke gaskets as per Manufacturer's installation requirements:
 - a. Hinge Jamb: Install smoke gaskets on jamb face of door frame so door will compress smoke gasket.
 - b. Header and Strike Jamb: Install smoke gaskets on face of stop of door frame so door will compress smoke gasket.
 2. Install acoustical seal with seal under door.
- H. Set exterior door thresholds with full-width bead of elastomeric sealant at each point of contact with floor providing a continuous weather seal; anchor thresholds with stainless steel countersunk screws.
 1. See Section 07 9200 for additional requirements.
- I. Turn key cabinet over to Owner's designated representative at Substantial Completion with all keys required for every locking device on Project identified by tags and on hooks. Owner will be responsible for installation.

3.03 FIELD QUALITY CONTROL

- A. Provide an Architectural Hardware Consultant (AHC) to inspect installation and certify that hardware and installation has been furnished and installed in accordance with manufacturer's instructions and as specified.
- B. Owner's Instructions:
 1. Before Final Acceptance Meeting, send master keys to [Insert Person to Receive Keys].

3.04 ADJUSTING

- A. Adjust hardware for smooth operation.
- B. Adjust gasketing for complete, continuous seal; replace if unable to make complete seal.

- C. Adjust closers to provide maximum opening force as required by governing code authority and proper backcheck and sweep speed.

3.05 CLEANING

- A. Clean finished hardware in accordance with manufacturer's written instructions after final adjustments have been made.
- B. Clean adjacent surfaces soiled by hardware installation.
- C. Replace items that cannot be cleaned to manufacturer's level of finish quality at no additional cost.

3.06 PROTECTION

- A. Do not permit adjacent work to damage hardware or finish.

END OF SECTION 08 7100

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**SECTION 09 0561
COMMON WORK RESULTS FOR FLOORING PREPARATION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. This section applies to floors identified in Contract Documents that are receiving the following types of floor coverings:
 - 1. Resilient tile and sheet.
 - 2. Broadloom carpet.
 - 3. Carpet tile.
 - 4. Thin-set ceramic tile and stone tile.
 - 5. Coordination and scheduling of Owner Furnished Field Testing for Alkalinity and Concrete Moisture Vapor Emission Rate (MVER) of concrete slab before flooring installation (except carpet) as described in Contract Documents.
 - 6. Preparing floor substrate to receive flooring as described in Contract Documents.
- B. Preparation of new and existing concrete floor slabs for installation of floor coverings.
- C. Testing of concrete floor slabs for moisture and alkalinity (pH) (See form below).
- D. Remediation of concrete floor slabs due to unsatisfactory moisture or alkalinity (pH) conditions.
 - 1. Contractor shall perform all specified remediation of concrete floor slabs. If such remediation is indicated by testing agency's report and is due to a condition not under Contractor's control or could not have been predicted by examination prior to entering into the contract, a contract modification will be issued.

1.02 REFERENCE STANDARDS

- A. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring 2021.
- B. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride 2022.
- C. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes 2019a.
- D. ICRI - Concrete Slab Moisture Testing Program Current.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate scheduling of cleaning and testing, so that preliminary cleaning has been completed for at least 24 hours prior to testing.
- B. Participate in MANDATORY pre-installation conference held jointly if possible for all related Division 09 6000 'Flooring' used for Project.
- C. Schedule conference after substrate preparation and before installation of all flooring systems included for Project at same time if schedule permits.
- D. Schedule conference after substrate preparation and before installation of flooring system. (If more than one (1) flooring system is included for project, hold conference at same time if schedule permits).
- E. Conference may be held at project site or another convenient site. Participants may also attend by video or audio conference if approved by Project Manager.
- F. In addition to agenda items specified in Section 01 3000, review following:
 - 1. Review condition of floor with regards to compliance with concrete installation tolerances and other work necessary to prepare floors for installation of flooring.
 - 2. Review Testing Agency testing report of Concrete Moisture of concrete:
 - a. Installer may verify Concrete Moisture of concrete.
- G. Review condition of floor regarding compliance with concrete installation tolerances and other work necessary to prepare floors for installation of flooring.

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- H. Review additional agenda items all related flooring sections.
- I. Scheduling:
 - 1. Concrete Moisture Testing:
 - a. General Contractor Responsibility to provide:
 - 1) Maintain ambient temperatures and relative humidity conditions as specified in Field Conditions in Part 1 of this specification before Moisture Testing Agency will test for concrete moisture.
 - 2) Notify Owner to contact Moisture Testing Agency when building is enclosed and temperature and relative humidity meet requirements for testing.
 - 3) Provide access for and cooperate with Moisture Testing Agency.
 - b. Owner's Representative Responsibility to provide:
 - 1) Provide following information to Moisture Testing Agency at time of notification:
 - (a) Digital copy of floor plan(s).
 - (b) Indicate different flooring material areas and which rooms on floor plan(s) and finish schedule requiring additional tests if required.
 - (c) Digital copy of Specification Section 09 0561 (this specification) and Section 01 4523 'Testing And Inspecting Services' from Contract Documents for this Project.
 - 2) Carpet Flooring:
 - (a) Carpet Installer at his/her discretion may test concrete slab for Alkalinity and Concrete Moisture Vapor Emission Rate (MVER) before installation of Owner Furnished carpet.
 - (b) If carpet area is tested, Installer to coordinate with Owner's Representative for following:
 - (1) Scheduling and coordination for maintain ambient temperatures and relative humidity conditions required before Moisture Testing of concrete moisture.
 - (2) Access to Building for concrete moisture testing.
 - c. Testing Agency will provide Moisture Testing for following flooring areas:
 - 1) Wood Athletic Flooring:
 - (a) Moisture Testing for Wood Athletic Flooring required.
 - (b) Moisture Testing and Testing Report requirements specified in Informational Submittals.
 - (c) See individual flooring section for additional scheduling requirements if required.

1.04 SUBMITTALS

- A. Informational Submittals:
 - 1. Certificates:
 - a. Concrete Slab Moisture Technician:
 - 1) Provide current ICRI 'Concrete Slab Moisture Testing Technician, Tier 2, Grade 1' Certification.
 - b. Certified Standard Moisture Testing Report:
 - 1) Report to include following:
 - (a) Available to Testing Agency from Owner's Representative:
 - (1) Project Name.
 - (2) Property Number.
 - (b) Test date.
 - (c) Executive summary.
 - (d) Certified Moisture and Alkalinity (pH) Test Report.
 - (e) Project floor plan.
 - (f) Project photographs including following information on each photograph:
 - (1) Site location.
 - (2) Test hole number.

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- (3) Serial number probe.
 - (4) Relative Humidity (RH), Alkalinity (pH) and temperature reading.
 - (5) Property number.
- (g) Outlier Test (As specified in Field Quality Control Testing in Part 3 of this specification:
 - (1) Note test as Outlier Test for which hole number was conducted.
 - (2) Site location.
 - (3) Test hole number.
 - (4) Serial number probe.
 - (5) Relative Humidity (RH), Alkalinity (pH) and temperature reading.
 - (6) Property number.
- 2) At completion of testing, Testing Agency shall submit Concrete Moisture Test Report for each flooring system included for project to following:
 - (a) One (1) copy to Owner's Representative.
- c. Certified Comprehensive Moisture Testing Report:
 - 1) Report to include following:
 - (a) Available to Testing Agency from Owner's Representative:
 - (1) Project Name.
 - (2) Property Number.
 - (b) Test date.
 - (c) Executive summary.
 - (d) Certified Moisture and Alkalinity (pH) Test Report.
 - (e) Project floor plan.
 - (f) Test results mapping diagrams.
 - (g) Project photographs including following information on each photograph:
 - (1) Site location.
 - (2) Test hole number.
 - (3) Serial number probe.
 - (4) Relative Humidity (RH), Calcium Chloride (CaCl₂), Alkalinity (pH) and temperature reading.
 - (5) Property number.
 - 2) At completion of testing, Testing Agency shall submit Concrete Moisture Test Report for each flooring system included for project to following:
 - (a) One (1) copy to Owner's Representative.
- 2. Special Procedure Submittals:
 - a. 'Concrete Moisture Testing Request and Proposal':
 - 1) Provided by Owner's Representative for each project to Testing Agency:
 - (a) Testing Agency to fill out form with following information and return as instructed:
 - (1) Review request information.
 - (2) Add information as requested.
 - (3) Sign form.
 - (4) E-mail form back to Owner's Representative.
 - b. Certified Moisture Testing Report Distribution:
 - 1) Owner's Representative responsibilities after receiving Concrete Moisture Test Report:
 - (a) Provide copies to following:
 - (1) One (1) copy to Architect.
 - (2) One (1) copy to Contractor.
 - 2) General Contractor responsibilities after receiving Concrete Moisture Test Report from Owner's Representative:
 - (a) Provide copies to following:
 - (1) One (1) copy to Wood Athletic Flooring Manufacturer.

- c. Moisture Testing Report Instructions:
 - 1) Wood Athletic Flooring area testing for Alkalinity and Concrete Slab Moisture by Testing Agency Testing:
 - (a) If Testing Agency Testing Results are eighty-five (85) percent RH or more as recommended by MFMA and/or pH level 9 or higher: (1) Remediation to be discussed with Owner's Representative and Athletic Wood Flooring Manufacturer. For questions, contact Church Headquarters Wood Athletic Flooring Contract Manager in Purchasing at markdouglass@churchofjesuschrist.org before proceeding with installation.
- B. Qualification Statement:
 - 1. Concrete Slab Moisture Technician:
 - a. Provide Qualification documentation if requested by Architect or Owner.
- C. Closeout Submittals:
 - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
 - a. Record Documentation:
 - 1) Testing and Inspection Reports:
 - (a) Testing Agency Testing Reports of Alkalinity and Concrete Moisture testing.

1.05 QUALITY ASSURANCE

- A. Owner will provide Field Testing for Alkalinity and Concrete Moisture Vapor Emission Rate (MVER) of concrete slab before flooring (except carpet) installation as specified in Field Quality Control in Part 3 of this specifications:
 - 1. See Section 01 1000: 'Multiple Contract Summary'.
 - 2. See Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
- B. Acceptable Testing Agency:
 - 1. See 'Agreement Between Owner And Testing Agency For Testing And Inspection Services (U.S.)' or 'Agreement Between Owner And Testing Agency For Testing And Inspection Services (Canada)'.
 - a. Equal as approved by Architect or Owner's Representative before bidding. See Section 01 6000.
 - 2. Existing Projects.
 - a. Flooring projects do not need to use Agreement Between Owner And Testing Agency listed in previous paragraph but Owner Testing Agency must:
 - 1) Meet Testing Agency Testing requirements of this specifications including 'Concrete Slab Moisture Technician' Qualifications.
- C. Testing Agency Qualifications: Independent testing agency experienced in the types of testing specified.
 - 1. Submit evidence of experience consisting of at least 3 test reports of the type required, with project Owner's project contact information.
 - 2. ICRI 'Concrete Slab Moisture Testing Technician, Tier 2, Grade 1' Certification:
 - a. Certification includes three (3) hour education session, written exam, and field testing performance exam based on ASTM standards.
 - b. Certification valid for period of five (5) years from date of testing completion.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, handle, and protect products in accordance with manufacturer's instructions and recommendations.
- B. Deliver materials in manufacturer's packaging; include installation instructions.
- C. Keep materials from freezing.

1.07 FIELD CONDITIONS

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- A. Maintain ambient temperature in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 65 degrees F or more than 85 degrees F.
- B. Maintain relative humidity in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 40 percent and not more than 60 percent.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PREPARATION

- A. Flooring Preparation:
 - 1. General:
 - a. Prepare floor substrate in accordance with ASTM F710, 'Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring' (This standard is used for preparing concrete floors for all flooring).
 - 1) Required RH test and alkalinity test of concrete slab has been performed.
 - b. Concrete floor slab patching:
 - 1) Cracks, chips and joints must be properly patched or repaired.
 - c. Concrete surface cured, clean, dry, and free of dirt, dust, grease, wax, and other foreign substances that will compromise flooring installations.
 - 1) Removal of curing compounds.
 - 2) Remove paint, sealer, grease, oil, silicone sealants, and other materials incompatible with flooring adhesives.
 - 3) Removal of overspray from painted walls (essential so glue will stick).
 - d. Vacuum and damp mop floor areas to receive flooring before flooring installation.
 - 2. Carpeted floor areas:
 - a. Prepare floor substrate in accordance with Carpet And Rug Institute (CRI) best practices to receive carpet installation and to provide installation that meets Carpet Manufacturer's warranty requirements.
 - 3. Carpet Accessories:
 - a. Sundry items, such as adhesives, shall be conditioned to building ambient conditions before use.

3.02 FIELD QUALITY CONTROL

- A. Field Tests:
 - 1. General:
 - a. Owner is responsible for Quality Assurance. Quality assurance performed by Owner will be used to validate Quality Control performed by Contractor.
 - b. Quality Control is sole responsibility of Contractor as specified in Section 01 4523 'Testing And Inspection Services'.
 - 2. Concrete Moisture and Alkalinity:
 - a. Testing Agency will test interior concrete slabs before installation of floor coverings as directed by Architect and will include following:
 - 1) Interior concrete slab areas to be tested:
 - (a) All areas with moisture sensitive flooring.
 - 2) Standard Moisture Testing required of interior concrete slabs on grade:
 - (a) General:
 - (1) Testing for concrete moisture shall be taken at concrete slab substrates scheduled to receive flooring as specified in Contract Drawings for complete flooring installation.
 - (2) Outlier Test: If one (1) test is abnormally different from other moisture tests, then additional test should be done. Outlier will be defined in this specification as moisture test that is at least fifteen (15) percent higher or lower than other tests at project building completed same day:
 - (3) Retesting should be done within 5 feet (1.50 m) feet of original test hole.

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- (4) Contact Owner's Representative for the need to outlier test and additional testing fees will apply.
 - (5) Include required tests for carpeting and additional tests at each different type of flooring system included for project.
- (b) Meetinghouse:
 - (1) Test sites required where floor coverings will be installed. Provide additional tests at each different type of flooring system included for project. Following are recommended tests required:
 - (2) Three (3) minimum tests per 1000 sq ft in sensitive flooring area.
 - (3) Provide additional testing as directed by Architect if necessary.
- 3) Comprehensive Moisture Testing: Test for moisture in concrete slab when known moisture problems exist such as high-water table, or when RH testing alone does not provide adequate understanding of concrete slab moisture conditions that may adversely affect flooring material:
 - (a) Contact Owner's Representative before conducting additional testing stating why need for addition testing and to approve additional fees to testing.
 - (b) Perform Comprehensive Moisture Testing where floor coverings will be installed including following tests:
 - (1) Calcium Chloride Testing referencing ASTM F1869.
 - (2) Relative Humidity In-Situ Probe Testing referencing ASTM F2170.
 - (c) Number of tests to be determined by Testing Agency.
- 4) Calcium Chloride Vapor Emission CaCl₂ Moisture Vapor Emission Test (MVER) (test used only with Comprehensive Moisture Testing):
 - (a) Surface (MVER) testing shall be performed in accordance with ASTM F1869:
 - (1) Anhydrous Calcium Chloride (CaCl₂) Moisture Vapor Emission Test requires 60 to 72 hours to complete.
 - (2) Prior to placement of anhydrous calcium chloride tests, actual test area shall be clean and free of all foreign substances.
 - (3) At start of testing, weigh dish of anhydrous calcium chloride, including tape used to seal container, container lid, and label which should be affixed to lid. Record weight to nearest 0.1 g on container label along with starting time to nearest $\pm 1/4$ hour.
 - (4) Lightly grind 20 in x 20 in (508 mm x 508 mm) area to produce surface profile equal to International Concrete Repair Institute (ICRI) surface profile CSP-1 to CSP-2.
 - (5) At end of testing, weigh dish of anhydrous calcium chloride, including tape used to seal container, container lid, and label which should be affixed to lid. Record weight to nearest 0.1 g on container label along with ending time to nearest $\pm 1/4$ hour.
 - (b) Test Report shall be submitted as specified in Informational Submittals in Part 1 of this specification.
- 5) Alkalinity Testing (pH) Test:
 - (a) Testing shall be performed in accordance with ASTM F710.
 - (b) Test with pH meter or pH paper.
 - (c) Testing shall be taken at every location and at each time concrete moisture test is performed at those locations.
 - (d) Clean floor to remove all oil, dirt, dust and any floor coating or sealer.
 - (e) Lightly grind, sand, or bead blasting. Do not remove more than 1/8 inch (3 mm) of concrete.
 - (f) Removal of more than 1/8 inch (3 mm) may give high pH reading.
 - (g) Failure to remove laitance will produce low, inaccurate pH reading.

- (h) Place several drops of water on clean surface, forming puddle approximately 1 inch (25 mm):
- (i) Allow puddle to set for sixty (60) ± five (5) seconds, then dip pH paper or meter into water.
- (j) Remove immediately and record test result.
- (k) Testing to be performed concurrently with concrete moisture testing.
- (l) Test Report shall be submitted as specified in Informational Submittals in Part 1 of this specification.

B. Approved Concrete Moisture Tests:

1. Concrete Moisture Test (test used with Standard Moisture and Comprehensive Moisture Testing if included for project). See Section 01 6200:
 - a. Relative Humidity (RH) testing using in-situ probes in accordance with ASTM F2170 testing requirements:
 - 1) Check calibration of measuring instrument.
 - 2) Building ambient conditions are met before testing.
 - 3) Drill Hole:
 - (a) Drill and prepare test holes as per ASTM F2170 (correct hole-depth and hole diameter are required).
 - (b) Drill holes equal to forty (40) percent of slab's thickness for concrete slabs on grade and twenty (20) percent of slab's thickness for suspended concrete slabs (hole must be perpendicular (90 deg) to surface).
 - 4) Clean Hole:
 - (a) Follow Manufacturer's installation instructions for cleaning holes and inserting sensor.
 - 5) Insert Sensor:
 - (a) Follow Manufacturer's installation instructions for inserting sensor.
 - 6) Readings:
 - (a) Follow Manufacturer's installation instructions for taking readings.
 - (b) Two (2) hours after installation of sensor, RH reading will be recorded. (Two (2) hour read is in lieu of the seventy-two (72) hour ASTM standard)
 - 7) Future Testing:
 - (a) For future readings, replace protective cap by snapping it back into sensor.
 - 8) Test Report shall be submitted as specified in Informational Submittals in Part 1 of this specification.
 - (a) For future readings, replace protective cap by snapping it back into sensor.
 - (b) Approved Products. See Section 01 6200:
 - (1) Concrete moisture testing meter: Rapid RH 4.0 EX with Touch-n-Sense Technology and Rapid RH EX Smart Sensors by Wagner Meters, Rogue River, OR www.wagnermeters.com.

3.03 PROTECTION

- A. Cover prepared floors with building paper or other durable covering.
- B. Concrete testing proposal

Concrete Moisture Testing Request and Proposal

Owner's Representative to complete Concrete Moisture Testing Request section below. Send completed form to Testing Agency. Testing Agency will complete Concrete Moisture Testing Proposal section and submit to Owner's Representative.

Agreement Between Owner And Testing Agency For Testing And Inspection Services (U.S.) and (Canada)

Project Information

Project Name:		Date:
Project Address:		Property Number:
City:		Plan Type (New Construction Only):
State:	Zip Code:	Project Type: New Construction _____ Existing _____
Facility Type: <input type="checkbox"/> Meetinghouse <input type="checkbox"/> CES/S&I <input type="checkbox"/> Temple <input type="checkbox"/> Residential <input type="checkbox"/> Family History <input type="checkbox"/> Higher Education <input type="checkbox"/> Welfare Facility		
Type of New Flooring to be Installed (check all that apply): <input type="checkbox"/> Wood Athletic Flooring <input type="checkbox"/> Resilient Tile <input type="checkbox"/> Resinous Flooring <input type="checkbox"/> Seamless Flooring <input type="checkbox"/> Synthetic Athletic Flooring		
Type of Concrete Slab: <input type="checkbox"/> Below grade <input type="checkbox"/> On grade <input type="checkbox"/> Above Grade / Suspended		Age of Slab? _____ Years _____ Months

Billing and Owner Contact Information (Owner's Representative)

Submit Quote and Report to: Project Manager _____ Facilities Manager _____		
Project Manager:	Phone:	E-mail:
Facilities Manager:	Phone:	E-mail:
Billing Address (Send Report to this Address):	Street Address:	
City:	State:	Zip Code:

Documents Provided to Testing Agency (Owner's Representative to provide the following to Testing Agency):

- Digital copy of floor plans(s) indicating different flooring material areas.
- Indicate which areas on floor plans(s) and/or finish schedule requiring additional tests (if required).
- Digital copy of Specification Section 09 0503 'Flooring Substrate Preparation' and Section 01 4523 'Testing And Inspection' from Contract Documents for this project.

New Construction (Large Meetinghouse and Welfare Projects): Allow thirty (30) days for testing agency to schedule testing. Testing and report to be completed 30 days prior to flooring installation.	Carpet Installation Date	Rush Service Requested Yes _____ No _____
New Construction (Small Meetinghouse, R&I, and Projects with Existing Concrete Slab): Allow thirty (30) days for testing agency to schedule testing. Testing and report to be completed 15-10 days prior to flooring installation.	Proposed Testing Date	Number of Tests (Section 09 0503)

Reference information:

Testing specified in Section 09 0503 'Flooring Substrate Preparation' for floor preparation and ambient condition requirements to be performed prior to flooring insulation and Section 01 4523 'Testing And Inspection' for administrative requirements.

Concrete Moisture Testing Proposal

Proposal #:

Testing Agency Contact Information

Testing Agency Name:	Contact:	Phone:
Address:	E-mail:	Fax:

Directions: Use this document to provide proposal for testing by doing following:

Review request Information above. Email proposal to Owner's Representative.

Scope of Work	Comments	Cost
Standard Testing		\$
Outlier Test		\$
Comprehensive Moisture Testing		\$
Additional Testing (if requested by Owner or Architect)		\$
Total		\$

Signatures - This form must be signed before testing can proceed.

Testing Agency:	Owner's Representative:
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Concrete Moisture Testing Request and Proposal

May 8, 2018

END OF SECTION

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**SECTION 09 2116
GYPSUM BOARD ASSEMBLIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Performance criteria for gypsum board assemblies.
- B. Metal stud wall framing.
- C. Metal channel ceiling framing.
- D. Resilient sound isolation clips.
- E. Acoustic insulation.
- F. Gypsum sheathing.
- G. Cementitious backing board.
- H. Gypsum wallboard.
- I. Joint treatment and accessories.
- J. Textured finish system.

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Building framing and sheathing.
- B. Section 06 1000 - Rough Carpentry: Wood blocking product and execution requirements.

1.03 REFERENCE STANDARDS

- A. ASTM C11 - Standard Terminology Relating to Gypsum and Related Building Materials and Systems 2018b.
- B. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board 2017 (Reapproved 2022).
- C. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing 2017.
- D. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products 2020.
- E. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board 2020.
- F. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications 2022.
- G. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness 2022.
- H. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs 2022.
- I. ASTM C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base 2019.
- J. ASTM C1178/C1178M - Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel 2018.
- K. ASTM C1396/C1396M - Standard Specification for Gypsum Board 2017.
- L. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.
- M. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements 2009 (Reapproved 2016).
- N. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials 2022.

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- O. ASTM E413 - Classification for Rating Sound Insulation 2022.
- P. GA-214 - Levels of Finish for Gypsum Panel Products 2021.
- Q. GA-216 - Application and Finishing of Gypsum Panel Products 2021.
- R. GA-600 - Fire Resistance and Sound Control Design Manual 2021.
- S. GA-801 - Handling and Storage of Gypsum Panel Products: A Guide for Distributors, Retailers, and Contractors 2017.
- T. UL 263 - Standard for Fire Tests of Building Construction and Materials Current Edition, Including All Revisions.
- U. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.
 - 1. Schedule MANDATORY pre-installation conference immediately before installation of gypsum wallboard.
 - 2. In addition to agenda items specified in Section 01 3000, review following:
 - a. Finish requirements necessary for installation of finish materials over gypsum wallboard, and location and installation of ceramic tile backerboard.

1.05 SUBMITTALS

- A. Product Data:
- B. Test Reports: For stud framing products that do not comply with ASTM C645 or ASTM C754, provide independent laboratory reports showing maximum stud heights at required spacings and deflections. Also provide fire test results or assembly diagrams and numbers confirming products used will provide required fire ratings with installation configurations used.
- C. Samples: Submit two samples of predecorated gypsum board, 12 by 12 inches in size, illustrating finish color and texture.
 - 1. Light Orange Peel Texture:
 - a. Provide minimum of three (3) 24 inch (600 mm) square control samples on primed gypsum wallboard of 'light orange peel' texture to show possible variations.
 - 2. Light Skip Trowel Texture:
 - a. Provide minimum of three (3) 24 inch (600 mm) square control samples on primed gypsum wallboard of 'light orange peel' texture to show possible variations.
 - 3. Hawk and Trowel, Multi-Directional (lightly sanded) Texture:
 - a. Provide minimum of three (3) 24 inch (600 mm) square control samples on primed gypsum wallboard of 'multi-directional' texture (70/30, 80/20, and 90/10) to show possible variations.
- D. Field Samples:
 - 1. Before performing work of this Section, prepare control samples.
 - 2. Architect will inspect control sample at pre-installation conference following preparation of control sample. When sample is approved, work of this Section may proceed. Approved samples will be kept at site at all times work of this section is being performed.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to project site in unopened containers clearly labeled with manufacturer's name and identification of contents.
- B. Follow recommendations of GA-801 Guide for Handling and Storage of Gypsum Panel Products unless local, state or federal laws or agency rules differing from the recommendations shall take precedence.
- C. Store materials in dry and clean location until needed for installation. During installation, handle in a manner that will prevent marring and soiling of finished surfaces.

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- D. Store material under roof and keep dry and protected against damage from weather, condensation, direct sunlight, construction traffic, and other causes. Stack gypsum board flat to prevent sagging.

1.07 FIELD CONDITIONS

A. Ambient Conditions:

1. Comply with ASTM C840 or GA-216 requirements, whichever are more stringent:
 - a. Do not install interior products until installation areas are enclosed and conditioned.
 - 1) Temperature shall be 50 deg F (10 deg C) and 95 deg F (35 deg C) maximum day and night during entire joint operation and until execution of Certificate of Substantial Completion.
 - 2) Provide ventilation to eliminate excessive moisture.
 - 3) Avoid hot air drafts that will cause too rapid drying.
 - b. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

- A. Provide completed assemblies complying with ASTM C840 and GA-216.
 1. See PART 3 for finishing requirements.

2.02 BOARD MATERIALS

A. Manufacturers - Gypsum-Based Board:

1. American Gypsum Company: www.americangypsum.com/#sle.
2. CertainTeed Corporation: www.certainteed.com/#sle.
3. Georgia-Pacific Gypsum: www.gpgypsum.com/#sle.
4. National Gypsum Company: www.nationalgypsum.com/#sle.
5. PABCO Gypsum: www.pabco gypsum.com/#sle.
6. USG Corporation: www.usg.com/#sle.

B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut, long edges tapered.

1. General:
 - a. Size:
 - 1) Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.
 - b. Quality Standard:
 - 1) Core: Fire-resistant rated gypsum core.
 - 2) Complies with Type X requirements of ASTM C1396/C1396M (Section 5).
 - 3) Surface paper: Face paper suitable for painting.
 - 4) Long edges: Tapered edge.
2. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
3. At Assemblies Indicated with Fire-Resistance Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
4. Thickness:
 - a. Vertical Surfaces: 5/8 inch.
 - b. Ceilings: 5/8 inch.
5. Paper-Faced Products:
 - a. American Gypsum Company; LightRoc Gypsum Wallboard: www.americangypsum.com/#sle.
 - b. American Gypsum Company; FireBloc Type X Gypsum Wallboard: www.americangypsum.com/#sle.
 - c. CertainTeed Corporation; Type X Drywall: www.certainteed.com/#sle.
 - d. Georgia-Pacific Gypsum; ToughRock: www.gpgypsum.com/#sle.
 - e. Georgia-Pacific Gypsum; ToughRock Fireguard X: www.gpgypsum.com/#sle.

- f. Gold Bond Building Products, LLC provided by National Gypsum Company; Gold Bond Fire-Shield Gypsum Board: www.goldbondbuilding.com/#sle.
- C. Impact Resistant Wallboard:
 - 1. Type: Fire-resistance-rated Type X, UL or WH listed.
 - 2. Thickness: 5/8 inch.
 - 3. Edges: Tapered.
 - 4. Paper-Faced Products:
 - a. Gold Bond Building Products, LLC provided by National Gypsum Company; Gold Bond XP Hi-Impact Gypsum Board: www.goldbondbuilding.com/#sle.
 - b. USG; Fiberrock VHI (Very High Impact) Abuse-Resistant Board.
- D. Backing Board For Wet Areas:
 - 1. Glass Mat Faced Board: Coated glass mat water-resistant gypsum backing panel.
 - a. Fire-Resistance-Rated Type: Type X core, thickness 5/8 inch.
 - b. Square edges.
 - c. Products:
 - 1) DensShield Fireguard Type X by Georgia Pacific.
 - 2) GlasRoc Tilebacker Type X by CertainTeed.

2.03 GYPSUM BOARD ACCESSORIES

- A. Manufacturers:
 - 1. Manufacturer Contact List:
 - a. Kinetics Noise Control, Dublin, OH www.kineticsnoise.com.
 - b. Magnum Products, Lenaxa, KS www.levelcoat.com.
 - c. National Gypsum, Charlotte, NC www.nationalgypsum.com.
 - d. Soundproofing Co, San Marcos, CA www.soundproofing.org.
 - e. United States Gypsum Co, Chicago, IL www.usg.com.
 - f. Westpac Materials Inc, Orange, CA www.westpacmaterials.com.
 - g. Wm. Zinsser & Co, Somerset, NJ www.zinsser.com.
- B. Corner And Edge Trim:
 - 1. Metal, paper-faced metal, paper-faced plastic, or solid vinyl meeting requirements of ASTM C1047. Surfaces to receive bedding cement treated for maximum bonding.
- C. Control Joint:
 - 1. Bent zinc sheet with V-shaped slot, perforated flanges, covered with plastic tape meeting requirements of ASTM C1047.
- D. Furring Channels:
 - 1. Quality Standards:
 - a. Walls: Galvanized DWFC-25.
 - b. Ceilings: Galvanized DWFC-20.
 - 2. Accessories as required by Manufacturer's fire tests to provide necessary fire ratings.
- E. Acoustic Insulation: ASTM C665; preformed glass fiber, friction fit type, unfaced. Thickness: 2 inch.
- F. Acoustic Sealant: Acrylic emulsion latex or water-based elastomeric sealant. Supplied and installed in accordance with ASTM Standards. Including but not limited to ASTM C919-19; do not use solvent-based non-curing butyl sealant.
- G. Finishing Accessories: ASTM C1047, extruded aluminum alloy (6063 T5) or galvanized steel sheet ASTM A924/A924M G90, unless noted otherwise.
 - 1. Types: As detailed or required for finished appearance.
 - 2. Special Shapes: In addition to conventional corner bead and control joints, provide U-bead at exposed panel edges.
- H. Beads, Joint Accessories, and Other Trim: ASTM C1047, rigid plastic, galvanized steel, or rolled zinc, unless noted otherwise.

1. Expansion Joints:
 - a. Type: V-shaped metal with factory-installed protective tape.
- I. Joint Materials: Best grade or ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
 1. Paper Tape: 2 inch wide, creased paper tape for joints and corners, except as otherwise indicated.
 2. Joint Reinforcing:
 - a. Paper reinforcing tape acceptable to Gypsum Board Manufacturer.
 3. Joint Compound: Drying type, vinyl-based, ready-mixed. Best grade or type recommended by Board Manufacturer and meeting requirements of ASTM C475/C475M.
 - a. Use Taping Compound for first coat to embed tape and accessories.
 - b. Use Taping Compound or All-Purpose Compound for subsequent coats except final coat.
 - c. Use Finishing Compound for final coat and for skim coat.
- J. Finishing Compound: Surface coat and primer, takes the place of skim coating.
- K. High Build Drywall Surfer: Vinyl acrylic latex-based coating for spray application, designed to take the place of skim coating and separate paint primer in achieving Level 5 finish.
 1. Products:
 - a. Sheetrock First Coat by USG.
 - b. Prep Coat by Westpac Materials.
 - c. Level Coat by Magnum Products.
 - d. Equal as approved by Architect before bidding. See Section 01 6200.
- L. Primer On Surfaces To Receive Wallcovering:
 1. White, self-sizing, water based, all purpose wallcovering primer.
 2. Acceptable Products:
 - a. Shieldz Universal Pre-Wallcovering Primer by Wm. Zinsser and Company.
- M. Primer / Surfer On Surfaces To Receive Texturing:
 1. Acceptable Products:
 - a. Sheetrock First Coat by USG.
 - b. Prep Coat by Westpac Materials.
 - c. Level Coat by Magnum Products.
 - d. Equal as approved by Architect before bidding. See Section 01 6200.
- N. Textured Finish Materials: Latex-based compound; plain.
 1. Products:
 - a. ProForm Perfect Spray EM/HF by National Gypsum.
 - b. Sheetrock Wall & Ceiling Texture by US Gypsum.
- O. Fasteners:
 1. Bugle head screws meeting requirements of ASTM C1002:
 - a. Gypsum Board:
 - 1) Type W: For fastening gypsum board to wood members, of length to penetrate wood framing 5/8 inch (15.9 mm) minimum.
 - 2) Type S: For fastening gypsum board to steel framing and ceiling suspension members, of length to penetrate steel framing 3/8 inch (9.5 mm) minimum.
 - b. Glass Mat Gypsum Tile Backer:
 - 1) Wood Framing: 11 ga (0.1233 in) (3.1318 mm), galvanized with 7/16 inch (11 mm) head, hot dipped. Screws: Type W or Type S Hi-Lo, bugle head, rust resistant.
 - 2) Light-gauge metal framing: Type S Hi-Lo, bugle or wafer head, self-tapping, rust resistant. Hi-Lo screws.
 - 3) Heavy-gauge metal framing: Type S-12 Hi-Lo, bugle or wafer head, rust resistant.

- P. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inches in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion-resistant.
- Q. Screws for Fastening of Gypsum Panel Products to Steel Members from 0.033 to 0.112 inch in Thickness: ASTM C954; steel drill screws, corrosion-resistant.
- R. Screws for Fastening Gypsum Sheathing: Bugle head screws as recommended by Sheathing Manufacturer and meeting requirements of ASTM C1002, corrosion resistant treated.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that project conditions are appropriate for work of this section to commence.
- B. Examine gypsum board before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Notify Architect of unsuitable conditions in writing.
 - 1. Do not install board over unsuitable conditions.
- D. Commencement of Work by installer is considered acceptance of substrate.

3.02 ACOUSTIC ACCESSORIES INSTALLATION

- A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.
- B. Sound Isolation Tape: Apply to vertical studs and top and bottom tracks/runners in accordance with manufacturer's instructions.
- C. Acoustic Sealant: Install in accordance with manufacturer's instructions.
 - 1. Place one bead continuously on substrate before installation of perimeter framing members.
 - 2. Place continuous bead at perimeter of each layer of gypsum board.
 - 3. Seal around all penetrations by conduit, pipe, ducts, and rough-in boxes, except where firestopping is provided.
- D. Acoustical Shielding: Install in accordance with manufacturer's instructions for application between studs and gypsum board.
- E. Installation shall comply with ASTM C919-19

3.03 BOARD INSTALLATION

- A. Interface With Other Work:
 - 1. Coordinate with Division 06 for location of backblocking for edges and ends of gypsum board and for blocking required for installation of equipment and building specialties.
 - 2. Do not install gypsum board until required blocking is in place.
- B. General: Install and finish as recommended in ASTM C840 or GA-216 unless specified otherwise in this Section.
- C. Mounting Accessories:
 - 1. Furring Channels: Apply with screws through flanges into each framing member.
- D. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.
- E. Single-Layer Nonrated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.
 - 1. Exception: Tapered edges to receive joint treatment at right angles to framing.
- F. Fire-Resistance-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.
- G. Exposed Gypsum Board in Interior Wet Areas: Seal joints, cut edges, and holes with water-resistant sealant.

H. Interior Gypsum Board:

1. General:

- a. Install so trim and reinforcing tape are fully backed by gypsum board. No hollow spaces between pieces of gypsum board over 1/8 inch (3 mm) wide before taping are acceptable.
- b. Rout out backside of gypsum board to accommodate items that extend beyond face of framing, but do not penetrate face of gypsum board, such as metal door frame mounting brackets, etc.
- c. On walls over 108 inches (2 700 mm) high, apply board perpendicular to support.
- d. Butt edges in moderate contact. Do not force in place. Shim to level.
- e. Leave facings true with joint, finishing flush. Vertical work shall be plumb and ceiling surfaces level.
- f. Scribe work closely:
 - 1) Keep joints as far from openings as possible.
 - 2) If joints occur near an opening, apply board so vertical joints are centered over openings.
 - 3) No vertical joints shall occur within 8 inches (200 mm) of external corners or openings.
- g. Install board tight against support with joints even and true. Tighten loose screws.
- h. Caulk perimeter joints in sound insulated rooms with specified acoustical sealant.

2. Ceilings:

- a. Apply ceilings first using minimum of two (2) men.
- b. Use board of length to give minimum number of joints.
- c. Apply board perpendicular to support.
- d. Chapel and Cultural Hall:
 - 1) Single Layer Application:
 - (a) Stagger end joints:
 - (1) End and edge joints of board applied on ceilings shall occur over framing members or be back blocked with 2x4 (38 mm by 89 mm) blocking.
 - (2) Edge joints of board vertically applied on walls shall occur over framing members.
 - (3) 2x4 (38 mm by 89 mm) blocking is required at wall to ceiling transitions and at top of ceiling vault transitions.

3. Fastening:

- a. Apply from center of board towards ends and edges.
- b. Apply screws 3/8 inch (9.5 mm) minimum from ends and edges, one inch (25 mm) maximum from edges, and 1/2 inch (13 mm) maximum from ends.
- c. Spacing:
 - 1) Ends: Screws not over 7 inches (175 mm) on center at edges where blocking or framing occurs.
 - 2) Wood Framed Walls And Ceilings: Screws 7 inches (175 mm) on center in panel field.
 - 3) Metal Framed Walls: Screws 12 inches (300 mm) on center in panel field.
- d. Set screw heads 1/32 inch (0.8 mm) below plane of board, but do not break face paper. If face is accidentally broken, apply additional screw 2 inches (50 mm) away.
- e. Screws on adjacent ends or edges shall be opposite each other.
- f. Drive screws with shank perpendicular to face of board.

4. Trim:

- a. Corner Beads:
 - 1) Attach corner beads to outside corners.
 - (a) Attach metal corner bead with staples spaced 4 inches (100 mm) on center maximum and flat taped over edges of corner bead. Also, apply screw through edge of corner bead where wood trim will overlay corner bead.

- (b) Set paper-faced trim in solid bed of taping compound.
- b. Edge Trim: Apply where gypsum board abuts dissimilar material. Hold channel and 'L' trim back from exterior window and door frames 1/8 inch (3 mm) to allow for caulking.
- I. Glass Mat Gypsum Tile Backer:
 - 1. Apply glass mat gypsum tile backer to framing. Attach using specified fasteners spaced 6 inches (150 mm) on center on edges and into all framing members. Drive screws flush with surface of board.
 - 2. Shim board to be plumb and flat or level and flat, depending on location.
 - 3. Apply reinforcing only at joints where abutting different materials.
- J. Installation on Metal Framing: Use screws for attachment of gypsum board except face layer of nonrated double-layer assemblies, which may be installed by means of adhesive lamination.
- K. Installation on Wood Framing: For rated assemblies, comply with requirements of listing authority. For nonrated assemblies, install as follows:
 - 1. Single-Layer Applications: Screw attachment.

3.04 INSTALLATION OF TRIM AND ACCESSORIES

- A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.
 - 1. Not more than 30 feet apart on walls and ceilings over 50 feet long.
 - 2. At exterior soffits, not more than 30 feet apart in both directions.
- B. Corner Beads: Install at external corners, using longest practical lengths.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.
- D. Decorative Trim: Install at locations shown on drawings and in accordance with manufacturer's instructions.
- E. Exterior Soffit Vents: Install according to manufacturer's written instructions and in locations indicated on drawings. Provide vent area specified.

3.05 JOINT TREATMENT

- A. Glass Mat Faced Gypsum Board and Exterior Glass Mat Faced Sheathing: Use fiberglass joint tape, embed and finish with setting type joint compound.
- B. Paper Faced Gypsum Board: Use paper joint tape, embed with drying type joint compound and finish with drying type joint compound.
- C. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
 - 1. Gypsum Board Surfaces not painted or finished:
 - a. GA-214 Level 1: 'All joints and interior angles shall have tape set in joint compound. Surface shall be free of excess joint compound. Tool marks and ridges are acceptable'.
 - 2. Gypsum Board Surfaces Under Acoustical Tile:
 - a. GA-214 Level 2: 'All joints and interior angles shall have tape embedded in joint compound and wiped with a joint knife leaving a thin coating of joint compound over all joints and interior angles. Fastener heads and accessories shall be covered with a coat of joint compound. Surface shall be free of excess joint compound. Tool marks and ridges are acceptable. Joint compound applied over the body of the tape at the time of tape embedment shall be considered a separate coat of joint compound and shall satisfy the conditions of this level.
 - b. Note: It is critical that gypsum board ceiling be smooth before installing ceiling tile.
 - 3. Gypsum Board Surfaces to Receive: Wall Covering Type A - Section 09 7226: 'Sisal Wall Covering':
 - a. GA-214 Level 3: 'All joints and interior angles shall have tape embedded in joint compound and one additional coat of joint compound applied over all joints and interior angles. Fastener heads and accessories shall be covered with two separate coats of joint compound. All joint compound shall be smooth and free of tool marks and ridges. Coat prepared surface with specified wall covering primer'.

4. Gypsum Board Surfaces to Receive: Acoustic Wall Fabric Type B - Section 09 7216, 'Vinyl-Coated Fabric Wall Covering':
 - a. GA-214 Level 4: 'All and interior angles shall have tape embedded in joint compound and two separate coats of joint compound applied over all flat joints and one separate coat of joint compound applied over interior angles. Fastener heads and accessories shall be covered with three separate coats of joint compound. All joint compound shall be smooth and free of tool marks and ridges. Coat prepared surface with specified primer'.
 5. Gypsum Board Surfaces to Receive: Painted Texturing - Section 09 9413: 'Interior Textured Finishing':
 - a. GA-214 Level 4: 'All and interior angles shall have tape embedded in joint compound and two separate coats of joint compound applied over all flat joints and one separate coat of joint compound applied over interior angles. Fastener heads and accessories shall be covered with three separate coats of joint compound. All joint compound shall be smooth and free of tool marks and ridges. Coat prepared surface with specified primer'.
 6. Gypsum Board Surfaces to Receive: Smooth Gypsum Board Surfaces:
 - a. GA-214 Level 4: 'All and interior angles shall have tape embedded in joint compound and two separate coats of joint compound applied over all flat joints and one separate coat of joint compound applied over interior angles. Fastener heads and accessories shall be covered with three separate coats of joint compound. All joint compound shall be smooth and free of tool marks and ridges. Coat prepared surface with specified primer'.
- D. Finishing:
1. General:
 - a. Tape and finish joints and corners throughout building as specified below to correspond with final finish material to be applied to gypsum board. When sanding, do not raise nap of gypsum board face paper or paper-faced trim.
 - b. First Coat:
 - 1) Apply tape over center of joint in complete, uniform bed of specified taping compound and wipe with a joint knife leaving a thin coating of joint compound. If metal corner bead is used, apply reinforcing tape over flange of metal corner bead and trim so half of tape width is on flange and half is on gypsum board.
 - 2) Completely fill gouges, dents, and fastener dimples.
 - 3) Allow to dry and sand lightly if necessary to eliminate high spots or excessive compound.
 - c. Second Coat:
 - 1) Apply coat of specified joint compound over embedded tape extending 3-1/2 inches (88 mm) on both sides of joint center. Use finishing compound only if applied coat is intended as final coat.
 - 2) Re-coat gouges, dents, and fastener dimples.
 - 3) Allow to dry and sand lightly to eliminate high spots or excessive compound.
 - d. Third Coat: Apply same as second coat except extend application 6 inches (150 mm) on both sides of joint center. Allow to dry and sand with fine sandpaper or wipe with damp sponge.
 - e. Fourth Coat: Apply same as second coat except extend application 9 inches (425 mm) on both sides of joint center. Allow to dry and sand with fine sandpaper or wipe with damp sponge.

3.06 TEXTURE FINISH

- A. Apply finish texture coating in accordance with manufacturer's instructions and to match approved sample.
- B. Location:
 1. Walls:

- a. Light Orange Peel Texture (or as approved by architect):
 - 1) All areas except those listed in following paragraph.
 - b. Smooth:
 - 1) Mechanical Rooms, Storage Rooms, and other Utility Areas.
- 2. Ceilings:
 - a. Light Orange Peel Texture (or as approved by architect):
 - 1) Bishop's Waiting Areas and corridor transition into Foyers (sides and bottoms of headers).
 - 2) Chapel (Includes soffit and fascia of light cove).
 - 3) High Council Rooms Areas where there is exposed gypsum board (includes soffit and fascia of coffered area at perimeter).
 - 4) Relief Society and Primary Rooms Areas where there is exposed gypsum board (includes soffit and fascia of coffered area at perimeter).
 - b. Smooth Finish (no applied texture) to be applied to the following ceilings:
 - 1) Font.
 - 2) Mechanical Rooms, Storage Rooms, and other Utility Areas.
 - 3) Restrooms.
 - 4) Serving Area.
- C. Finishing:
 - 1. Texture:
 - a. After gypsum board is taped, sanded, and primed, apply texture. Closely match samples accepted by Architect.
 - 1) 1) After wall has been textured, apply priming and paint as specified in Section 09 9123.
 - 2. 3. Smooth:
 - a. a. No applied texture is required. Apply priming and paint as specified in Section 09 9123.

3.07 FIELD QUALITY CONTROL

- A. Non-Conforming Work:
 - 1. Remove and replace panels that are wet, moisture damaged, and mold damaged.
 - a. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - b. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

3.08 TOLERANCES

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

3.09 CLEANING

- A. Remove from site debris resulting from work of this Section including taping compound spills.

END OF SECTION 09 2116

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**SECTION 09 3000
TILING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Tile for floor applications.
- B. Tile for wall applications.

1.02 REFERENCE STANDARDS

- A. A108.21 - Interior Installation of Flowable Hydraulic Cement Underlayment / Self-Leveling Underlayment – 2021.; 2021.
- B. A118.16 - American National Standard Specifications for Flowable Hydraulic Cement Underlayment / Self-Leveling Underlayment; 2021.
- C. ANSI A108.4 - American National Standard Specifications for Installation of Ceramic Tile with Organic Adhesive or Water Cleanable Tile-Setting Epoxy Adhesive; 2019.
- D. ANSI A108.5 - American National Standard Specifications for Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar; 2021.
- E. ANSI A108.6 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grout Epoxy; 1999 (Reaffirmed 2019).
- F. ANSI A108.10 - American National Standard Specifications for Installation of Grout in Tilework; 2017.
- G. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units; 2018.
- H. ANSI A118.3 - American National Standard Specifications for Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy and Water Cleanable Tile-Setting Epoxy Adhesive; 2021.
- I. ANSI A118.4 - American National Standard Specifications for Modified Dry-Set Cement Mortar; 2019.
- J. ANSI A118.6 - American National Standard Specifications for Standard Cement Grouts for Tile Installation; 2019.
- K. ANSI A118.7 - American National Standard Specifications for High Performance Cement Grouts for Tile Installation; 2019.
- L. ANSI A118.11 - American National Standard Specifications for EGP (Exterior Glue Plywood) Latex-Portland Cement Mortar; 2017.
- M. ANSI A118.12 - American National Standard Specifications for Crack Isolation Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation; 2014 (Reaffirmed 2019).
- N. ANSI A118.15 - American National Standard Specifications for Improved Modified Dry-Set Cement Mortar; 2019.
- O. ANSI A137.1 - American National Standard Specifications for Ceramic Tile; 2022.
- P. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2018.
- Q. ASTM C150/C150M - Standard Specification for Portland Cement; 2022.
- R. ASTM C206 - Standard Specification for Finishing Hydrated Lime; 2014 (Reapproved 2022).
- S. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2018.
- T. ASTM C373 - Standard Test Methods for Determination of Water Absorption and Associated Properties by Vacuum Method for Pressed Ceramic Tiles and Glass Tiles and Boil Method for Extruded Ceramic Tiles and Non-tile Fired Ceramic Whiteware Products; 2018.
- U. ASTM C482 - Standard Test Method for Bond Strength of Ceramic Tile to Portland Cement Paste; 2020.

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- V. ASTM C501 - Standard Test Method for Relative Resistance to Wear of Unglazed Ceramic Tile by the Taber Abraser; 2021.
- W. ASTM C627 - Standard Test Method for Evaluating Ceramic Floor Tile Installation Systems Using the Robinson-Type Floor Tester; 2018.
- X. ASTM F3191 - Standard Practice for Field Determination of Substrate Water Absorption (Porosity) for Substrates to Receive Resilient Flooring; 2023.
- Y. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation; 2022.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by affected installers.
- B. In addition to agenda items specified in Section 01 3000, review following:
 - 1. Review installation scheduling, coordination with related work, and placement of tile.
 - 2. Review Manufacturer's installation requirements, submittals, and Installers requirements to assure issuance of Manufacturer's system warranty.
 - 3. Review surface preparation.
 - 4. Review water-proofing and crack isolation membrane requirements.
 - 5. Review tile base installation requirements.
 - 6. Review floor tile grout thickness requirements.

1.04 SUBMITTALS

- A. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.
- B. Shop Drawings: Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, control and expansion joints, thresholds, ceramic accessories, and setting details.
- C. Samples: Mount tile and apply grout on two plywood panels, minimum 24 x 24 inches in size illustrating pattern, color variations, and grout joint size variations.
 - 1. One sample of each type of base tile and trim piece to be used on Project.
- D. Maintenance Data: Include recommended cleaning methods, cleaning materials, and stain removal methods.
- E. Source Quality Control Submittals:
 - 1. Provide Manufacturer documentation indicating proposed materials will satisfy requirements for Manufacturer's Warranty.
- F. Closeout Submittals:
 - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
 - a. Operations and Maintenance Data:
 - 1) Cleaning and maintenance instructions.
 - b. Warranty Documentation:
 - 1) Include copy of final, executed warranty.
 - c. Record Documentation:
 - 1) Manufacturer's Documentation:
 - (a) Source Quality Control Submittal documentation showing materials will satisfy requirements for Manufacturer's Warranty.
 - (b) Manufacturer's cut sheets of materials used in installed system.
 - (c) Tile color and pattern selections.

1.05 QUALITY ASSURANCE

- A. Source Of Materials:
 - 1. Provide materials obtained from one (1) source for each type and color of tile, grout, and setting materials for Manufacturer's system warranty.
- B. Installer Qualifications:

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1. Company specializing in performing tile installation, with minimum of five years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.07 FIELD CONDITIONS

- A. Do not install solvent-based products in an unventilated environment.
- B. Maintain ambient and substrate temperature above 50 degrees F and below 100 degrees F during installation and curing of setting materials.

PART 2 PRODUCTS

2.01 TILE

- A. National Contract Suppliers. See Section 01 6000:
 1. Contact following suppliers to procure components of tile assembly:
 - a. Daltile And Stone, Salt Lake City, UT:
 - 1) Project Coordinators:
 - (a) Patrick Dohrer and Libby Lockington, (801) 487-9901, fax (801) 487-0345, Patrick.Dohrer@daltile.com or Libby.Lockington@daltile.com - www.daltileproducts.com or www.daltilegreenworks.com.
- B. Design Criteria:
 1. General:
 - a. Porcelain Tile:
 - 1) Cove Base with external and internal corner pieces shall be standard grade.
 - b. Ceramic Tile:
 - 1) Tile shall be standard quality, white or off-white body, square or cushion edge, graded in accordance with ANSI A137.1.
 - 2) Square edge, white body, lug type wall tile. Field wall tile shall have two lugs on each edge to assure uniform joint, approximately 0.040 inch (one mm).
 - 3) External and internal corner pieces shall be standard grade.
 - c. Font Floor And Font Stair Treads: Porcelain mosaic tile with non-slip, non-abrasive surface.
 2. Capabilities:
 - a. Porcelain Tile:
 - 1) Water Absorption when tested in accordance with ASTM C373: 0.1 to 0.5 percent.
 - 2) Abrasive Wear Resistance when tested in accordance with ASTM C501: 275 minimum.
 - 3) Breaking Strength when tested in accordance with ASTM C648: 300 lbs minimum.
 - 4) Bond Strength when tested in accordance with ASTM C482: 200 psi minimum.
 - 5) Coefficient of Friction: 0.42 minimum as measured by DCOF (Dynamic Coefficient of Friction) AcuTest method and requirements as per ANSI A137.1.
- C. Description:
 1. Porcelain Tile:
 - a. Floor Tile (Restroom and Serving Area):
 - 1) Option A (Finish Floor Tile with no slope shown on Contract Documents):
 - (a) Tile Size: 12 inches x 12 inches (300 mm x 300 mm).
 - (b) Cove Base: 6 inches x 12 inches (150 mm x 300). Cove base outcorner to match.
 - (c) Approved Products (See Section 01 6000):
 - (1) Harmonist by Daltile.
 - (d) Approved Colors (See Section 01 6000):

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- (1) HM20 Serene.
 - (2) HM21 Tranquil.
 - 2) Option B (Finish Floor Tile with no slope shown on Contract Documents):
 - (a) Tile Size: 12 inches x 24 inches (300 mm x 600 mm).
 - (b) Cove Base: 6 inches x 12 inches (150 mm x 300 mm). Cove base outcorner to match.
 - (c) Approved Products (See Section 01 600):
 - (1) Portfolio by Daltile.
 - (d) Approved Colors (See Section 01 6000):
 - (1) PF04 Dove Grey.
 - (2) PF07 Cream.
 - 3) Option C (Finish Floor Tile with slope shown on Contract Documents):
 - (a) Tile Size: 2 inches (50 mm) square.
 - (b) Cove Base: 6 inches x 12 inches (150 mm x 300). Cove base outcorner to match.
 - (c) Approved Products (See Section 01 6000):
 - (1) Portfolio by Daltile.
 - (d) Approved Colors (See Section 01 6000):
 - (1) PF04 Dove Grey.
 - (2) PF07 Cream.
 - b. Font Floor Tile and Font Stair Tread:
 - 1) Floor and stair treads:
 - (a) Tile Size: 2 inches (50 mm) square.
 - (b) Approved Products (See Section 01 6000):
 - (1) Keystone Mosaics by Daltile.
 - (c) Approved Colors (See Section 01 6000):
 - (1) Floors and Stair Treads: D037 Pepper White.
 - (2) Font Stair Risers and Safety Strips: D169 Waterfall
2. Ceramic Tile:
- a. Wall Tile:
 - 1) Option A (use only with Floor Tile Option A):
 - (a) Tile Size: 6 inches x 6 inches (150 mm x 150 mm).
 - (b) Approved Products (See Section 01 6000):
 - (1) Color Wheel Collection - Classic: Semi-Gloss or Matte by Daltile.
 - (c) Approved Field Colors (See Section 01 6000):
 - (1) Option A: 0135 Almond.
 - (2) Option B: 0100 White.
 - (d) Approved Accent Colors:
 - (1) Option A: 0100 White.
 - (2) Option B: 0135 Almond.
 - 2) Option B (use only with Floor Tile Option B):
 - (a) Tile Size: 8 inches x 24 inches (200 mm x 600 mm).
 - (b) Approved Products (See Section 01 6000):
 - (1) Color Wheel Linear Collection - Classic: Semi-Gloss or Matte by Daltile.
 - (c) Approved Colors (See Section 01 6000):
 - (1) Arctic White 0190.
 - 3) Option C (use only with Floor Tile Option C):
 - (a) Tile Size: 8 inches x 24 inches (200 mm x 600 mm).
 - (b) Approved Products (See Section 01 6000):
 - (1) Color Wheel Linear Collection - Classic: Semi-Gloss or Matte by Daltile.
 - (c) Approved Colors (See Section 01 6000):

- (1) Arctic White 0190.
- b. Font Wall and Ceiling Tile:
 - 1) Tile Size: 6 inch by 6 inch (150 mm by 150 mm).
 - 2) Ceramic Tile Base: 6 inch (150 mm) high, A3602 bullnose base.
 - 3) Approved Products (See Section 01 6000):
 - (a) Color Wheel Collection - Classic: Semi-Gloss or Matte by Daltile.
 - 4) Approved Colors (See Section 01 6000):
 - (a) 0100 White.

2.02 SETTING MATERIALS

- A. Manufacturer's Contact List:
 - 1. Custom Building Products, Santa Fe Springs, CA www.custombuildingproducts.com.
 - a. Contact Information: Kolby Colledge, (801) 362-6100, Kolby.Colledge@cbpmail.net.
 - 2. Dal-Tile Corp., Div. of Mohawk Industries, Dallas, TX www.daltile.com.
 - 3. Laticrete International Inc., Bethany, CT www.laticrete.com.
 - a. Contact Information: Susan Dolata, sldolata@laticrete.com, (203) 859-2069.
 - 4. Mapei Americas Headquarters, Deerfield Beach, FL www.mapei.com.
 - a. Contact Information: Bart A. Wilde (801) 467-2060 [www.bwilde@mapei.com](mailto:bwilde@mapei.com).
 - 5. Schulters Systems L.P., Plattsburgh, NY www.schluter.com.
- B. Materials:
 - 1. Mortar Bed:
 - a. Design Criteria:
 - 1) Portland Cement: Meet requirements of ASTM C150/C150M, Type 1, designation shall appear on bag.
 - 2) Hydrated Lime: Meet Requirements of one of following:
 - (a) ASTM C206.
 - (b) ASTM C207, Type S (designation shall appear on bag).
 - 3) Sand: Clean, washed, well-graded, meeting requirements of ASTM C144 with gradation of 100 percent passing No. 8 sieve with not over five (5) percent passing No. 100 sieve.
 - b. Approved Products:
 - 1) CUSTOM: Quikrete Sand Topping Mix.
 - 2) LATICRETE: 209.
 - 3) MAPEI: 4 to 1.
 - 2. Latex Additive; in lieu of all water:
 - a. Design Criteria:
 - 1) Meet material specification requirements of ANSI A118.4 or ANSI A118.11.
 - 2) Meet ANSI installation specification requirements of ANSI A108.5.
 - 3) Expansion joints complies with TCA method EJ171.
 - b. Approved Products:
 - 1) CUSTOM: Thin-Set Mortar Admix.
 - 2) LATICRETE: 3701 Mortar Admix.
 - 3) MAPEI: Planicrete AC.
 - 3. Flowable Hydraulic Cement Underlayment/Self-Leveling Underlayment:
 - a. Design Criteria:
 - 1) Meet material specification requirements of ANSI A118.16.
 - b. Approved Products. See Section 01 6000:
 - 1) CUSTOM: TECH TechLevel 150 Self-Leveling Underlayment.
 - 2) LATICRETE: NXT.
 - 3) MAPEI: UltraPlan 2.
 - 4. Underlayment Primer:
 - a. Design Criteria:
 - 1) Meet material specification requirements of ANSI A118.16.

- b. Approved Products. See Section 01 6000:
 - 1) CUSTOM: TECH TechPrime A Acrylic Primer.
 - 2) LATICRETE: NXT Primer.
 - 3) MAPEI: Primer T.
- 5. Metal Trim:
 - a. Approved Products. See Section 01 6200:
 - 1) Tile / Carpet Junction: Schluter-RENO-AETK.
 - 2) Tile / Carpet Junction: Profilitec zerotec ZRN.
 - 3) Font Stair Nosing: Schluter-TREP-B, one inch (25 mm), color G or HB as selected by Architect.
 - 4) Font / Stair Nosing: ProfilitecStairtec FL or FS as selected by Architect.
 - 5) Over Expansion Joints In Slabs: Schluter DILEX-BWS, color G, PG, or HB as selected by Architect.
 - 6) Over Expansion Joints in Slabs: Profilitec coflex CAJ.
- 6. Joint Sealants:
 - a. Interior Ceramic Tile Joints are furnished in Section 07 9213 and installed in Section 09 3013 'Ceramic Tiling' including the following:
 - 1) Ceramic and paver cove base inside corners.
 - 2) Ceramic and paver tile joints.
 - 3) Termination joints in showers and fonts.
 - b. Design Criteria:
 - 1) Meet material specification requirements of ASTM C920, Type S, Grade NS, Class 25, Use T, NT, A, I, M and G, ASTM C1248 and ASTM C0794 properties.
 - 2) Meets or exceeds TCNA EJ171 Movement Joint Guidelines for Ceramic, Glass & Stone.
 - c. Approved Products. See Section 01 6000:
 - 1) CUSTOM: 100% Silicone Sealant
 - 2) LATICRETE: Latasil.
 - 3) MAPEI: Mapesil.
- 7. Backer Board Joint Reinforcing: 2 inch (50 mm) wide glass fiber mesh tape.
- 8. Tile Setting Products:
 - a. Use only products of same Manufacturer to validate warranty, unless otherwise acceptable to Ceramic Tile Supplier.
 - b. Use only products that meet Mortar Manufacturer's twenty five (25) year system warranty requirements.
 - c. Latex-Portland Cement Mortar For Floors:
 - 1) Design Criteria:
 - (a) Meet ANSI material specification requirements of ANSI A118.4, ANSI A118.11, ANSI A118.15 and ISO C2TES1P1.
 - (b) Meet ANSI installation specification requirements of ANSI A108.4 and ISO material specification ISO13007 installation material specification and C2ES1P1 performance requirements for adhesive.
 - 2) Approved Products. See Section 01 6000:
 - (a) CUSTOM: ProLite Tile & Stone Mortar or FlexBond Premium Crack Prevention Thin-set Mortar.
 - (b) LATICRETE: Multimax Lite.
 - (c) MAPEI: Keraflex Super.
 - d. Latex/Polymer Modified Portland Cement Mortar For Walls:
 - 1) Design Criteria:
 - (a) Meet ANSI material specification requirements of ANSI A118.4, ANSI A118.11, or ANSI A118.15.

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- (b) Meet ANSI installation specification requirements of ANSI A108.4 or ISO material specification ISO13007 installation material specification and C2ES1 performance requirements for adhesive.
 - 2) Approved Products. See Section 01 6000:
 - (a) CUSTOM: ProLite Tile & Stone Mortar or FlexBond Fortified Thin-Set Mortar.
 - (b) LATICRETE:Multimax Lite.
 - (c) MAPEI: Keraflex Super.
- e. Floor Grout (Epoxy):
 - 1) Design Criteria:
 - (a) Meet ANSI material specification requirements of ANSI A118.3.
 - (b) Meet ANSI installation specification requirements of ANSI A108.6 and ISO material specification ISO13007 RG.
 - 2) Approved Color:
 - (a) CUSTOM: No. 09 Natural Gray.
 - (b) LATICRETE: No. 24 Natural Grey.
 - (c) MAPEI Kerapoxy CQ: No. 11 Sahara Beige.
 - 3) Approved Color (Font Floor only):
 - (a) CUSTOM: No. 165 Delorean Gray.
 - (b) LATICRETE: No. 78 Sterling Silver.
 - (c) MAPEI Kerapoxy CQ: No. 27 Silver.
 - 4) Approved Products. See Section 01 6000:
 - (a) CUSTOM: CEG-Lite 100% Solids Commercial Epoxy Grout.
 - (b) LATICRETE: SpectraLOCK PRO Premium Grout.
 - (c) MAPEI: Kerapoxy CQ (sanded).
- f. Wall Grout (Modified Polymer):
 - 1) Design Criteria:
 - (a) Meet ANSI material specification requirements of ANSI A118.6 or ANSI A118.7.
 - (b) Meet ANSI installation specification requirements of ANSI A108.10 or ISO material specification ISO13007 CG2WA.
 - 2) Color:
 - (a) CUSTOM: No. 381 Bright White.
 - (b) LATICRETE: No. 44 Bright White.
 - (c) MAPEI: No. 00 White.
 - 3) Approved Products. See Section 01 6000:
 - (a) CUSTOM: PolyBlend Non-Sanded Grout or Prism Color Consistent Grout.
 - (b) LATICRETE: Permacolor Grout or Permacolor Select.
 - (c) MAPEI: Keracolor-U Unsanded Polymer-Modified Grout.
- g. Waterproofing Membrane At Restroom Floors and Font:
 - 1) Design Criteria:
 - (a) Meet ANSI installation specification requirements of ANSI A108.10.
 - (b) ANSI installation specification requirements not required.
 - 2) Approved Products. See Section 01 6000:
 - (a) Troweled applied, cement based:
 - (1) LATICRETE: Hydro Ban Cementitious Waterproofing Membrane.
 - (2) MAPEI: Mapelastic 315.
 - (b) Liquid applied, latex based:
 - (1) CUSTOM: RedGard Waterproofing or Crack Prevention Membrane or FractureFree Crack Prevention Membrane.
 - (2) LATICRETE: Hydro Ban or Hydro Ban XP.
 - (3) MAPEI: Mapelastic AquaDefense.
- h. Crack Isolation Membrane:

- 1) Design Criteria:
 - (a) Meet ANSI installation specification requirements of ANSI A118.12.
 - (b) ANSI installation specification requirements not required.
- 2) Approved Products. See Section 01 6000:
 - (a) Flexible, thin, load-bearing, fabric-reinforced:
 - (1) CUSTOM: Crack Buster Pro Crack Prevention Mat Underlayment, with Peel & Stick Primer.
 - (2) LATICRETE: Fracture Ban 40 with Fracture Ban Primer.
 - (3) MAPEI: Mapeguard 2, and Primer SM.
 - (b) Liquid applied, latex based:
 - (1) CUSTOM: RedGard Waterproofing and Crack Prevention Membrane or FractureFree Crack Prevention Membrane.
 - (2) LATICRETE: Hydro Ban or Hydro Ban XP.
 - (3) MAPEI: Mapelastic AquaDefense.
- i. Stone Thresholds:
 - 1) Texture and color variation shall be within limits established by Architect's approved sample.
 - 2) Free of defects that would materially impair strength, durability, and appearance.
 - 3) Finish: 80 grit exterior hone.
 - 4) White marble, one (1) piece, 7/8 inch (22 mm) thick by 2 1/2 inches (64 mm) by door opening width. Cross-section to meet handicap accessibility requirements.
- C. Mixes:
 1. Mortar Beds:
 - a. Floor Mix: One Part Portland Cement, 5 Parts Dry Sand, 4 Part Damp Sand, 1/10 Part hydrated Lime optional.
 - b. Wall Mix: One Part portland cement, 5-1/2 to 7 Parts damp sand, 1/2 Part hydrated lime optional.
 - c. Font One Part portland cement, 4 Parts damp sand. Use waterproofing admixture. Mix dry then add minimum amount of water.

PART 3 EXECUTION

3.01 INSTALLERS

- A. Acceptable Installers:
 1. Meet Quality Assurance Installer Qualifications as specified in Part 1 of this specification.

3.02 EXAMINATION

- A. Verify that subfloor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive tile.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive tile.
- C. Verify that subfloor surfaces are dust free and free of substances that could impair bonding of setting materials to subfloor surfaces.
- D. Verify that concrete sub-floor surfaces are ready for tile installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within limits recommended by tile manufacturer and setting materials manufacturer.
- E. Verify that required floor-mounted utilities are in correct location.
- F. Notify Architect in writing if surfaces are not acceptable to install tile:
 1. Do not lay tile over unsuitable surface.
 2. Commencing installation constitutes acceptance of surfaces and approval of existing conditions.

3.03 PREPARATION

- A. Allow concrete to cure for twenty-eight (28) days minimum before application of mortar bed.

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- B. Protect surrounding work from damage.
- C. Vacuum clean surfaces and damp clean.
- D. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.
- E. Install backer board in accordance with ANSI A108.11 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of setting material to a feather edge.
- F. Prepare substrate surfaces for adhesive installation in accordance with adhesive manufacturer's instructions.

3.04 **INSTALLATION - GENERAL**

- A. Interface with Other Work:
 - 1. Grounds, anchors, plugs, hangers, door frames, electrical, mechanical, and other work in or behind tile shall be installed before tile work is started.
- B. Special Techniques:
 - 1. Install in accordance with following latest TCNA (HB) installation methods:
 - a. Flush Concrete Slabs with crack isolation membrane: TCNA F115.
 - b. Mortar Bed on Concrete Slab: TCNA F111 with reinforcing.
- C. Tolerances:
 - 1. Plane of Vertical Surfaces:
 - a. 1/8 inch in 8 feet (3 mm in 2.450 meters) from required plane shall be plumb and true with square corners.
 - 2. Variation in Slab Grade:
 - a. Plus or minus 1/8 inch (3 mm) in any 10 feet (3.050 m) of floor slab and distance between high point and low point of slab of 1/2 inch (12.7 mm).
 - b. Slab Testing Procedure:
 - 1) Place ends of straightedge on 3/8 inch (10 mm) high shims.
 - 2) Floor is satisfactory if 1/4 inch (6 mm) diameter steel rod rolled under straightedge will not touch anywhere along 10 foot (3.050 m) length and 1/2 inch (12.7 mm) diameter steel rod will not fit under straightedge anywhere along 10 foot (3.050 m) length.
- D. General:
 - 1. Install tile in pattern indicated:
 - a. Align joints when adjoining tiles on floor, base, walls, and trim are same size.
 - b. Adjust to minimize tile cutting and to avoid tile less than half size.
 - c. Center and balance areas of tile if possible.
 - 2. Extend tile into recesses and under equipment and fixtures to form a complete covering without interruption:
 - 3. Maintain heights of tilework in full courses to nearest obtainable dimension where heights are given in feet and inches (meters and millimeters) and are not required to fill vertical spaces exactly.
 - 4. Install cut tile with cuts on outer edges of field:
 - a. Provide straight cuts that align with adjacent materials.
 - b. When possible, smooth cut edges of tile or use appropriate cutter or wet saw to produce smooth cuts.
 - c. Do not install tile with jagged or flaked edges.
 - 5. Terminate tile neatly at obstructions, edges, and corners, without disruption of pattern or joint alignment:
 - a. Fit tile closely where edges are to be covered by trim, escutcheons, or similar devices.
 - 6. Provide straight tile joints of uniform width, subject to variance in tolerance allowed in tile size:
 - a. Make joints smooth and even, without voids, cracks, or excess mortar or grout.

7. Use a beating block and hammer or rubber mallet so faces and edges of individual tiles are flush and level with faces and edges of adjacent tiles, and to reduce lippage.
 8. Accessories in tilework shall be evenly spaced, properly centered with tile joints, and level, plumb, and true to correct projection.
 9. Leave finished installation clean and free of cracked, chipped, broken, unbonded, and otherwise defective tile work.
- E. Application on Concrete Floor:
1. On Mortar Bed:
 - a. Apply mortar bed to depth equal to depression in slab minus 1/2 inch (12.7 mm).
 - b. Properly cure before installing tile.
 2. Clean substrate surface thoroughly.
 - a. Dampen if very dry, but do not saturate.
 3. Install tile with 100 percent contact with mortar bed.
 - a. Obtaining 100 percent contact may require troweling mortar layer on back of each tile before placing on mortar bed.
 4. Install base by flush method (square or thin-lip method is not acceptable):
 - a. Allow for expansion joint directly above any expansion or control joints in slab.
 5. Insert temporary filler in expansion joints.
- F. Application of Mortar:
1. Do not spread more mortar than can be covered within ten (10) to fifteen (15) minutes:
 - a. If 'skinning' occurs, remove mortar and spread fresh material.
 - b. Spread mortar with notches running in one (1) direction, perpendicular to pressing, pushing and pulling of tile during placement.
 2. Install tile before mortar has started initial cure:
 - a. For thin set mortar application, use notch trowel that will achieve the recommended coverage of mortar after tiles have been installed.
 3. Place tile in fresh mortar, press, push and pull tile slightly to achieve as near 100 percent coverage and contact of tile with setting material and substrate as possible:
 - a. Average contact area shall be not less than eighty (80) percent except on exterior or shower installations where contact area shall be ninety-five (95) percent when not less than three (3) tiles or tile assemblies are removed for inspection. The eighty (80) percent or ninety-five (95) percent coverage shall be sufficiently distributed to give full support of the tile.
 - b. Support corners and edges with mortar leaving no hollow corners or edges.
 4. Install so there is 1/8 inch (3 mm) of mortar between tile and substrate after proper bedding:
 - a. Periodically remove sheets or individual tiles to assure proper bond coverage consistent with industry specifications.
 - b. If coverage is found to be insufficient, use a larger size notch trowel.
- G. Application of Grout:
1. Firmly set tile before applying grout:
 - a. This requires forty-eight (48) hours minimum.
 2. Before grouting:
 - a. Remove all paper and glue from face of mounted tile.
 - b. Remove spacers or ropes before applying grouting:
 3. Mixing Grout:
 - a. Use clean buckets and mixing tools:
 - 1) Use sufficient pressure and flow grout in progressively to avoid air pockets and voids.
 - b. Machine mixing of grout is preferred to assure uniform blend. To prevent trapping air bubbles into prepared grout, use slow speed mixer.
 - c. Slake for fifteen (15) minutes.
 - d. Water or latex additives used for mixing with dry grout shall be measured accurately.

4. Before grouting entire area, do a test area to assure there will be no permanent staining or discoloration of tile and to verify that excess grout can be easily removed from tile surface:
 - a. If necessary, pre-coat exposed surfaces of tile with a grout release recommended by Grout Manufacturer to facilitate removal of excess grout.
5. Installing Grout:
 - a. Use caution, when grouting glazed ceramic tiles to prevent scratching or damaging surface of tile.
 - b. Dampen dry joints prior to grouting with sand-portland cement grout, standard sanded cement grout, standard unsanded cement grout, polymer modified sanded tile grout, and polymer modified unsanded tile grout. Do not leave puddles of water in joints before grouting.
 - c. Keep an adequate joint depth open for grouting. Force maximum amount of grout into joints.
 - d. Apply grout to produce full, smooth grout joints of uniform width, and free of voids and gaps
 - 1) Fill joints of cushion edge tile to depth of cushion.
 - 2) Fill joints of square edge tile flush with surface.
 - 3) Fill joint between wall tile and bull-nosed paver tile base with floor grout.
 - e. Install floor tile with grout thickness of 3/16 inch (4.76 mm) maximum.
 - f. Remove excess grout from surface of tile before it loses its plasticity or begins to set.
 - g. Finished grout shall be uniform in color, smooth, and without voids, pin holes, or low spots.
- H. Curing:
 1. Keep installation at 65 to 85 deg F (18 to 30 deg C) during first eight (8) hours of cure. Shade area completely from sun during this period.
- I. Application of Joint Sealants:
 1. Apply joint sealants after grout has cured:
 - a. This requires forty-eight (48) hours minimum.
 2. Before applying sealant:
 - a. Remove spacers or ropes before applying joint sealants.
 - b. Apply backer rod and joint sealants at expansion joints.

3.05 FIELD QUALITY CONTROL

- A. Non-Conforming Work:
 1. Correct any work found cracked, chipped, broken, unbounded and otherwise defective or not complying with contract document requirements at no additional cost to the Owner.

3.06 CLEANING

- A. Clean tile and grout surfaces.
- B. If one has been used, remove grout release and clean tile surfaces so they are free of grout residue and foreign matter:
 1. If a grout haze or residue remains, use a suitable grout haze remover or cleaner.
 2. Flush surface with clean water before and after cleaning.

3.07 PROTECTION

- A. Do not permit traffic over finished floor surface for 4 days after installation.
- B. Close to traffic areas where tile is being set and other tile work being done:
 1. Keep closed until tile is firmly set.
 2. Before, during, and after grouting, keep area clean, dry, and free from foreign materials and airflow that will interfere with setting and curing of grout.
- C. Newly tiled floors shall not be walked on nor worked on without using kneeling boards or equivalent protection of tiled surface.

- D. After cleaning, provide protective covering and maintain conditions protecting tile work from damage and deterioration:
1. Where tiled surfaces will be subject to equipment or wheel traffic or heavy construction traffic, cover protective covering with 1/4 inch (6 mm) hardboard, plywood, or similar material.

END OF SECTION 09 3000

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**SECTION 09 7200
WALL COVERINGS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation and prime painting.
- B. Wall covering and borders.

1.02 REFERENCE STANDARDS

- A. ASTM C557 - Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing 2003 (Reapproved 2017).
- B. ASTM D256 - Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics 2010 (Reapproved 2018).
- C. ASTM D2583 - Standard Test Method for Indentation Hardness of Rigid Plastics by Means of Barcol Impressor 2013a.
- D. ASTM D5319 - Standard Specification for Glass-Fiber Reinforced Polyester Wall and Ceiling Panels 2022.
- E. ASTM D570 - Standard Test Method for Water Absorption of Plastics 2022.
- F. ASTM D638 - Standard Test Method for Tensile Properties of Plastics 2022.
- G. ASTM D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials 2017.
- H. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.
- I. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials Current Edition, Including All Revisions.

1.03 SUBMITTALS

- A. Product Data: Provide data on wall covering and adhesive.
- B. Samples: Submit two samples of wall covering, ____by____ inch in size illustrating color, finish, and texture.
 - 1. Exposed molding and trim showing each type, finish, and color.
- C. Manufacturer's Installation Instructions: Indicate special procedures.
- D. Installer's Qualification Statement.
- E. Closeout Submittals:
 - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
 - a. Operations and Maintenance Data:
 - 1) Cleaning and maintenance instructions.
 - b. Record Documentation:
 - 1) Manufacturers documentation:
 - (a) Manufacturer's literature or cut sheet.
 - (b) Color and pattern selection.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: Minimum one (1) satisfactorily completed installation of comparable quality, scope, similar size, and complexity in past two (2) years before bidding.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Inspect roll materials at arrival on site, to verify acceptability.

1.06 FIELD CONDITIONS

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- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the adhesive or wall covering product manufacturer.
- B. Maintain these conditions 24 hours before, during, and after installation of adhesive and wall covering.

PART 2 PRODUCTS

2.01 WALL COVERINGS

- A. General Requirements:
 - 1. Meet or exceed Fed Spec CCC-W-408A Type II, Class A. Requirements of this standard restrict approvals to flame spread no higher than 25.
- B. Vinyl Coated Fabric Wall Covering:
 - 1. Manufacturers:
 - a. Supplier List:
 - 1) Command Express Wallcovering, distributed by LBI-Boyd Wallcoverings, Glendora, CA.
 - (a) Contact Sandy Bloniarz (606) 376-1454 sandyb@lbiboyd.com.
 - 2) Koroseal Interior Products, Fairlawn, Ohio.
 - (a) Contact National Accounts na@koroseal.com 866-628-2280.
 - 3) Versa Wallcovering, Distributed by Momentum Textiles & Wallcovering.
 - 4) Len-Tex Wallcoverings, Distributed by MDC Wallcoverings, Elk Grove Village, IL.
 - (a) Contact Stephanie Mulford (385) 529-1436 smulford@mdcwall.com.
 - 5) US Vinyl Wallcoverings, Distributed by Wall Resources.
 - (a) Contact Kristen Benko (702) 888-2071 kbenko@wallresources.com.
 - 2. Materials:
 - a. Wallcovering:
 - 1) Supporting Materials: Cotton cloth, Osnaburg, or other suitable materials that will meet above standards.
 - 2) Coating Compound: Formulate from Virgin Polymerized or Copolymerized Vinylchloride resin, plasticized with phosphate or phthalate-ester plasticizers exclusively and be integrally pigmented.
 - 3) Top Coating: Meet requirements of Table 1 Fed Spec CCC-W-408 clear virgin polymerized vinyl-chloride resin or modified vinyl chloride resin.
 - (a) Use phosphate or phthalate-ester plasticized exclusively.
 - 4) Width: 54 inches (1 350 mm) minimum.
 - 5) Minimum Weight: 20 oz per lineal yard (518 g per lineal meter) for 54 inch (1 350 mm) width.
 - 3. Colors / Patterns:
 - a. Approved Products. See Section 01 6000:
 - 1) Cherry / Blue:
 - (a) Command Express: ACT 12244.
 - (b) Koroseal: Legacy CWS 2404 Vista.
 - (c) VERSA: JFB009.
 - (d) LEN-TEX: Alpha 7140.
 - (e) US VINYL: 0510-3322.
 - 2) Cherry / Green:
 - (a) Command Express: ACT 12244.
 - (b) Koroseal: Legacy CWS 2921 Hope.
 - (c) VERSA: JFB009.
 - (d) LEN-TEX: Alpha 6704.
 - (e) US VINYL: 0510-3324.
 - 3) Cherry / Red:
 - (a) Command Express: ACT 12242.

- (b) Koroseal: Legacy CWS 2634 Mexican Agate.
 - (c) VERSA: JFB010.
 - (d) LEN-TEX: Alpha 7140.
 - (e) US VINYL: 0510-3322.
 - 4) OAK 95 / Blue:
 - (a) Command Express: ACT 12244.
 - (b) Koroseal: Legacy CWS 2815 Linen.
 - (c) VERSA: JFB009.
 - (d) LEN-TEX: Alpha 6705.
 - (e) US VINYL: 0510-3324.
 - 5) OAK 95 / Green:
 - (a) Command Express: ACT 12244.
 - (b) Koroseal: Legacy CWS 2921 Hope.
 - (c) VERSA: JFB009.
 - (d) LEN-TEX: Alpha 6704.
 - (e) US VINYL: 0510-3324.
 - 6) OAK 95 / Red:
 - (a) Command Express: ACT 12244.
 - (b) Koroseal: Legacy CWS 2921 Hope.
 - (c) VERSA: JFB009.
 - (d) LEN-TEX: Alpha 6705.
 - (e) US VINYL: 0510-3324.
- C. Sisal Wall Covering:
1. Manufacturers:
 - a. Design Materials Inc, Kansas City, KS www.dmikc.com.
 - b. Fibreworks, Louisville, KY www.fibreworks.com.
 2. Material:
 - a. Sisal Wall Covering. 100 percent fire-treated sisal yarn.
 - b. 1/4 inch (6 mm) pile height, 48 oz/sq yd (1 627 grams/sq meter) minimum. Sisal to be installed full height on walls shall be furnished in 9 or 13 foot (2.75 or 3.96 meters) wide goods.
 - c. Reversible weave type, without backing.
 3. Colors:
 - a. Approved Colors. See Section 01 6000:
 - 1) Cherry / Blue:
 - (a) Design Materials: 108.
 - (b) Fibreworks: 712 Ivory.
 - 2) Cherry / Green:
 - (a) Design Materials: 108.
 - (b) Fibreworks: 712 Ivory.
 - 3) Cherry / Red:
 - (a) Design Materials: 108.
 - (b) Fibreworks: 712 Ivory.
 - 4) OAK 95 / Blue:
 - (a) Design Materials: 108.
 - (b) Fibreworks: 712 Ivory.
 - 5) OAK 95 / Green:
 - (a) Design Materials: 108.
 - (b) Fibreworks: 712 Ivory.
 - 6) OAK 95 / Red:
 - (a) Design Materials: 108.
 - (b) Fibreworks: 712 Ivory.

- D. Acoustically Transparent Wall Covering:
1. Manufacturers:
 - a. Acoustone Grille Cloth by Acoustone Corp, Brooklyn, NY
www.acoustonegrillecloth.com.
 - b. Mellotone by Wendell Fabrics Corp., Blacksburg, SC www.wendellfabrics.com.
 2. Design Criteria:
 - a. Transparency to Sound.
 - 1) Fully accredited testing lab for sound transmissibility.
 - b. Sound Absorption.
 - c. Fire-Test-Response Characteristics: Class A flame spread rating in accordance with ASTM E84 or UL 723 Type 1.
 - d. Withstands Mildew and Dust.
 - e. Non Sag.
 3. Approved Products. See Section 01 6000:
 - a. Acoustone Grille Cloth:
 - 1) FR94*, FR248, FR250, FR260, FR270*, FR 280, FR345*, FR360*, FR401, FR407, FR602*, FR605, FR900*, FR901, FR902*, FR903*, FR 905, FR1000, FR1003, FR1004, FR1005, FR1010, FR 3402, FR3403, FR7000, FR7001*, FR7002, FR7003*, FR7004*, FR7006*, FR7007, FR7008, FR7010*, FR7012, FR7013*, or FR7015* (patterns noted with asterisk are not listed on manufacturer webpage, but all fabrics samples are available from manufacturer).
 - b. Mellotone:
 - 1) DA 5004, DA 5005, DA 5006, DF 6002, DF 6003, or DF 6004 (pattern samples available from manufacturer).
 - c. Locations:
 - 1) Grille Material used at Organ Chamber.

2.02 ACCESSORIES

- A. Adhesive: Type recommended by wall covering manufacturer to suit application to substrate . Use only fungus resistant adhesives.
1. Vinyl Wall Covering
 - a. Acceptable Products:
 - 1) Roman's Professional Extra Strength by Roman Adhesive Co, Calumet City, IL (800) 488- 6117 or (708) 891-0770.
 - 2) Equal as recommended by Wall Covering Manufacturer and approved by Architect before use.
 2. Sisal Wall Covering
 - a. Approved Products.
 - 1) 257 Sisal Adhesive by Fibreworks.
 - 2) Sisal Adhesive No. 1-422 by Design Materials.
 3. Seam Cement:
 - a. 8415 Glue-Down Carpet Seam Adhesive by Roberts Consolidated Industries, Div QEP, Henderson, NV www.robertsconsolidated.com.
 - b. Equal as recommended by Wall Covering Manufacturer with approval of Architect before installation. See Section 01 6000.
 - B. Substrate Filler: As recommended by adhesive and wall covering manufacturers; compatible with substrate.
 - C. Substrate Primer and Sealer: Alkyd enamel type.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are prime painted and ready to receive work, and comply with requirements of wall covering manufacturer.

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- B. Measure moisture content of surfaces using an electronic moisture meter. Do not apply wall coverings if moisture content of substrate exceeds level recommended by wall covering manufacturer.

3.02 PREPARATION

- A. Fill cracks in substrate and smooth irregularities with filler; sand smooth.
- B. Surface Appurtenances: Remove or mask electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.
- C. Surfaces: Correct defects and clean surfaces that affect work of this section. Remove existing coatings that exhibit loose surface defects.
- D. Marks: Seal with shellac those that may bleed through surface finishes.
- E. Apply one coat of primer sealer to substrate surfaces. Allow to dry. Lightly sand smooth.
- F. Vacuum clean surfaces free of loose particles.

3.03 INSTALLATION - GENERAL

- A. Apply adhesive and wall covering in accordance with manufacturer's instructions.

3.04 INSTALLATION SISAL WALL COVERING

- A. Apply wall covering in accordance with Manufacturer's instructions, available on DVD from Owner through Architect. See Quality Assurance Installer Qualifications as specified in Part 1 of this specification.
- B. Using specified adhesive, glue continuously to surface to be covered with wall covering. Apply adhesive in accordance with Manufacturer's recommendations.
- C. Run 'ribs' in weaving horizontally (panel style) when installing wall covering full height. If sisal installed only as wainscoting, 'ribs' may be installed vertically. Install wall covering so it extends to within 1/8 inch (3 mm) of floor slab.
- D. Carry sisal around corners approximately 6 inch (152 mm) making no outside corner cuts.
- E. Apply wall covering in one piece on walls adjacent to stairs leading to Platform to avoid unsightly and challenging seams.

3.05 CLEANING

- A. Clean wall coverings of excess adhesive, dust, dirt, and other contaminants.
- B. Reinstall wall plates and accessories removed prior to work of this section.
- C. Fiberglass Reinforced Wall Covering:
 - 1. Remove excess sealant from panels and moldings.
 - 2. Refer to manufacturer's specific cleaning recommendations:
 - a. Wipe panel down using damp cloth and mild soap solution or cleaner.
 - b. Do not use abrasive cleaners.

3.06 PROTECTION

- A. Do not permit construction activities at or near finished wall covering areas.

3.07 CLOSE-OUT ACTIVITIES

- A. Instruction of Owner:
 - 1. Instruct Owner in proper maintenance and cleaning methods for acoustic wall carpet.

END OF SECTION 09 7200

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SECTION 09 9123 INTERIOR PAINTING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints.
- C. Materials for backpriming woodwork.
- D. Do Not Paint or Finish the Following Items:
 - 1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
 - 2. Items indicated to receive other finishes.
 - 3. Items indicated to remain unfinished.
 - 4. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.
 - 5. Stainless steel, anodized aluminum, bronze, terne-coated stainless steel, and lead items.
 - 6. Marble, granite, slate, and other natural stones.
 - 7. Floors, unless specifically indicated.
 - 8. Ceramic and other tiles.
 - 9. Brick, architectural concrete, cast stone, integrally colored plaster, and stucco.
 - 10. Glass.
 - 11. Concrete masonry units in utility, mechanical, and electrical spaces.
 - 12. Acoustical materials, unless specifically indicated.
 - 13. Concealed pipes, ducts, and conduits.

1.02 DEFINITIONS

- A. Comply with ASTM D16 for interpretation of terms used in this section.

1.03 REFERENCE STANDARDS

- A. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications 2019.
- B. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association Current Edition.
- C. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual Current Edition.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conferences:
 - 1. Schedule painting pre-installation conference after delivery of paint or coatings and before or at same time as application of field samples.
 - a. Coordinate pre-installation conferences of all related painting and coating Sections under 09 9000 heading 'Paints and Coatings'.
 - b. Schedule conference before preparation of control samples as specified in Sections under 09 9000 heading 'Paints and Coatings'.
 - c. Conference to be held at same time as Section 09 2116 to review gypsum board finish preparation.
 - 2. In addition to agenda items specified in Section 01 3000, review following:
 - a. Review Quality Assurance for Approval requirements.
 - b. Review Quality Assurance Field Sample requirements.
 - c. Review Submittal requirements for compliance for MPI Approved Products.
 - d. Review Design Criteria requirements.
 - e. Review Cleaning requirements.
 - f. Review painting schedule.

- g. Review safety issues.
- 3. Review additional agenda items from Sections under 09 9000 heading 'Paints and Coatings'.

1.05 SUBMITTALS

- A. Product Data: Provide complete list of products to be used, with the following information for each:
 - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g., "alkyd enamel").
 - 2. MPI product number (e.g., MPI #47).
 - 3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
 - 4. Manufacturer's installation instructions.
- B. Samples: Submit two paper "draw down" samples, 4 x 6 inches in size, illustrating range of colors available for each finishing product specified.
 - 1. Where sheen is specified, submit samples in only that sheen.
 - 2. Where sheen is not specified, submit each color in each sheen available.
- C. Closeout Submittals:
 - 1. Include following in Operations and Maintenance Manual specified in Section 01 7800:
 - a. Record Documentation:
 - 1) Manufacturer's documentation:
 - (a) Manufacturer's cut sheet for each component of each system.
 - (b) Schedule showing rooms and surfaces where each system was used.

1.06 QUALITY ASSURANCE

- A. Applicator Qualifications: Company specializing in performing the type of work specified with minimum five years experience and approved by manufacturer.
 - 1. Minimum five (5) satisfactorily completed projects of comparable quality, similar size, and complexity in past three (3) years before bidding.
 - 2. Maintain qualified crew of painters throughout duration of the Work.
 - 3. Upon request, submit documentation.

1.07 MOCK-UP

- A. Before application of any paint system, meet on Project site with Architect, Owner's representative, and Manufacturer's representative. Architect may select one (1) surface for application of each paint system specified. This process will include establishing acceptable substrate conditions required for Project before application of paints and coatings.
- B. Apply paint systems to surfaces indicated by Architect following procedures outlined in Contract Documents and Product Data submission specified above.
- C. After approval of samples, proceed with application of paint system throughout Project. Approved samples will serve as standard of acceptability.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

PART 2 PRODUCTS

2.01 PERFORMANCE AND DESIGN CRITERIA

- A. Regulatory Agency Sustainability Approval:

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1. Conform to work place safety regulations and requirements of those authorities having jurisdiction for storage, mixing, application and disposal of all paint and related hazardous materials.
2. Paint and painting materials shall be free of lead and mercury, and have VOC levels acceptable to local jurisdiction.
3. Master Painters Institute (MPI) Standards:
 - a. Products: Comply with MPI standards indicated and listed in 'MPI Approved Products List'.
 - b. Preparation and Workmanship: Comply with requirements in 'MPI Architectural Painting Specification Manual' for products and coatings indicated.

2.02 MANUFACTURERS

- A. Provide products indicated from one of the following. Alternate products must be approved by Architect prior to bid. Alternate products must meet specified criteria and be listed in Master Painters Institute Approved Product List, current edition available at www.paintinfo.com, for specified MPI categories, except as otherwise indicated.
 1. Benjamin Moore and Company: www.benjaminmoore.com.
 - a. National Account Representative: Doug Summers, Doug.Summers@Benjaminmoore.com , (801) 721-6380
 - 1) Open Job Account: Preferred for projects greater than \$10,000. Link to Church Parent Account #10020025
 - 2) Cash Only Account: #10020025 - pay at purchase.
 2. PPG Industries: www.ppgpaints.com
 - a. Specification and design Representative: Ryan Henrie, rhenrie@ppg.com, (435)817-3011. Corporate Account Manager: Vito Anteri, vfanteri@ppg.com (480) 6665-9769.
 - 1) Open Job Account: Preferred for projects greater than \$10,000. Link to Church Parent Account #CRCHLTTR.
 - 2) Cash Only Account: #CRCHLTTR - pay at purchase.
 3. Sherwin-Williams Company: www.sherwin-willams.com.
 - a. National Account Representative: Mike Koncilja, mike.k@sherwin.com , Account Representative: Todd W. Taylor, todd.w.taylor@sherwin.com , Architectural Account Executive: Richard Condie, Richard.condie@sherwin.com .
 - 1) Open Job Account: Preferred for projects greater than \$10,000. Link to Church Parent Account #3692
 - 2) Cash Only Account: #302276043 – pay at purchase.
 4. Contact Account Representative before acquiring paint to ensure required acquisition process is followed.

2.03 PAINTS AND FINISHES - GENERAL

- A. Ready-mixed, unless intended to be a field-catalyzed paint.
 1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
 2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
 3. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.
 4. Supply each paint material in quantity required to complete entire project's work from a single production run.
 5. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.

2.04 PAINT SYSTEMS - INTERIOR

- A. Interior Poured Concrete:

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1. Materials:
 - a. MPI Product 60" 'Floor Paint, Latex, Low Gloss' (or):
 - 1) N122 Floor & Patio Low Sheen Enamel Floor Coating by Benjamin Moore
 - 2) 3-510XI Series PPG Floor & Porch Enamel Interior/Exterior 100% Acrylic Latex Satin
 - 3) B90A102 Armorseal Tread Plex Water Based Acrylic Floor Coating by Sherwin Williams
 2. Performance:
 - a. Design Criteria:
 - 1) Gloss / Sheen Level Required: Semi-Gloss.
 - b. New Surfaces: Use MPI(a) INT 3.2A Latex Finish system (or products listed above).
 - c. Previously Finished Surfaces: Use MPI(r) RIN 3.2A Latex Finish system (or products listed above).
 - d. Finish Requirements: Use MPI Custom Grade finish requirements.
- B. Interior Gypsum Board and Plaster:
1. Materials:
 - a. Primers:
 - 1) MPI Product 50, 'Primer Sealer, Latex, Interior' (or):
 - (a) 354 Super Hide® Zero VOC Interior Latex Primer by Benjamin Moore.
 - (b) 6-4900xi PPG Speedhide Zero Interior Latex Primer by PPG Paints.
 - (c) B28W02600 ProMar 200 Zero Interior Latex Primer by Sherwin Williams.
 - b. Finish Coats:
 - 1) Rest Rooms And Custodial Rooms:
 - (a) Buildings with only Gypsum Board surfaces in rooms:
 - (b) MPI Product 115, 'Epoxy-Modified Latex, Interior, Gloss (MPI Gloss Level 6)' (or):
 - (1) V341 Corotech Pre-Catalyzed Waterborne Epoxy Semi-Gloss by Benjamin Moore.
 - (2) Aquapon WB EP 98E-X/98E-98 Waterborne Catalyzed Semi-Gloss Epoxy by PPG Paints.
 - (3) B73W311 Pro Industrial Waterbased Catalyzed Epoxy by Sherwin Williams.
 - (c) Buildings with CMU and Gypsum Board surfaces in same rooms:
 - (d) MPI Product 77, 'Epoxy, Gloss' (or):
 - (1) V341 Corotech Pre-Catalyzed Waterborne Epoxy Semi-Gloss by Benjamin Moore.
 - (2) Aquapon WB EP 98E-X/98E-98 Waterborne Catalyzed Semi-Gloss Epoxy by PPG Paints.
 - (3) B73W311 Pro Industrial Waterbased Catalyzed Epoxy by Sherwin Williams.
 - 2) Remaining Painted Surfaces:
 - (a) Walls/Partitions/Vertical Surfaces - MPI Product 141, 'Latex, Interior, High Performance Architectural, Semi-Gloss (MPI Gloss Level 5)' (or):
 - (1) 358 Super Hide® Zero VOC Interior Semi-Gloss by Benjamin Moore.
 - (2) 6-5510 PPG Speedhide Zero Interior Latex Semi-Gloss by PPG Paints.
 - (3) ProMar 200 Zero VOC HP Latex Semi-Gloss by Sherwin Williams.
 - (b) Ceilings - MPI Product 143 'Latex, Interior, High Performance Architectural, Flat (MPI Gloss Level 1 or 2)' (or):
 - (1) Waterborne Ceiling Paint Ultra Flat 508 by Benjamin Moore.
 - (2) 6-4110xi PPG Speedhide Zero Interior Latex Flat by PPG Paints.
 - (3) ProMar 200 Zero VOC Interior Latex Flat by Sherwin Williams.
 2. Performance:

- a. Design Criteria:
 - 1) New Surfaces: MPI Premium Grade finish requirements.
 - 2) Gloss / Sheen Required:
 - (a) Rest Rooms And Custodial Rooms: Gloss Level 6.
 - (b) Remaining Painted Surfaces: Gloss Level 5.
 - b. Rest Rooms And Custodial Rooms:
 - 1) New Surfaces: Use MPI(a) INT 9.2E Waterborne Epoxy Finish system (or products listed above).
 - c. All Other:
 - 1) New Surfaces: Use MPI(a) INT 9.2B Latex Finish system (or products listed above).
- C. Interior Metal:
- 1. Materials:
 - a. Primers:
 - 1) Ferrous Metal: MPI Product 107, 'Primer, Rust-Inhibitive, Water Based' (or):
 - (a) HP04 Ultra Spec HP Acrylic Metal Primer by Benjamin Moore.
 - (b) PPG Pitt-Tech Plus 4020PF / 90-19XX series Waterborne Acrylic Primer/Finish by PPG Paints.
 - (c) Pro-Cryl Universal Primer by Sherwin Williams.
 - 2) Galvanized Metal: MPI Product 134: 'Primer, Galvanized, Water Based' (or):
 - (a) HP04 Ultra Spec HP Acrylic Metal Primer by Benjamin Moore.
 - (b) PPG Pitt-Tech Plus 4020PF / 90-19XX series Waterborne Acrylic Primer/Finish by PPG Paints.
 - (c) Pro-Cryl Universal Primer by Sherwin Williams.
 - 3) Aluminum: MPI Product 134: 'Primer, Quick Dry, for Aluminum' (or):
 - (a) HP04 Ultra Spec HP Acrylic Metal Primer by Benjamin Moore.
 - (b) PPG Pitt-Tech Plus 4020PF / 90-19XX series Waterborne Acrylic Primer/Finish by PPG Paints.
 - (c) Pro-Cryl Universal Primer by Sherwin Williams.
 - b. Finish Coats: MPI Product 153: 'Light Industrial Coating, Interior, Water Based, Semi-Gloss (MPI Gloss Level 5)' (or):
 - 1) V341 Corotech Pre-Catalyzed Waterborne Epoxy Semi-Gloss by Benjamin Moore.
 - 2) 16-1510 PPG Pitt-Glaze WB1 Waterborne Pre-Catalyzed Semi-Gloss Epoxy by PPG Paints.
 - 3) B73W311 Pro Industrial Waterbased Catalyzed Epoxy by Sherwin Williams.
 - 2. Performance:
 - a. Design Requirements:
 - 1) New Surfaces: MPI Premium Grade finish requirements.
 - 2) Deteriorated Existing Surfaces: MPI Premium Grade finish requirements.
 - 3) Sound Existing Surfaces: MPI Custom Grade finish requirements.
 - 4) Gloss / Sheen Level Required: Gloss Level 5.
 - b. Ferrous Metal:
 - 1) New Surfaces: Use MPI(a) INT 5.1B Waterborne Light Industrial Finish system (or products listed above).
 - 2) Previously Finished Surfaces: Use MPI(r) RIN 5.1B Waterborne Light Industrial Finish system (or products listed above).
 - c. Galvanized Metal:
 - 1) New Surfaces: Use MPI(a) INT 5.3J Latex Finish system (or products listed above).
 - 2) Previously Finished Surfaces: Use MPI(r) RIN 5.3AH Latex Finish system (or products listed above).
 - d. Aluminum:

- 1) New Surfaces: Use MPI(a) INT 5.4E Waterborne Light Industrial Finish system (or products listed above).
 - 2) Previously Finished Surfaces: Use MPI(r) REX 5.4E Light Industrial Finish system (or products listed above).
- D. Locations indicated as Epoxy:
1. Materials
 - a. Wall and Ceiling Surfacing System:
 - 1) Interior Primer:
 - (a) Approved Product. See Section 01 6000:
 - (b) Multi-Purpose Primer 067 by Benjamin Moore
 - (c) 6-4 PPG Speedhide MaxPrime High Build Interior Latex Primer/Surfacer by PPG Paints.
 - (d) B28W601 PrepRite High Build Interior Latex Primer/Surfacer by Sherwin-Williams.
 - 2) Epoxy:
 - (a) Color: White.
 - (b) Approved Product. See Section 01 6000:
 - (c) V341 Corotech Pre-Catalyzed Waterborne Epoxy Semi-Gloss by Benjamin Moore.
 - (d) 16-1510 PPG Pitt-Glaze WB1 Waterborne Pre-Catalyzed Semi-Gloss Epoxy by PPG Paints.
 - (e) K45 Series Pro Industrial Pre-Catalyzed Epoxy by Sherwin-Williams.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin application of paints and finishes until substrates have been adequately prepared.
- B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Protection of In-Place Conditions:
 1. Protect other finish work and adjacent materials during painting. Do not splatter, drip, or paint surfaces not intended to be painted. These items will not be spelled out in detail but pay special attention to the following:
 - a. Do not paint finish copper, bronze, chromium plate, nickel, stainless steel, anodized aluminum, or monel metal except as explicitly specified.
 - b. Keep cones of ceiling speakers completely free of paint. In all cases where painting of metal speaker grilles is required, paint without grilles mounted to speakers and without grilles on ceiling.
- B. Surface Preparation:
 1. Prepare surfaces in accordance with MPI requirements and requirements of Manufacturer for each painting system specified, unless instructed differently in Contract Documents. Bring conflicts to attention of Architect in writing.
 2. Fill minor holes and cracks in wood surfaces to receive paint or stain.
 3. Surfaces to be painted shall be clean and free of loose dirt. Clean and dust surfaces before painting or finishing.
 4. Do no exterior painting while surface is damp, unless recommended by Manufacturer, nor during rainy or frosty weather. Interior surfaces shall be dry before painting. Moisture content of materials to be painted shall be within tolerances acceptable to Paint Manufacturer.

5. Sand woodwork smooth in direction of grain leaving no sanding marks. Clean surfaces before proceeding with stain or first coat application.
- C. Clean surfaces thoroughly and correct defects prior to application.
- D. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- E. Remove or repair existing paints or finishes that exhibit surface defects.
- F. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
- G. Seal surfaces that might cause bleed through or staining of topcoat.
- H. Interior Poured Concrete:
 1. New Surfaces:
 - a. Prep according to manufacturer's instructions.
 - b. Apply prime coat.
 - c. Apply finish coats.
 2. Existing Painted Surfaces:
 - a. Remove deteriorated existing paint down to sound substrate by scraping and sanding. Feather edges of existing paint by sanding to be smooth with adjacent surfaces. Acid etch bare concrete areas, if necessary.
 - b. Clean floors as recommended by Paint Manufacturer.
 - c. Apply coating system.
- I. Interior Gypsum Board and Plaster:
 1. Interface With Other Work: Properly clean and paint light cove interiors before installation of light fixtures.
 2. New Surfaces:
 - a. Primer: Apply primer to be covered with other paint coats with roller only, or with spray gun and back-rolled.
 3. Existing Painted Surfaces:
 - a. Remove deteriorated existing paint down to sound substrate by scraping or sanding. Feather edges of existing paint by sanding to be smooth with adjacent surfaces.
 - b. Clean surface with mild soap and water, or with tri-sodium phosphate (TSP). Wash surfaces that have been defaced with marking pens, crayons, lipstick, etc, with solvent recommended by Paint Manufacturer. Spot prime such surfaces.
 - c. Spackle and tape cracks. Sand to smooth finish and spot prime.
 - d. Sand or chemically etch existing painted surface as required to prepare surface to accept new paint.
 - e. Re-clean surface.
 - f. Apply primer coat.
 - g. Apply finish coats.
- J. Interior Metal:
 1. New Surfaces: Remove rust spots by sanding and immediately spot prime. If all traces of rust cannot be removed, apply rust blocker recommended by Paint Manufacturer before applying full primer coat.
 2. Existing Painted Surfaces:
 - a. Remove deteriorated existing paint down to sound substrate by scraping and sanding. Feather edges of existing paint by sanding to be smooth with adjacent surfaces. Spot prime bare metal surfaces immediately.
 - b. Remove rust spots by sanding and immediately spot prime. If all traces of rust cannot be removed, apply rust blocker recommended by Paint Manufacturer before applying full primer coat.
 - c. Clean existing sound painted surfaces as well as scraped and sanded existing painted surfaces as recommended by Paint Manufacturer.

- d. Apply prime coat over entire surface to be painted.
 - e. Lightly sand entire surface.
 - f. Clean surface as recommended by Paint Manufacturer.
 - g. Apply finish coats.
- K. Interior Wood:
- 1. New Surfaces:
 - a. Spot prime nail holes, cracks, and blemishes before and after puttying.
 - b. Apply stain blocker or other product recommended by Paint Manufacturer to knots before applying primer coat.
 - 2. Existing Painted Surfaces:
 - a. Remove deteriorated existing paint down to sound substrate by scraping and sanding. Feather edges of existing paint by sanding to be smooth with adjacent surfaces. Spot prime bare wood areas on woodwork.
 - b. Wash surfaces that have been defaced with marking pens, crayons, lipstick, etc, with solvent recommended by Paint Manufacturer. Spot prime such surfaces.
 - c. Apply finish coats.

3.03 APPLICATION

- A. Interface with Other Work:
 - 1. Coordinate with other trades for materials and systems that require painting before installation.
 - 2. Schedule painting and coating work to begin when work upon which painting and coating work is dependent has been completed. Schedule installation of pre-finished and non-painted items, which are to be installed on painted surfaces, after application of final finishes.
- B. Paint or finish complete all surfaces to be painted or coated as described in Contract Documents, including but not limited to following items.
- C. Apply sealant in gaps 3/16 inch (5 mm) and smaller between two substrates that are both to be painted or coated. Sealants in other gaps furnished and installed under Section 07 9200.
- D. On wood to receive a transparent finish, putty nail holes in wood after application of stain using natural colored type to match wood stain color. Bring putty flush with adjoining surfaces.
- E. In multiple coat paint work, tint each succeeding coat with slightly lighter color, but approximating shade of final coat, so it is possible to check application of specified number of coats. Tint final coat to required color.
- F. Spread materials smoothly and evenly. Apply coats to not less than wet and dry film thicknesses and at spreading rates for specified products as recommended by Manufacturer.
- G. Touch up suction spots after application of first finish coat.
- H. Paint shall be thoroughly dry and surfaces clean before applying succeeding coats.
- I. Use fine sandpaper between coats as necessary to produce even, smooth surfaces.
- J. Make edges of paint adjoining other materials or colors clean, sharp, and without overlapping.
- K. Finished work shall be a 'Properly Painted Surface' as defined in this Section.
 - 1. Finish casework and wood trims that are specified to be installed under Section 06 2000 and that are not called out to be factory-or shop-finished. Back prime wood elements to be installed against concrete or masonry or that may be subjected to moisture.
 - 2. Paint mechanical, electrical, and audio/visual items that require field painting as indicated in Contract Documents. These include but are not limited to:
 - a. Gas pipe from gas meter into building.
 - b. Mechanical flues and pipes penetrating roof.
 - c. Electrical panel and disconnect enclosures.
 - d. Metal protective structures for refrigerant lines.
 - 3. Metal reveals at ceiling access doors.

4. Paint inside of chases in occupied spaces flat black for 18 inches (450 mm) or beyond sightline, whichever is greater.
5. Paint surfaces in organ chamber behind grille cloth with flat black paint.
- L. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- M. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- N. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.
- O. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- P. Apply each coat to uniform appearance in thicknesses specified by manufacturer.
- Q. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide.
- R. Sand wood and metal surfaces lightly between coats to achieve required finish.
- S. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- T. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection.
- B. Owner will provide field inspection.
- C. Non-Conforming Work:
 1. Correct deficiencies in workmanship as required to leave surfaces in conformance with 'Properly Painted Surface,' as defined in this Section.
 2. Correction of 'Latent Damage' and 'Damage Caused By Others,' as defined in this Section, is not included in work of this Section.

3.05 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.
- B. As work proceeds and upon completion of work of any painting Section, remove paint spots from floors, walls, glass, or other surfaces and leave work clean, orderly, and in acceptable condition.
- C. Waste Management:
 1. Remove rags and waste used in painting operations from building each night. Take every precaution to avoid danger of fire.
 2. Paint, stain and wood preservative finishes and related materials (thinners, solvents, caulking, empty paint cans, cleaning rags, etc.) shall be disposed of subject to regulations of applicable authorities having jurisdiction.
 3. Remove debris caused by work of paint Sections from premises and properly dispose.
 4. Retain cleaning water and filter out and properly dispose of sediments.

3.06 PROTECTION

- A. Protect finishes until completion of project.
- B. Touch-up damaged finishes after Substantial Completion.

3.07 SCHEDULE OF PAINT COLORS

- A. Interior:
 1. Interior Poured Concrete (See Section 09 9123):
 - a. Color Quality Standard. See Section 01 6000:

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- 1) [Insert Product and Color] by [Insert Manufacturer].
2. Interior Clear Finished Wood (See Section 09 9300):
 - a. Match other interior clear finished wood building elements.
3. Interior Gypsum Board, Plaster (See Section 09 9123):
 - a. Color Quality Standard. See Section 01 6000:
 - 1) Cherry / Blue: SW6070 by Sherwin Williams or PPG 1021-1 Mountain Gray by PPG Paints or 961 Seapearl by Benjamin Moore.
 - 2) Cherry / Green: SW6098 by Sherwin Williams or PPG 1078-2 Water Chestnut by PPG Paints or OC-142 Sail Cloth by Benjamin Moore.
 - 3) Cherry / Red: SW6070 by Sherwin Williams or PPG 1021-1 Mountain Gray by PPG Paints or 961 Seapearl by Benjamin Moore.
 - 4) OAK 95 / Blue: SW6098 by Sherwin Williams or PPG 1078-2 Water Chestnut by PPG Paints or OC-142 Sail Cloth by Benjamin Moore.
 - 5) OAK 95 / Green: SW6098 by Sherwin Williams or PPG 1078-2 Water Chestnut by PPG Paints or OC-142 Sail Cloth by Benjamin Moore.
 - 6) OAK 95 / Red: SW6098 by Sherwin Williams or PPG 1078-2 Water Chestnut by PPG Paints or OC-142 Sail Cloth by Benjamin Moore.
4. Interior Metal (See Section 09 9123):
 - a. Color Quality Standard. See Section 01 6000:
 - 1) Cherry / Blue: SW6070 by Sherwin Williams or PPG 1021-1 Mountain Gray by PPG Paints or 961 Seapearl by Benjamin Moore.
 - 2) Cherry / Green: SW6098 by Sherwin Williams or PPG 1078-2 Water Chestnut by PPG Paints or OC-142 Sail Cloth by Benjamin Moore.
 - 3) Cherry / Red: SW6070 by Sherwin Williams or PPG 1021-1 Mountain Gray by PPG Paints or 961 Seapearl by Benjamin Moore.
 - 4) OAK 95 / Blue: SW6098 by Sherwin Williams or PPG 1078-2 Water Chestnut by PPG Paints or OC-142 Sail Cloth by Benjamin Moore.
 - 5) OAK 95 / Green: SW6098 by Sherwin Williams or PPG 1078-2 Water Chestnut by PPG Paints or OC-142 Sail Cloth by Benjamin Moore.
 - 6) OAK 95 / Red: SW6098 by Sherwin Williams or PPG 1078-2 Water Chestnut by PPG Paints or OC-142 Sail Cloth by Benjamin Moore.
5. Interior Painted Wood (See Section 09 9123):
 - a. Color Quality Standard. See Section 01 6000:
 - 1) Cherry / Blue: SW6070 by Sherwin Williams or PPG 1021-1 Mountain Gray by PPG Paints or 961 Seapearl by Benjamin Moore.
 - 2) Cherry / Green: SW6098 by Sherwin Williams or PPG 1078-2 Water Chestnut by PPG Paints or OC-142 Sail Cloth by Benjamin Moore.
 - 3) Cherry / Red: SW6070 by Sherwin Williams or PPG 1021-1 Mountain Gray by PPG Paints or 961 Seapearl by Benjamin Moore.
 - 4) OAK 95 / Blue: SW6098 by Sherwin Williams or PPG 1078-2 Water Chestnut by PPG Paints or OC-142 Sail Cloth by Benjamin Moore.
 - 5) OAK 95 / Green: SW6098 by Sherwin Williams or PPG 1078-2 Water Chestnut by PPG Paints or OC-142 Sail Cloth by Benjamin Moore.
 - 6) OAK 95 / Red: SW6098 by Sherwin Williams or PPG 1078-2 Water Chestnut by PPG Paints or OC-142 Sail Cloth by Benjamin Moore.

END OF SECTION 09 9123

**SECTION 09 9300
STAINING AND TRANSPARENT FINISHING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of stains and transparent finishes.

1.02 DEFINITIONS

- A. Comply with ASTM D16 for interpretation of terms used in this section.

1.03 REFERENCE STANDARDS

- A. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications 2019.
- B. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials 2020.
- C. KCMA A161.1 - Performance and Construction Standard for Kitchen and Vanity Cabinets 2017.
- D. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association Current Edition.
- E. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual Current Edition.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conferences:
 - 1. Participate in pre-installation conference as specified in Section 09 9123.
 - 2. In addition to agenda items specified in Section 01 3100 and Section 09 9001, review following:
 - a. Review control sample(s).

1.05 SUBMITTALS

- A. Product Data: Provide complete list of products to be used, with the following information for each:
 - 1. Manufacturer's name, product name and/or catalog number, and general product category.
 - 2. MPI product number (e.g. MPI #33).
 - 3. Manufacturer's installation instructions.
- B. Samples: Submit two samples, illustrating selected colors and sheens for each system with specified coats cascaded. Submit on actual wood substrate to be finished, 4 by 6 inch in size.
 - 1. Sample will be used as performance standard for evaluating finish provided.
- C. Finish Manufacturer's literature or certification that finish material meets requirements of ANSI / KCMA A161.1.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of stain or transparent finish, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Stain and Transparent Finish Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.07 FIELD CONDITIONS

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- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by manufacturer of stains and transparent finishes.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Do not apply materials when relative humidity exceeds 85 percent; at temperatures less than 5 degrees F above the dew point; or to damp or wet surfaces.
- D. Minimum Application Temperature: 50 degrees F unless required otherwise by manufacturer's instructions.
- E. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 STAINS AND TRANSPARENT FINISHES - GENERAL

- A. Finishes:
 - 1. Where MPI paint numbers are specified, provide products listed in Master Painters Institute Approved Product List, current edition available at www.paintinfo.com, for specified MPI categories, except as otherwise indicated.
 - 2. Provide finishes capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
 - 3. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
 - 4. Supply each finish material in quantity required to complete entire project's work from a single production run.
 - 5. Do not reduce, thin, or dilute finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.

2.02 INTERIOR STAIN AND TRANSPARENT FINISH SYSTEMS

- A. Stain: MPI 90, 'Stain, Semi-Transparent, for Interior Wood'.
 - 1. Clear Finish Coats:
 - a. Field Finished:
 - 1) Chemcraft International Inc:
 - (a) First, Second, And Third Coats: 20 Sheen Opticlear Pre-Catalyzed Lacquer.
 - 2) ICI Dulux / Trinity:
 - (a) First Coat: ICE Vinyl Sanding Sealer.
 - (b) Second And Third Coats: ICI Pre-Catalyzed Lacquer.
 - 3) Lilly / Valspar:
 - (a) First, Second, And Third Coats: 20 Sheen Pre-Catalyzed Lacquer 587E208.
 - 4) Sherwin-Williams:
 - (a) First Coat: T67F3 Vinyl Sealer.
 - (b) Second And Third Coats: T77F38 Sherwood Pre-Catalyzed Lacquer DRE.
 - b. Mill Finished: Architectural Woodwork finished in a mill may use one (1) coat of Vinyl Sealer and two (2) coats of Conversion Varnish (vinyl sealer not required if required thickness can be achieved without) or three (3) coats of Conversion Varnish from one (1) of the approved Finish Manufacturers, or approved equal, as recommended by Finish Manufacturer.
 - c. Products meeting testing requirements for finishes of ANSI / KCMA A161.1 may be used upon approval of submission by Architect before use.
 - 2. Color:
 - a. Design Criteria:
 - 1) Finish to match Owner selected sample.

- (a) Oak 95:
 - (1) Performance standard: Owner provided sample.
 - (2) Contact Information: Michael Jensen (801) 240-3367
jensonmb@churchofjesuschrist.org, Meetinghouse Facilities Department.
 - (b) Cherry:
 - (1) Performance standard: Owner provided sample.
 - (2) Contact Information: Michael Jensen (801) 240-3367
jensonmb@churchofjesuschrist.org, Meetinghouse Facilities Department.
- 2) Elective finishing process:
 - (a) Approved Products: See Section 01 6200.
 - (1) Cherry stain: S4XXR1093 by Sherwin Williams.
 - (2) Sealer: V81FH4 by Sherwin Williams.
 - (b) Option One Toner:
 - (1) Toner: T7XXN11343 by Sherwin Williams.
 - (c) Option Two Toner:
 - (1) 1 qt (0.946 liter) cherry stain.
 - (2) 2 qts (1.893 liter) sealer.
 - (3) 6 qts (5.678 liter) lacquer thinner.
 - (4) Red oxide 42.8 grams.
 - (5) Black 25.0 grams.
 - (6) Medium yellow 30 grams.
 - (d) Finish:
 - (1) Finish: V84FF8007 by Sherwin Williams.
 - (e) Application:
 - (1) Use quart spray pot. Apply gently and lightly to surface.
 - (2) Use control sample at all times.
 - (3) Spray on stain and let stand five (5) minutes before wiping off. Let dry sixteen (16) hours (or overnight).
 - (4) Use sealer and let dry one (1) hour.
 - (5) Buff surfaces with 220 grit sanding sponge blocks.
 - (6) Blow off dust.
 - (7) Spray on toner (let dry thirty (30) minutes minimum).
 - (8) Spray on finish.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin application of stains and finishes until substrates have been properly prepared.
- B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.
- D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- E. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
 - 1. Wood: 15 percent, measured in accordance with ASTM D4442.

3.02 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

- C. Remove or repair existing finishes that exhibit surface defects.

3.03 APPLICATION

- A. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- B. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- C. Apply each coat to uniform appearance in thicknesses specified by manufacturer.
- D. Sand wood surfaces lightly between coats to achieve required finish.
- E. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- F. Wood to Receive Transparent Finishes: Tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.
- G. Reinstall items removed prior to finishing.
- H. General:
 - 1. See appropriate paragraphs of Section 09 9001.
 - 2. Sand entire exposed surface of item to be finished lightly with 120 to 150 non-stearated sandpaper and clean before applying dye or stain.
 - 3. Apply stain in accordance with Manufacturer's recommendations and as necessary to attain correct color.
 - 4. Scuff sand with 220 non-stearated sandpaper between application of application stain and first finish coat.
 - 5. If wood is finished before installation, finish cut ends and other unfinished, exposed surfaces same as previously finished surfaces after installation of wood.
- I. Where back-priming is required, apply one coat of finish material.
- J. Architectural Woodwork Door Surfaces (cabinetry doors only):
 - 1. Finish tops, bottoms, and edges before faces.
 - 2. Finish architectural woodwork doors with no hardware applied to doors.

3.04 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.05 PROTECTION

- A. Protect finishes until completion of project.
- B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION

**SECTION 10 2600
WALL AND DOOR PROTECTION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Corner guards.

1.02 REFERENCE STANDARDS

- A. ASTM D256 - Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics 2010 (Reapproved 2018).
- B. ASTM D543 - Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents 2021.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.
- D. NFPA 101 - Life Safety Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. NFPA 265 - Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Textile or Expanded Vinyl Wall Coverings on Full Height Panels and Walls 2019.
- F. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials Current Edition, Including All Revisions.

1.03 SUBMITTALS

- A. Product Data: Manufacturer's literature, Indicate physical dimensions, features, wall mounting brackets with mounted measurements, anchorage details, and rough-in measurements, color selections.
- B. Shop Drawings: Include plans, elevation, sections, and attachment details. Show design and spacing of supports for protective corridor handrails, required to withstand structural loads.
- C. Samples: Submit samples illustrating component design, configurations, joinery, color and finish.
 - 1. Submit two sections of corner guards, 12 inches long.
- D. Manufacturer's Instructions: Indicate special procedures, perimeter conditions requiring special attention.
- E. Maintenance Data: For each type of product include information regarding recommended and potentially detrimental cleaning materials and methods.
- F. Test and Evaluation Reports:
 - 1. Copies of Quality Assurance requirements for 'Class A' flame spread rating.
- G. Qualification Statement:
 - 1. Installer:
 - a. Provide Qualification documentation if requested by Architect or Owner.
- H. Closeout Submittals:
 - 1. Include following in Operations and Maintenance Manual specified in Section 01 7800:
 - a. Operations and Maintenance Data:
 - 1) Maintenance, and cleaning instructions.
 - b. Warranty Documentation:
 - 1) Final, executed copy of Warranty
 - c. Record Documentation:
 - 1) Manufacturers documentation:
 - (a) Manufacturer's literature.
 - (b) Color selection.

1.04 QUALITY ASSURANCE

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- A. Regulatory Requirements:
 - 1. System shall be recognized for intended use by applicable building codes.
- B. Qualifications:
 - 1. Installers:
 - a. Installer shall have performed at least three (3) installations of similar size, scope, and complexity in each of the past two (2) years.
 - b. Provide documentation if requested.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver wall and door protection items in original, undamaged, unopened protective packaging. Intact Label items to designate installation locations.
- B. Protect work from moisture damage.
- C. Protect work from UV light damage.
- D. Do not deliver products to project site until areas for storage and installation are fully enclosed, and interior temperature and humidity are in compliance with manufacturer's recommendations for each type of item.
- E. Store products in either horizontal or vertical position, in compliance with manufacturer's instructions.
- F. Storage and Handling Requirements:
 - 1. Store materials in protected area in original, undamaged packaging in a cool, dry place out of direct sunlight and exposure to elements. Minimum room temperature of 40 deg F (4.4 deg C) and a maximum of 100 deg F (37.8 deg C) should be maintained.
- G. Ambient Conditions:
 - 1. Material must be acclimated in an environment of 65 deg F to 75 deg F (18 deg C to 24 deg C) for at least twenty-four (24) hours prior to beginning installation.
 - 2. Installation areas must be enclosed and weatherproofed before installation commences.

PART 2 PRODUCTS

2.01 PRODUCT TYPES

- A. Corner Guards:
 - 1. Manufacturers:
 - a. Stainless Steel Corner Guards:
 - 1) Acceptable Manufacturers:
 - (a) Acrovyn, Div Construction Specialties Group, Muncy, PA www.c-sgroup.com.
 - (b) American Floor Products Co, Rockville, MD www.afco-usa.com.
 - (c) IPC Door and Wall Protection Systems, Muskego, WI www.inprocorp.com.
 - (d) Pawling Corp, Pawling, NY www.pawling.com.
 - (e) Equal as approved by Architect before installation. See Section 01 6000 .
 - b. Vinyl Corner Guards:
 - 1) Approved Manufacturers.
 - (a) Acrovyn, Div Construction Specialties Group, Muncie, PA www.c-sgroup.com.
 - (b) American Floor Products Co, Rockville, MD www.afco-usa.com.
 - (c) IPC Door and Wall Protection Systems, Muskego, WI www.inprocorp.com.
 - (d) Koroseal Wall Protection Systems, Fairlawn, OH www.korogard.com.
 - (e) Pawling Corp, Pawling, NY www.pawling.com.
 - 2. Materials:
 - a. Stainless Steel Corner Guards:
 - 1) 16-ga (1.6 mm) stainless steel with finish equal to US32D Satin Stainless Steel.
 - 2) Size:

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- (a) Wall Corners: 3-1/2 inches (89 mm) by 3-1/2 inches (89 mm) by 48 inches (1200 mm) high.
 - b. Vinyl Corner Guards:
 - 1) Design Criteria:
 - (a) Chemical and stain resistance: Provide wall protection system components with chemical and stain resistance in accordance with ASTM D543.
 - 2) Color and Texture: As selected by Architect from Manufacturer's premium colors.
 - 3) Design Standard: Acrovyn VA Series, 1-1/2 inches (38mm) by 1-1/2 inches (38mm).
- 3. Fabrication:
 - a. Fabricate wall protection systems to comply with requirements indicated for design, dimensions, details, finish, and member sizes.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that rough openings, concealed blocking, and anchors are correctly sized and located, and identify conditions detrimental to proper or timely completion.
- B. Verify that field measurements are as indicated on drawings.
- C. Verify that substrate surfaces for adhered items are clean and smooth.
 - 1. Test painted or wall covering surfaces for adhesion in inconspicuous area, as recommended by manufacturer. Follow adhesive manufacturer's recommendations for remedial measures at locations and/or application conditions where adhesion test's results are unsatisfactory.
- D. Notify Architect of unsuitable conditions in writing.
- E. Do not proceed until unsatisfactory conditions have been corrected.
- F. Start of installation constitutes acceptance of project conditions.

3.02 INSTALLATION

- A. Install components in accordance with manufacturer's instructions, level and plumb, secured rigidly in position to supporting construction.
- B. Apply adhesive carefully to insure continuous contact between wall and guard. Take care to avoid soiling or leaving visible adhesive on wall or base.
- C. Maintain ambient conditions for at least forty-eight (48) hours.
- D. Allow materials to acclimate to building temperature 65 to 75 deg F (18 to 24 deg C) for at least twenty-four (24) hours prior to installation.
- E. Take all necessary steps to prevent damage to material during installation as required in manufacturer's installation instructions.
- F. Surface Preparation:
 - 1. Prior to installation, clean substrate to remove dirt, debris and loose particles. Perform additional preparation procedures as required by manufacturer's instructions.
 - 2. Follow Manufacturers' installation instructions, using only approved mounting hardware, and locating all components firmly into position, level and plumb.

3.03 TOLERANCES

- A. Maximum Variation From Required Height: 1/4 inch.
- B. Maximum Variation From Level or Plane For Visible Length: 1/4 inch.

3.04 CLEANING

- A. Clean wall and door protection items of excess adhesive, dust, dirt, and other contaminants as per Manufacturer's cleaning instructions.

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- B. Remove surplus materials, rubbish and debris resulting from installation as work progresses and upon completion of work.

3.05 PROTECTION

- A. Protect installed materials to prevent damage by other trades. Use materials that may be easily removed without leaving residue or permanent stains.

END OF SECTION

SECTION 10 2800
TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Commercial toilet accessories.
- B. Utility room accessories.

1.02 REFERENCE STANDARDS

- A. ADA Standards - 2010 ADA Standards for Accessible Design 2010.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2022.
- D. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar 2015.
- E. ASTM C1036 - Standard Specification for Flat Glass 2021.
- F. ASTM F446 - Standard Consumer Safety Specification for Grab Bars and Accessories Installed in the Bathing Area 2019.
- G. ISO 25537 - Glass in building — Silvered, flat-glass mirror 2008.

1.03 SUBMITTALS

- A. Product Data: Submit data on accessories describing operating characteristics, size, finish, details of function, rough-in dimensions and attachment methods.
- B. Shop Drawings:
 - 1. Schedule showing items used, location where installed, and proper attaching devices for substrate.
- C. Manufacturer's Installation Instructions: Indicate operation, care, cleaning instructions, special procedures and conditions requiring special attention.
- D. Closeout Submittals:
 - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
 - 2. Operations and Maintenance Data:
 - a. Folding Bench:
 - 1) Manufacturer's service and parts manual.
 - 3. Warranty Documentation:
 - a. Final, executed copy of Warranty for each product.
 - 4. Record Documentation:
 - a. Manufacturers documentation:
 - 1) Manufacturer's literature or cut sheets.

1.04 QUALITY ASSURANCE

- A. Source Limitations:
 - 1. For products listed together in same Part 2 articles, obtain products from single source from single manufacturer.

1.05 WARRANTY

- A. Commercial Toilet Accessories:
 - 1. Manufacturer's standard warranty.
- B. Baby Changing Station:
 - 1. Manufacturer's standard warranty to be free from defects in material and workmanship under normal use and service, with proper maintenance, for five (5) years.

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- C. Special Mirror Warranty:
 - 1. Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage or frame corrosion defects within specified warranty period:
 - a. Warranty Period: fifteen (15) years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 OWNER-FURNISHED PRODUCTS

- A. Approved Products:
 - 1. Automatic Touchless Towel Dispensers:
 - a. Size: 14.8 inches (376 mm) wide x 9.75 inches (248 mm) deep x 16.75 inches (425 mm) high.
 - 2. Soap dispensers.
 - 3. Toilet tissue dispensers.
- B. Baby Changing Station:
 - 1. Horizontal: Koala Kare model number KB200 by Koala.

2.02 MANUFACTURED UNITS

- A. Manufacturers:
 - 1. Manufacturer Contact List:
 - a. AJW Architectural Products, A&J Washroom Accessories, Inc., New Windsor, NY www.ajwashroom.com.
 - b. American Specialties Inc (ASI), Yonkers, NY www.americanspecialties.com.
 - c. Bobrick Washroom Equipment Inc, North Hollywood, CA www.bobrick.com or Bobrick Washroom Equipment of Canada Ltd, Scarborough, ON (416) 298-1611.
 - d. Bradley Corp, Menomonee Falls, WI www.bradleycorp.com.
 - e. General Accessory Manufacturing Co (GAMCO), Durant, OK www.gamcousa.com.
- B. Materials:
 - 1. Design Criteria:
 - a. Stainless Steel: ASTM A666 Type 304 (18-8); satin finish exposed surfaces unless otherwise indicated.
 - b. Galvanized-Steel Mounting Devices: ASTM A153/A153M, hot-dip galvanized after fabrication.
 - c. Fasteners:
 - 1) Exposed: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant.
 - 2) Concealed: Galvanized Steel.
 - 2. Rest Rooms:
 - a. Mirrors:
 - 1) Channel-Frame Mirror:
 - (a) Frame: Type 304 or Type 430, 20 gauge stainless steel channel frame.
 - (b) Roll-formed one piece construction.
 - (c) Exposed surfaces have #4 satin finish.
 - (d) Edges and corners are burr free.
 - (e) Glass: 1/4 inch (6.4 mm) silver coated and hermetically sealed. Guaranteed for 15 years against silver spoilage. Mirrors meet ASTM C1036 requirements.
 - (f) Concealed surface mounted wall hanger.
 - 2) Approved Products. See Section 01 6000:
 - (a) AJW Architectural Products: Model U711.
 - (b) American Specialties (ASI): Model 0620.
 - (c) Bobrick: Model B-165.
 - (d) Bradley: Model 781.
 - (e) General Accessory (GAMCO): Model C Series.

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- b. Sanitary Napkin Disposal Container:
 - 1) Design Criteria:
 - (a) Surface mounted type 304, 22 gauge stainless steel with #4 satin finish. Seamless construction with radius and hemmed edges.
 - (b) Stainless steel piano hinge.
 - 2) Approved Products. See Section 01 6000:
 - (a) AJW Architectural Products: Model U590.
 - (b) American Specialties (ASI): Model 0852.
 - (c) Bobrick: Model B-270.
 - (d) Bradley: Model 4781-15.
 - (e) General Accessory (GAMCO): Model ND-1.
 - c. Single Robe Hook:
 - 1) Surface mounted type 304, 22 gauge stainless steel with #4 satin finish.
 - 2) Concealed mounting bracket.
 - 3) Stainless steel locking setscrew on bottom.
 - 4) Approved Products. See Section 01 6000:
 - (a) AJW Architectural Products: Model UX110SF.
 - (b) American Specialties (ASI): Model 7340-S.
 - (c) Bobrick: Model B6717.
 - (d) Bradley: Model 9114.
 - (e) General Accessory (GAMCO): Model 76717.
 - d. Grab Bars:
 - 1) Configuration shown on Contract Drawings. Include center support for longer lengths when required:
 - 2) Design Criteria:
 - (a) Comply with ADA guidelines and ADAAG accessible design for structural strength and local and state codes.
 - (b) Concealed mount.
 - (c) 18 ga (1.27 mm), type 304 stainless steel tubing.
 - (d) 1-1/2 inch (38 mm) diameter.
 - (e) Provide center support when required.
 - (f) Snap-on flange covers.
 - (g) Peened (non-slip) finish.
 - (h) Sustain loads in excess of 900 lbs (408 kg).
 - 3) Approved Products. See Section 01 6000:
 - (a) AJW Architectural Products: Model UG3 Series.
 - (b) American Specialties (ASI): Model 3800 Series.
 - (c) Bobrick: Model B-6806 Series.
 - (d) Bradley: Model 812 Series.
 - (e) General Accessory (GAMCO): Model 150 Series.
 - e. Shelf:
 - 1) Design Criteria:
 - (a) 18 ga (1.27 mm), stainless steel with No. 4 Satin finish.
 - (b) 6 inches (150 mm) wide.
 - 2) Approved Products. See Section 01 6000:
 - (a) AJW Architectural Products: Model U776.
 - (b) American Specialties (ASI): Model 0692.
 - (c) Bobrick: Model B-296.
 - (d) Bradley: Model 756.
 - (e) General Accessory (GAMCO): Model S-6.
3. Custodial Rooms:
- a. Utility Shelf:
 - 1) Provide mop / broom hangers, shelf, and rod for hanging rags.

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- 2) Size as shown on Contract Drawings.
- 3) Approved Products. See Section 01 6000:
 - (a) AJW Architectural Products: Model UJ41.
 - (b) American Specialties (ASI): Model 1300 Series.
 - (c) Bobrick: Model B-224 Series.
 - (d) Bradley: Model 9933 Series.
 - (e) General Accessory (GAMCO): Model US Series.
4. Mother's Rooms:
 - a. Mirror:
 - 1) Size:
 - (a) 24 inch by 60 inch (600 mm by 1 500 mm) mirror.
 - 2) Channel-Frame Mirror:
 - (a) Frame: Type 304 or Type 430, 20 gauge stainless steel channel frame.
 - (b) Roll-formed one piece construction.
 - (c) Exposed surfaces have #4 satin finish.
 - (d) Edges and corners are burr free.
 - (e) Glass: 1/4 inch (6.4 mm) silver coated and hermetically sealed. Guaranteed for 15 years against silver spoilage. Mirrors meet ASTM C1036 requirements.
 - (f) Concealed surface mounted wall hanger.
 - 3) Approved Products. See Section 01 6000:
 - (a) AJW Architectural Products: Model U711.
 - (b) American Specialties (ASI): Model 0620.
 - (c) Bobrick: Model B-165.
 - (d) Bradley: Model 781.
 - (e) General Accessory (GAMCO): Model C Series.
 5. Folding Bench:
 - a. Design Criteria:
 - 1) Reversible solid phenolic folding shower seat.
 - 2) Frame constructed of type 304, satin-finish stainless steel.
 - 3) Comply with barrier-free ADA accessibility guidelines.
 - b. Acceptable Product:
 - 1) Bobrick: Model B-5181.
 - 2) Equal as approved by Architect before installation. See Section 01 6000.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify exact location of accessories for installation.
- C. For electrically-operated accessories, verify that electrical power connections are ready and in the correct locations.
- D. Verify that field measurements are as indicated on drawings.
- E. See Section 06 1000 for installation of blocking, reinforcing plates, and concealed anchors in walls and ceilings.

3.02 PREPARATION

- A. Deliver inserts and rough-in frames to site for timely installation.
- B. Provide templates and rough-in measurements as required.

3.03 INSTALLATION

- A. Install accessories in accordance with manufacturers' instructions in locations indicated on drawings.

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- B. Install plumb and level, securely and rigidly anchored to substrate.
- C. Comply with ADA Accessibility Guidelines and installation heights as shown on Contract Drawings.
- D. Assemble fixtures and associated fittings and trim in accordance with manufacturer's instructions.
- E. Install using mounting devices proper for base structure.
- F. Install equipment level, plumb, and firmly in place in accordance with manufacturer's rough-in drawings.
- G. Where possible, mount like items in adjoining compartments back-to-back on same partition.
- H. Folding Bench:
 - 1. Secure unit to wall as per Manufacturer instructions.
- I. Grab Bars:
 - 1. Install as per Manufacturers written installation instructions.
 - 2. Install grab bars to withstand downward force of not less than 250 lbf (1112 N) per ASTM F446.
- J. Baby Changing Stations:
 - 1. Verify that solid blocking has been installed in wall framing where changing station is to be installed.
 - 2. Do not install unit by any other means other than screws or lag bolts into solid blocking.
- K. Install items in accordance with Manufacturer's submitted, written instructions for screws or lag bolts into solid substrate capable of supporting 200 lbs (90 kg). Install using mounting devices proper for base structure.

3.04 REPAIR

- A. Repair or replace defective work, including damaged equipment and components.
- B. Repair or replace malfunctioning equipment, or equipment with parts that bind or are misaligned.

3.05 CLEANING

- A. Clean unit surfaces and leave in ready-to-use condition.

3.06 ADJUSTING

- A. Test each piece of equipment provided with moving parts to assure proper operation, freedom of movement, and alignment. Install new batteries in battery-powered items.

3.07 CLOSEOUT ACTIVITIES

- A. Turn over keys, tools, maintenance instructions, and maintenance stock to Owner.

3.08 PROTECTION

- A. Protect installed accessories from damage due to subsequent construction operations.

END OF SECTION

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**SECTION 10 2815
MISCELLANEOUS ACCESSORIES**

PART 1 GENERAL

1.01 SUMMARY

- A. Products Furnished but Not Installed Under This Section:
 - 1. Wall-mounted coat racks and hangers as described in Contract Documents.
 - 2. Door-mounted coat racks and hangers.
 - 3. Wall clocks.

1.02 RELATED REQUIREMENTS:

- A. Section 06 1000 - Rough Carpentry for wall blocking.
- B. Section 06 2000 - Finish Carpentry for:
 - 1. Installation of Coat Racks.
 - 2. Furnishing and installation of Wardrobe Hooks (Coat and Hat Hooks).
 - 3. Furnishing and installation of Hooks (mounted in accessible stalls in Restrooms in projects with Baptismal Fonts).
- C. United States Department of Justice Civil Rights Division (www.ADA.gov)
 - 1. The Americans with Disabilities Act of 1990:
 - a. Guidance on the 2010 ADA Standards for Accessible Design.

1.03 SUBMITTALS

- A. Closeout Submittals:
 - 1. Include following in Operations and Maintenance Manual specified in Section 01 7800:
 - a. Record Documentation:
 - 1) Manufacturers documentation:
 - (a) Manufacturer's literature.

PART 2 PRODUCTS

2.01 WALL-MOUNTED COAT RACKS

- A. Manufacturers:
 - 1. Manufacturer Contact List:
 - a. EMCO Specialty Products Inc, Kansas City, KS www.emcospi.com.
 - b. Magnuson Group, Burr Ridge, IL www.magnusongroup.com.
- B. Materials:
 - 1. Coat Racks:
 - a. Furnish one hanger for each 2-1/2 inches (63 mm) of rack.
 - b. Design Criteria:
 - 1) Wall mounted.
 - 2) Brackets: powder-coated metal.
 - 3) Shelf Slats or Tubes: aluminum.
 - 4) Hanger Bar: 1 inch (25 mm) metal.
 - 5) Finish as selected by Architect.
 - c. Acceptable Products:
 - 1) Coat Hall Alcoves:
 - (a) EMCO System R1.
 - (b) Magnuson DS-3HA Series.
 - 2) Coat Rooms:
 - (a) EMCO System R1.
 - (b) Magnuson DS-3HA Series.
 - 3) Hangers / Receptacles:
 - (a) EMCO No. 17 ball top hangers and model C receptacles.
 - (b) Magnuson MIRAC MG-17PH molded polystyrene hanger.

- 4) Equal as approved by Architect before bidding. See Section 01 6000.

2.02 OWNER-FURNISHED CLOCKS

- A. Wall Clocks:
 1. Approved Suppliers. See Section 01 6000 for definitions of Categories:
 - a. Staples Advantage, PO Box 95708, Chicago, IL, phone (877) 295-0003, fax (800) 270-7611.
 - 1) Howard Miller model HOW625323.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Wall Clocks:
 1. Mount at height as shown and in locations as shown on Contract Drawings.

END OF SECTION

**SECTION 10 4400
FIRE PROTECTION SPECIALTIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fire extinguishers.
- B. Fire extinguisher cabinets.
- C. Accessories.

1.02 REFERENCE STANDARDS

- A. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems 2013a (Reapproved 2017).
- B. NFPA 10 - Standard for Portable Fire Extinguishers 2022.

1.03 SUBMITTALS

- A. Product Data: Provide extinguisher operational features.
- B. Shop Drawings: Indicate locations of cabinets, cabinet physical dimensions, and rough-in measurements for recessed cabinets.
- C. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.
- D. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.
- E. Closeout Submittals:
 - 1. Include following in Operations and Maintenance Manual specified in Section 01 7800:
 - a. Warranty Documentation:
 - 1) Include copy of final, executed warranty.
 - b. Record Documentation:
 - 1) Testing and Inspection Reports:
 - (a) Testing Agency Inspecting Reports of Drilled-In Mechanical Anchors / Adhesive Anchors / Screw Anchors.

1.04 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
 - 1. Fire extinguishers shall be inspected and have annual inspection tag attached before Substantial Completion.

1.05 FIELD CONDITIONS

- A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

1.06 WARRANTY

- A. Manufacturer Warranty:
 - 1. Manufacturer's standard, written warranty on fire extinguisher.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Fire Extinguishers:
 - 1. Approved Manufacturers. See Section 01 6000:
 - a. Amerex Corp, Trussville, AL www.amerex-fire.com.
 - b. Ansul Incorporated, Marinette, WI www.ansul.com.
 - c. Buckeye Fire Equipment, Kings Mountain, NC www.buckeyef.com.
 - d. Extinguishers private-labeled by manufacturers approved above are approved, with appropriate documentation.
- B. Cabinets and Brackets:

1. Acceptable Manufacturers:
 - a. J L Industries, Bloomington, MN www.jlindustries.com.
 - b. Larsen's Manufacturing Co, Minneapolis, MN www.larsensmfg.com.
 - c. Modern Metal Products / Technico, Owatonna, MN www.modern-metal.com.
 - d. National Fire Equipment Ltd, Scarborough, ON www.nationalfire.com.
 - e. Potter-Roemer, Cerritos, CA www.potterroemer.com.
 - f. Samson Products Inc, City of Commerce, CA www.samsonproducts.com.
 - g. Seton Inc, Richmond Hill, ON (905) 764-1122.
 - h. Equal as approved by Architect before bidding. See Section 01 6000.

C. Acceptable Distributors:

1. W.W. Grainger, Inc., Lake Forest, IL www.grainger.com.
2. Equal as approved by Architect before bidding. See Section 01 6000.

2.02 FIRE EXTINGUISHERS

- A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
- B. Design Criteria:
 1. Ten pound dry chemical ABC stored pressurized type equipped with pressure gauge and which does not need recharging except after use.
 2. Instructions for repairs, maintenance, and recharging shall be attached.
 3. Unit shall be tested and approved by UL and have minimum 4A:60-B:C UL rating. UL rating shall appear on extinguisher labels and be attached to and a part of fire extinguisher units.

2.03 FIRE EXTINGUISHER CABINETS

- A. Fire Rating: Listed and labeled in accordance with ASTM E814 requirements for fire resistance rating of walls where being installed.
- B. Design Criteria:
 1. Two-piece, semi-recessed or flush type depending on wall thickness, and have white baked enameled steel tubs with white baked enamel return trim and doors, clear acrylic glazing, 'Safe-T-Lock,' and cylinder locks.
 2. Supply each cabinet with one specified fire extinguisher.
- C. Acceptable Manufacturers:
 1. Basis of Design Product: Ambassador 1017 G10 by J L Industries.
 2. Equal as approved by Architect before bidding from Acceptable Manufacturer's equivalent product. See Section 01 6000.

2.04 ACCESSORIES

- A. Extinguisher Brackets:
 1. Design Criteria:
 - a. Heavy duty with minimum of double strap/bracket.
 2. Approved Bracket. See Section 01 6000:
 - a. Basis of Design Product: No. 846 by Larsen's.
 - b. Equal as approved by Architect before bidding from Approved Manufacturer's equivalent product.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify rough openings for cabinet are correctly sized and located.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

- B. Securely Install cabinets and hangers plumb and level with wall surfaces.
- C. Trim for cabinets shall be neat in appearance.
- D. Place extinguishers in cabinets.

3.03 ADJUSTING

- A. Fire extinguishers shall be inspected and have annual inspection tag attached before Substantial Completion.

END OF SECTION

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**SECTION 22 0501
COMMON WORK RESULTS FOR PLUMBING**

PART 1 GENERAL

1.01 SUMMARY

- A. Includes But Not Limited To:
 - 1. Common requirements and procedures for plumbing systems.
 - 2. Responsibility for proper operation of electrically powered equipment furnished under this Division.
 - 3. Furnish and install sealants relating to installation of systems installed under this Division.
- B. Products Furnished But Not Installed Under This Section:
 - 1. Sleeves, inserts, supports, and equipment for plumbing systems installed under other Sections.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Exterior concrete pads and bases for mechanical equipment.
- B. Section 05 5000 - Metal Fabrications: Quality and requirements for welding.
- C. Section 07 9200 - Joint Sealants: Elastomeric Joint Sealant: Quality at building exterior.
- D. Sections 09 9113 - Exterior Painting: Painting of plumbing items requiring field painting.
- E. Sections 09 9123 - Interior Painting: Painting of plumbing items requiring field painting.
- F. Division 26: 'Electrical' for raceway and conduit, unless specified otherwise, and line voltage wiring.
- G. Division 33: 'Utilities' for piped utilities.
- H. Slots and openings through floors, walls, ceilings, and roofs provided under other Divisions in their respective materials.

1.03 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.
- B. FM (AG) - FM Approval Guide current edition.
- C. ITS (DIR) - Directory of Listed Products Current Edition.
- D. NEMA MG 1 - Motors and Generators 2021.
- E. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. UL (DIR) - Online Certifications Directory Current Edition.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: See drawings for details.
- B. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.
- C. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.
- D. Scheduling: [].

1.05 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data:
 - a. Manufacturer's catalog data for each manufactured item.

- 1) Provide section in submittal for each type of item of equipment. Include Manufacturer's catalog data of each manufactured item and enough information to show compliance with Contract Document requirements. Literature shall show capacities and size of equipment used and be marked indicating each specific item with applicable data underlined.
- 2) Include name, address, and phone number of each supplier.
- b. Informational Submittals:
 - 1) Design Submittals:
 - (a) See individual specification sections in Division 22 for Submittals required.
 - 2) Qualification Statement:
 - (a) Plumbing Subcontractor:
 - (1) Provide Qualification documentation if requested by Architect or Owner.
 - (b) Installer:
 - (1) Provide Qualification documentation if requested by Architect or Owner.
- B. Shop Drawings: Indicate [____].
- C. Certificate: Certify that products of this section meet or exceed specified requirements.
- D. Delegated Design Data: Indicate [____].
- E. Test Reports: Indicate [____].
- F. Evaluation Service Reports: Show compliance with specified requirements.
- G. Manufacturer's Instructions: Indicate [____].
- H. Source Quality Control Submittals: [____].
- I. Field Quality Control Submittals: [____].
- J. Manufacturer Reports: Indicate [____].
- K. Designer's Qualification Statement.
- L. Manufacturer's Qualification Statement.
- M. Installer's Qualification Statement.
- N. Operation Data: [____].
- O. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- P. Project Record Documents: Record actual locations of [____].

1.06

QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
 1. Perform work in accordance with applicable provisions of Plumbing Codes applicable to Project. Provide materials and labor necessary to comply with rules, regulations, and ordinances.
 2. In case of differences between building codes, laws, local ordinances, utility company regulations, and Contract Documents, the most stringent shall govern. Notify Architect in writing of such differences before performing work affected by such differences.
 3. Identification:
 - a. Motor and equipment name plates as well as applicable UL and AGA labels shall be in place when Project is turned over to Owner.
- B. Qualifications: Requirements of Section 01 4000 - Quality Requirements apply, but not limited to the following:
 1. Plumbing Subcontractor:
 - a. Company specializing in performing work of this section.
 - 1) Minimum five (5) years' experience in plumbing installations.

- 2) Minimum five (5) satisfactorily completed installations in past three (3) years of projects similar in size, scope, and complexity required for this project before bidding.
- b. Upon request, submit documentation.
2. Installer:
 - a. Licensed for area of Project.
 - b. Designate one (1) individual as project foremen who shall be on site at all times during installation and experienced with installation procedures required for this project.
 - c. Upon request, submit documentation.
- C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with at least three years of documented experience.
- D. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.
- E. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.
- F. Preconstruction Testing: [____].
- G. Copies of Documents at Project Site: Maintain at the project site a copy of each referenced document that prescribes execution requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Delivery and Acceptance Requirements:
 1. Accept valves on site in shipping containers with labeling in place.
 2. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- B. Storage and Handling Requirements:
 1. In addition to requirements specified in Division 01, stored material shall be readily accessible for inspection by Architect until installed.
 2. Store items subject to moisture damage in dry, heated spaces.

1.08 WARRANTY

- A. Manufacturer Warranty:
 1. Provide certificates of warranty for each piece of equipment made out in favor of the Owner.
- B. Special Warranty:
 1. Guarantee plumbing systems to be free from noise in operation that may develop from failure to construct system in accordance with Contract Documents.
 2. If plumbing sub-contractor with offices located more than 150 miles from Project site is used, provide service / warranty work agreement for warranty period with local plumbing sub-contractor approved by Architect. Include copy of service / warranty agreement in warranty section of Operation And Maintenance Manual.

PART 2 PRODUCTS

2.01 COMPONENTS

- A. Components shall bear Manufacturer's name and trade name. Equipment and materials of same general type shall be of same make throughout work to provide uniform appearance, operation, and maintenance.
- B. Pipe and Pipe Fittings:
 1. Weld-O-Let and Screw-O-Let fittings are acceptable.
- C. Sleeves:
 1. General:
 - a. Two sizes larger than bare pipe or insulation on insulated pipe.

2. In Concrete and Masonry:
 - a. Standard weight galvanized iron pipe, Schedule 40 PVC, or 14 gage galvanized sheet metal.
- D. Valves:
 1. Valves of same type shall be of same manufacturer.

PART 3 EXECUTION

3.01 INSTALLERS

- A. Acceptable Installers:
 1. Meet Quality Assurance Installer Qualifications as specified in Part 1 of this specification.
- B. Substitution Limitations: Same as specified for products; see Section 01 6000 - Product Requirements.

3.02 INSTALLERS

- A. Approved Installers. See Section 01 4000 - Quality Requirements:
 1. Plumbing Subcontractor Contact Information:
 - a. .
 - b. .
 - c. .
- B. Approved Installers. See Section 01 4000 - Quality Requirements:
 1. Approved Plumbing Subcontractors shall be pre-approved in accordance with Supplementary Conditions and included in Construction Documents by Addendum.
- C. Approved Installers. See Section 01 4000 - Quality Requirements:
 1. Meet Quality Assurance Installer Qualifications as specified in Part 1 of this specification.

3.03 EXAMINATION

- A. Drawings:
 1. Plumbing Drawings show general arrangement of piping, equipment, etc. Follow as closely as actual building construction and work of other trades will permit.
 2. Mechanical Drawings show general arrangement of piping, equipment, etc. Follow as closely as actual building construction and work of other trades will permit.
 3. Consider Architectural and Structural Drawings part of this work insofar as these drawings furnish information relating to design and construction of building. These drawings take precedence over Plumbing Drawings.
 4. Because of small scale of Drawings, it is not possible to indicate all offsets, fittings, and accessories that may be required. Investigate structural and finish conditions affecting this work and arrange work accordingly, providing such fittings, valves, and accessories required to meet conditions.
- B. Verification of Conditions:
 1. Examine premises to understand conditions that may affect performance of work of this Division before submitting proposals for this work. Examine adjoining work on which plumbing work is dependent for efficiency and report work that requires correction.
 2. Ensure that items to be furnished fit space available. Make necessary field measurements to ascertain space requirements including those for connections and furnish and install equipment of size and shape so final installation shall suit true intent and meaning of Contract Documents. If approval is received by Addendum or Change Order to use other than originally specified items, be responsible for specified capacities and for ensuring that items to be furnished will fit space available.
 3. Check that slots and openings provided under other Divisions through floors, walls, ceilings, and roofs are properly located. Perform cutting and patching caused by neglecting to coordinate with Divisions providing slots and openings at no additional cost to Owner.

4. No subsequent allowance for time or money will be considered for any consequence related to failure to examine site conditions.

3.04 PREPARATION

- A. Changes Due to Equipment Selection:
 1. Where equipment specified or otherwise approved requires different arrangement or connections from that shown in Contract Documents, submit drawings showing proposed installations.
 2. If proposed changes are approved, install equipment to operate properly and in harmony with intent of Contract Documents. Make incidental changes in piping, ductwork, supports, installation, wiring, heaters, panelboards, and as otherwise necessary.
 3. Provide additional motors, valves, controllers, fittings, and other equipment required for proper operation of systems resulting from selection of equipment.
 4. Be responsible for proper location of rough-in and connections provided under other Divisions.

3.05 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Interface With Other Work:
 1. Furnish exact location of electrical connections and complete information on motor controls to installer of electrical system.
 2. Furnish sleeves, inserts, supports, and equipment that are to be installed by others in sufficient time to be incorporated into construction as work proceeds. Locate these items and confirm that they are properly installed.
 3. Furnish inserts for attaching hangers that are to be cast in concrete floor construction to Division 03 at time floors are poured.
- C. Cut carefully to minimize necessity for repairs to previously installed or existing work. Do not cut beams, columns, or trusses.
- D. Locating Equipment:
 1. Arrange pipes and equipment to permit ready access to valves, cocks, unions, traps, and to clear openings of doors and access panels.
 2. Adjust locations of pipes, equipment, and fixtures to accommodate work to interferences anticipated and encountered.
 3. Install plumbing work to permit removal of equipment and parts of equipment requiring periodic replacement or maintenance without damage to or interference with other parts of equipment or structure.
 4. Determine exact route and location of each pipe before fabrication.
 - a. Right-Of-Way:
 - 1) Lines that pitch shall have right-of-way over those that do not pitch. For example, plumbing drains shall normally have right-of-way.
 - 2) Lines whose elevations cannot be changed shall have right-of-way over lines whose elevations can be changed.
 - b. Offsets, Transitions, and Changes in Direction:
 - 1) Make offsets, transitions, and changes in direction in pipes as required to maintain proper head room and pitch of sloping lines whether or not indicated on Drawings.
 - 2) Furnish and install all traps, air vents, sanitary vents, and devices as required to effect these offsets, transitions, and changes in direction.
- E. Penetration Firestops:
 1. Install Penetration Firestop System appropriate for penetration at plumbing systems penetrations through walls, ceilings, roofs, and top plates of walls.
- F. Sealants:

1. Seal openings through building exterior caused by penetrations of elements of plumbing systems.
 2. Furnish and install acoustical sealant to seal penetrations through acoustically insulated walls and ceilings.
- G. Furnish and install complete system of piping, valved as indicated or as necessary to completely control entire apparatus:
1. Pipe drawings are diagrammatic and indicate general location and connections. Piping may have to be offset, lowered, or raised as required or directed at site. This does not relieve this Division from responsibility for proper installation of plumbing systems.
 2. Arrange piping to not interfere with removal of other equipment, ducts, or devices, or block access to doors, windows, or access openings:
 - a. Arrange so as to facilitate removal of tube bundles.
 - b. Provide accessible flanges or ground joint unions, as applicable for type of piping specified, at connections to equipment and on bypasses.
 - 1) Make connections of dissimilar metals with di-electric unions.
 - 2) Install valves and unions ahead of traps and strainers. Provide unions on both sides of traps.
 - c. Do not use reducing bushings, bull head tees, close nipples, or running couplings. Street elbows are allowed only on potable water pipe 3/4 inch in diameter and smaller.
 - d. Install piping systems so they may be easily drained.
 - e. Install piping to insure noiseless circulation.
 - f. Place valves and specialties to permit easy operation and access. Valves shall be regulated, packed, and glands adjusted at completion of work before final acceptance.
 - g. Do not install piping in shear walls.
 - h. Cut piping accurately to measurements established at site. Remove burr and cutting slag from pipes.
 - i. Work piping into place without springing or forcing.
 - j. Make changes in direction with proper fittings.
 3. Expansion of Thermoplastic Pipe:
 - a. Provide for expansion in every 30 feet of straight run.
 - b. Provide 12 inch offset below roof line in each vent line penetrating roof.
 4. Expansion of PEX Pipe: Allow for expansion and contraction of PEX pipe as recommended by Pipe Manufacturer.
- H. Sleeves:
1. Do not place sleeves around soil, waste, vent, or roof drain lines passing through concrete slabs on grade.
 2. Provide sleeves around pipes passing through concrete or masonry floors, walls, partitions, or structural members. Seal sleeves with specified sealants. Follow Pipe Manufacturer's recommendations for PEX pipe penetrations through studs and floor slabs.
 3. Sleeves through floors shall extend 1/4 inch (6 mm) above floor finish in mechanical equipment rooms above basement floor. In other rooms, sleeves shall be flush with floor.
 4. Sleeves through floors and foundation walls shall be watertight.
- I. Escutcheons:
1. Provide spring clamp plates where pipes run through walls, floors, or ceilings and are exposed in finished locations of building. Plates shall be chrome plated heavy brass of plain pattern and shall be set tight on pipe and to building surface.

3.06 REPAIR / RESTORATION

- A. Each Section of this Division shall bear expense of cutting, patching, repairing, and replacing of work of other Sections required because of its fault, error, tardiness, or because of damage done by it:

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1. Patch and repair walls, floors, ceilings, and roofs with materials of same quality and appearance as adjacent surfaces unless otherwise shown.
2. Surface finishes shall exactly match existing finishes of same materials.

3.07 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Field Tests:
 1. Perform tests on HVAC piping systems. Furnish devices required for testing purposes.
- C. Non-Conforming Work:
 1. Replace material or workmanship proven defective with sound material at no additional cost to Owner.
 2. Repeat tests on new material, if requested.

3.08 CLEANING

- A. Remove dirt, grease, and other foreign matter from each length of piping before installation:
 1. After each section of piping used for movement of water or steam is installed, flush with clean water, except where specified otherwise.
 2. Arrange temporary flushing connections for each section of piping and arrange for flushing total piping system.
 3. Provide temporary cross connections and water supply for flushing and drainage and remove after completion of work.
- B. Clean exposed piping, equipment, and fixtures. Remove stickers from fixtures and adjust flush valves.
- C. See Section 01 7419 - Construction Waste Management and Disposal, for additional requirements.

3.09 CLOSEOUT ACTIVITIES

- A. See Section 01 7800 - Closeout Submittals, for closeout submittals.
- B. See Section 01 7900 - Demonstration and Training, for additional requirements.
- C. Instruction of Owner:
- D. Instruct building maintenance personnel and Stake Physical Facilities Representative in operation and maintenance of plumbing systems utilizing Operation And Maintenance Manual when so doing.
- E. Instruct building maintenance personnel and Facility Manager in operation and maintenance of plumbing systems utilizing Operation And Maintenance Manual when so doing.
- F. Conduct instruction period after Substantial Completion inspection when systems are properly working and before final payment is made.
- G. Demonstrate proper operation of equipment to Owner's designated representative.
- H. Demonstration: Demonstrate operation of system to Owner's personnel.
 1. Use operation and maintenance data as reference during demonstration.
 2. Conduct walking tour of project.
 3. Briefly describe function, operation, and maintenance of each component.
- I. Training: Train Owner's personnel on operation and maintenance of system.
 1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
 2. Provide minimum of two hours of training.
 3. Instructor: Manufacturer's training personnel.
 4. Location: At project site.

3.10 PROTECTION

- A. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system. Cap or plug open ends of pipes and

equipment to keep dirt and other foreign materials out of system. Do not use plugs of rags, wool, cotton waste, or similar materials. Protect plastic pipe from exposure to sunlight as appropriate.

END OF SECTION

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**SECTION 22 1005
PLUMBING PIPING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Domestic water piping, above grade.

1.02 SUMMARY

- A. Includes But Not Limited To:
 - 1. Plumbing Piping:
 - a. Furnish and install potable water piping complete with necessary valves, connections, and accessories inside building and connect with outside utility lines 5 feet (1 50 m) from building perimeter as described in Contract Documents.

1.03 RELATED REQUIREMENTS

- A. N/A

1.04 REFERENCE STANDARDS

- A. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300 2021.
- B. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings 2021.
- C. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings 2021.
- D. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes 2018.
- E. ASTM B32 - Standard Specification for Solder Metal 2020.
- F. ASTM B42 - Standard Specification for Seamless Copper Pipe, Standard Sizes 2020.
- G. ASTM B88 - Standard Specification for Seamless Copper Water Tube 2022.
- H. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric) 2020.
- I. ASTM B813 - Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube 2016.
- J. ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings 2016.
- K. ASTM F876 - Standard Specification for Crosslinked Polyethylene (PEX) Tubing 2022a, with Editorial Revision.
- L. ASTM F1960 - Standard Specification for Cold Expansion Fittings with PEX Reinforcing Rings for Use with Cross-linked Polyethylene (PEX) and Polyethylene of Raised Temperature (PE-RT) Tubing 2022.
- M. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding 2019.
- N. AWWA C651 - Disinfecting Water Mains 2014, with Addendum (2020).

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Qualifications:
 - 1. Manufacturer Qualifications:
 - a. PP-R pipe and PP-RCT pipe:
 - 1) Certified by NSF International.
 - 2. Installers Qualifications:
 - a. PP-R pipe and PP-RCT pipe:
 - 1) Certified by Manufacturer.
 - 3. Pre-Installation Conference:
 - a. Participate in pre-installation conference as specified in Section 03 3111.

1.06 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.

- B. Action Submittals:
 - 1. Product Data:
 - a. Manufacturer's Literature:
 - 1) PEX pipe and PEX pipe fittings.
 - 2) PP-R pipe and PP-R pipe fittings.
 - 3) PP-RCT pipe and PP-RCT pipe fittings.
 - 2. Samples:
 - a. PEX pipe and fitting.
 - b. PP-R pipe and fitting
 - c. PP-RCT pipe and PP-RCT fitting
- C. Informational Submittals:
 - 1. Test And Evaluation Reports:
 - a. Written report of sterilization test.
- D. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers with catalog information. Indicate valve data and ratings.
- E. Shop Drawings: For non-penetrating rooftop supports, submit detailed layout developed for this project, with design calculations for loadings and spacings.
- F. Sustainable Design Documentation: For soldered copper joints, submit installer's certification that the specified installation method and materials were used.
- G. Sustainable Design Documentation: For products meeting regulatory lead-content restrictions.
- H. Project Record Documents: Record actual locations of valves.
- I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements for additional provisions.
 - 2. Valve Repacking Kits: One for each type and size of valve.

1.07 QUALITY ASSURANCE

- A. Perform work in accordance with applicable codes.
- B. Valves: Manufacturer's name and pressure rating marked on valve body.
- C. Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary protective coating on cast iron and steel valves.
- C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.09 FIELD CONDITIONS

- A. Do not install underground piping when bedding is wet or frozen.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Potable Water Supply Systems: Provide piping, pipe fittings, and solder and flux (if used), that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

2.02 DOMESTIC WATER PIPING, ABOVE GRADE

- A. Copper Pipe: ASTM B88 (ASTM B88M), Type K (A), Drawn (H).
 - 1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
 - 2. Joints: ASTM B32, Alloy Sn95 solder.

3. Mechanical Press Sealed Fittings: Double-pressed type, NSF 61 and NSF 372 approved or certified, utilizing EPDM, nontoxic, synthetic rubber sealing elements.
- B. Cross-Linked Polyethylene (PEX) Pipe: ASTM F876 or ASTM F877.
 1. PPI TR-4 Pressure Design Basis:
 - a. 160 psig at maximum 73 degrees F.
 - b. 100 psig at maximum 180 degrees F.
 - c. 80 psig at maximum 200 degrees F.
 2. Fittings: Brass and copper.
 3. Fittings: Brass and engineered polymer (EP) ASTM F1960.
 4. Joints: Mechanical compression fittings.
 5. Joints: ASTM F1960 cold-expansion fittings.

2.03 PIPE UNIONS, AND COUPLINGS

- A. Unions for Pipe Sizes 3 inch and Under:
 1. Copper Tube and Pipe: Class 150 bronze unions with soldered joints.

2.04 BALL VALVES

- A. Manufacturers:
 1. Apollo Valves; www.apollovalves.com/#sle.
 2. Grinnell Products; www.grinnell.com/#sle.
 3. Nibco, Inc; www.nibco.com/#sle.
 4. Uponor, Inc; www.uponorengineering.com/#sle.
 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Construction, 4 inch and Smaller: MSS SP-110, Class 150, 400 psi CWP, bronze or ductile iron body, 304 stainless steel or chrome plated brass ball, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handle with balancing stops, threaded or grooved ends with union.

PART 3 EXECUTION

3.01 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.
- D. Follow all manufacturers requirements.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- C. Route piping in an orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- D. Install piping to maintain headroom, conserve space, and not interfere with use of space.
- E. Group piping whenever practical at common elevations.
- F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. See Section 22 0516.
- G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
 1. See Section 22 0719.
- H. Provide access where valves and fittings are not exposed.
 1. Coordinate size and location of access doors with Section 08 3100.
- I. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc-rich primer to welding.

- J. Provide support for utility meters in accordance with the requirements of utility companies.
- K. Prepare exposed, unfinished pipe, fittings, supports, and accessories for finish painting.
- L. Install valves with stems upright or horizontal, not inverted. See Section 22 0523.
- M. Install water piping to ASME B31.9.
- N. Copper Pipe and Tube: Make soldered joints in accordance with ASTM B828, using specified solder, and flux meeting ASTM B813; in potable water systems use flux also complying with NSF 61 and NSF 372.
- O. Pipe Hangers and Supports:

3.03 TOLERANCES

- A. Water Piping: Slope at minimum of 1/32 inch per foot and arrange to drain at low points.

3.04 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Use method prescribed by the applicable state or local codes, or health authority or water purveyor having jurisdiction, or in the absence of any of these follow AWWA C651.
- B. Prior to starting work, verify system is complete, flushed, and clean.
- C. Ensure acidity (pH) of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).
- D. Inject disinfectant, free chlorine in liquid, powder, tablet, or gas form throughout system to obtain 50 to 80 mg/L residual.
- E. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.
- F. Maintain disinfectant in system for 24 hours.
- G. If final disinfectant residual tests less than 25 mg/L, repeat treatment.
- H. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.
- I. Take samples no sooner than 24 hours after flushing, from 10 percent of outlets and from water entry, and analyze in accordance with AWWA C651.

3.05 WARRANTY

- A. 10 years factory-certified minimum for
 - 1. PP-R pipe and fittings
 - 2. PP-RCT pipe and PP-RCT fittings

END OF SECTION

**SECTION 22 4000
PLUMBING FIXTURES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Sinks.

1.02 SUMMARY

- A. Includes But Not Limited To:
 - 1. Furnish and install plumbing fixtures as described in Contract Documents.

1.03 RELATED REQUIREMENTS

- A. Section 22 1005 - Plumbing Piping.

1.04 DEFINITIONS

- A. High-Efficiency Toilet (HET): Toilets with effective flush volume of 1.28 gallons (4.8 liters) or less.
- B. Maximum Performance (MaP): Toilet testing that rates toilet efficiency and flush performance by measuring number of grams of solid waste (soybean paste and toilet paper) that a toilet can flush and remove completely from fixture in single flush represented as a scale or score. 1000 grams is highest score possible (www.map-testing.com <<http://www.map-testing.com>>). All products must meet MaP 1000 score

1.05 REFERENCE STANDARDS

- A. ASME A112.6.1M - Floor-Affixed Supports for Off-the-Floor Plumbing Fixtures for Public Use; 1997 (Reaffirmed 2017).
- B. ASME A112.18.1 - Plumbing Supply Fittings; 2018, with Errata.
- C. ASME A112.19.2 - Ceramic Plumbing Fixtures; 2018, with Errata.
- D. ASME A112.19.3 - Stainless Steel Plumbing Fixtures; 2022.
- E. ASME A112.19.4M - Porcelain Enameled Formed Steel Plumbing Fixtures; 1994 (Reaffirmed 2009).
- F. UL (DIR) - Online Certifications Directory; Current Edition.

1.06 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.
- C. Samples: Submit two lavatory supply fittings.
- D. Manufacturer's Instructions: Indicate installation methods and procedures.
- E. Maintenance Data: Include fixture trim exploded view and replacement parts lists.
- F. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
- G. Closeout Submittals:
 - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
 - a. Operation and Maintenance Data:
 - 1) Sensor Operated operation and maintenance manuals.

1.07 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.08 WARRANTY

- A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.
- B. Provide five-year manufacturer warranty for electric water cooler.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Potable Water Systems: Provide plumbing fittings and faucets that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.
- B. Water Efficiency: EPA WaterSense label is required for all water closets, urinals, lavatory faucets, and showerheads.

2.02 REGULATORY REQUIREMENTS

- A. Comply with applicable codes for installation of plumbing systems.
- B. Comply with UL (DIR) requirements.
- C. Perform work in accordance with local health department regulations.
- D. Provide certificate of compliance from Authority Having Jurisdiction indicating approval of installation.

2.03 GENERAL MANUFACTURERS

- A. Manufacturers:
 - 1. Manufacturer Contact List:
 - a. American Standard Brands; www.americanstandard-us.com.
 - b. AMTC - Advanced Modern Technologies Corp; www.amtccorporation.com.
 - c. Bemis Manufacturing Co; www.bemismfg.com.
 - d. Beneke by Sanderson Plumbing Products; www.sppl.com.
 - e. Church Seat Co; www.churchseats.com.
 - f. Delany Flush Valves; www.delanyproduct.com.
 - g. Delta Faucet Co; www.deltafaucet.com; (519) 659-3626.
 - h. Dearborn Brass; www.dearbornbrass.com.
 - i. Gerber Plumbing Fixtures LLC; www.gerberonline.com.
 - j. Josam Co; www.josam.com.
 - k. Jay R. Smith Mfg. Co; www.jrsmith.com.
 - l. Kohler Co Plumbing Div; www.us.kohler.com.
 - m. McGuire Manufacturing Co; www.mcguiremfg.com.
 - n. Mifab Manufacturing Inc; www.mifab.com.
 - o. Moen Incorporated; www.moen.com.
 - p. Olsonite Corp; www.olsonite.net; (519) 682-1240.
 - q. Sloan Valve Co; www.sloanvalve.com.
 - r. South Fork Manufacturing; (801) 953-3001; www.dirt-grabber.com.
 - s. Toto U.S.A., Inc; www.totousa.com.
 - t. Wade Div Tyler Pipe; www.wadedrains.com.
 - u. Watts Drainage; www.wattsdrainage.com.
 - v. Zurn Industries, LLC; www.zurn.com; (905) 795-8844.

2.04 SINKS

- A. Manufacturers:
- B.
 - 1. Acorn-Sinks, <https://www.acorneng.com/home>
 - 2. American Standard, Inc; []: www.americanstandard-us.com/#sle.
 - 3. Kohler Company; www.kohler.com/sale.
 - 4. Meganite, Inc; www.meganite.com/#sle.
 - 5. Relang International, LLC; DURASEIN: www.duraseinusa.com/#sle.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that the walls and floor finishes are prepared and ready for installation of fixtures.
- B. Verify that electric power is available and of the correct characteristics.
- C. Confirm that millwork is constructed with adequate provision for the installation of countertop lavatories and sinks.

3.02 PREPARATION

- A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

3.03 INSTALLATION

- A. Install each fixture with trap, easily removable for servicing and cleaning.
- B. Provide chrome-plated rigid or flexible supplies to fixtures with loose key stops, reducers, and escutcheons.
- C. Install components level and plumb.
- D. Install and secure fixtures in place with wall supports and bolts.
- E. Solidly attach water closets to floor with lag screws. Lead flashing is not intended to hold fixture in place.
- F. Install each fixture with separate vent line. Do not circuit vent.
- G. Ensure provisions are made for proper support of fixtures and that rough-in piping is accurately set and protected from movement and damage.
 - 1. Seal wall-mounted fixtures around edges to wall with sealant specified in Section 07 9213 'Elastomeric Joint Sealants'.
 - 2. Attach wall-hung fixtures to carriers.
 - 3. Support fixture hanger or arm free of finished wall.
- H. Adjust flush valves for proper flow.
- I. Provide each individual fixture supply with accessible chrome-plated stop valve with hand wheel.
- J. Self-Supporting Lavatories: Install using carriers. Support carrier free of finished wall.
- K. Install Safety Covers on all under sink / lavatories with exposed water supply pipes and traps.
- L. Install Handicap Accessible Lavatories as per ADA height mounting requirements.
- M. Service Sink:
 - 1. Follow Manufacture's written instructions including but not limited to the following:
 - a. Install and level terrazzo service basin on 1/2-inch (12.7 mm) layer of mortar.
 - b. Install wall guard panels over galvanized flange of service sink and over FRP panels on both walls.
 - c. Apply sealant between flanges and wall guard and edges of wall guard.

3.04 INTERFACE WITH WORK OF OTHER SECTIONS

- A. Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.

3.05 ADJUSTING

- A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

3.06 CLEANING

- A. Clean plumbing fixtures and equipment.
- B. A. Polish chrome finish at completion of Project.

- C. See Section 01 7419 - Construction Waste Management and Disposal for additional requirements.

END OF SECTION 22 4000

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**SECTION 23 0501
COMMON WORK RESULTS FOR HVAC**

PART 1 GENERAL

1.01 SUMMARY

- A. Includes But Not Limited To:
 - 1. Common requirements and procedures for HVAC systems.
 - 2. Responsibility for proper operation of electrically powered equipment furnished under this Division.
 - 3. Interface with Testing And Balancing Agency.
 - 4. Furnish and install sealants relating to installation of systems installed under this Division.
 - 5. Furnish and install Firestop Penetration Systems for HVAC system penetrations as described in Contract Documents.
 - 6. Furnish and install sound, vibration, and seismic control elements.
- B. Products Furnished But Not Installed Under This Section:
 - 1. Sleeves, inserts, and equipment for mechanical systems installed under other Sections.
- C. Related Requirements:
 - 1. Section 03 3000 - Cast-in-Place Concrete for exterior concrete pads and bases for mechanical equipment.
- D. Products Furnished But Not Installed Under This Section:
 - 1. Sleeves, inserts, supports, and equipment for mechanical systems installed under other Sections.
 - 2. Section 07 8400 - Firestopping for quality of Penetration Firestop Systems to be used on Project and submittal requirements.
 - 3. Section 07 9200 - Joint Sealants for quality of sealants used at building exterior.
 - 4. Section 07 9200 - Joint Sealants for quality of acoustical sealants.
 - 5. Section 09 9123 - Interior Painting: Painting of plumbing items requiring field painting.
 - 6. Division 26: Raceway and conduit, unless specified otherwise, line voltage wiring, outlets, and disconnect switches.

1.02 RELATED REQUIREMENTS

- A. Section 05 5000 - Metal Fabrications: Quality and requirements for welding.
- B. Section 07 8400 - Firestopping: Quality of penetration firestop systems to be used on Project and submittal requirements.
- C. Section 07 9200 - Joint Sealants: Elastomeric Joint Sealant: Quality at building exterior.
- D. Section 09 9123 - Interior Painting: Painting of plumbing items requiring field painting.
- E. Slots and openings through floors, walls, ceilings, and roofs provided under other Divisions in their respective materials.

1.03 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.
- B. FM (AG) - FM Approval Guide current edition.
- C. ITS (DIR) - Directory of Listed Products Current Edition.
- D. NEMA MG 1 - Motors and Generators 2021.
- E. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. UL (DIR) - Online Certifications Directory Current Edition.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

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- B. Action Submittals:
1. Product Data:
 - a. Manufacturer's catalog data for each manufactured item.
 - 1) Provide section in submittal for each type of item of equipment. Include Manufacturer's catalog data of each manufactured item and enough information to show compliance with Contract Document requirements. Literature shall show capacities and size of equipment used and be marked indicating each specific item with applicable data underlined.
 - 2) Include name, address, and phone number of each supplier.
 - b. Informational Submittals:
 - 1) Design Submittals:
 - (a) See individual Specification Sections in Division 23 for Submittals required.
 - 2) Qualification Statement:
 - (a) HVAC Subcontractor:
 - (1) Provide Qualification documentation if requested by Architect or Owner.
 - (b) Installer:
 - (1) Provide Qualification documentation if requested by Architect or Owner.
 - C. Shop Drawings:
 1. Schematic control diagrams for each separate fan system, heating system, control panel, etc. Each diagram shall show locations of all control and operational components and devices. Mark correct operating settings for each control device on these diagrams.
 2. Diagram for electrical control system showing wiring of related electrical control items such as firestats, fuses, interlocks, electrical switches, and relays. Include drawings showing electrical power requirements and connection locations.
 3. Drawing of each temperature control panel identifying components in panels and their function
 4. Other shop drawings required by Division 23 trade Sections.
 - D. Certificate: Certify that products of this section meet or exceed specified requirements.
 - E. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

QUALITY ASSURANCE

- F. Regulatory Agency Sustainability Approvals:
1. Perform work in accordance with applicable provisions of Mechanical Codes applicable to Project. Provide materials and labor necessary to comply with rules, regulations, and ordinances.
 2. In case of differences between building codes, laws, local ordinances, utility company regulations, and Contract Documents, the most stringent shall govern. Notify Architect in writing of such differences before performing work affected by such differences.
 3. Identification:
 - a. Motor and equipment name plates as well as applicable UL and AGA labels shall be in place when Project is turned over to Owner.
- G. Qualifications: Requirements of Section 01 4000 - Quality Requirements apply, but not limited to the following:
1. Mechanical Subcontractor:
 - a. Company specializing in performing work of this section.
 - 1) Minimum five (5) years experience in HVAC installations.
 - 2) Minimum five (5) satisfactorily completed installations in past three (3) years of projects similar in size, scope, and complexity required for this project before bidding.
 - b. Upon request, submit documentation.

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- 2. Installer:
 - a. Licensed for area of Project.
 - b. Designate one (1) individual as project foremen who shall be on site at all times during installation and experienced with installation procedures required for this project.
 - c. Upon request, submit documentation.
- H. Designer Qualifications: Perform design under direct supervision of a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.
- I. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with at least three years of documented experience.
- J. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.
- K. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.
- L. Copies of Documents at Project Site: Maintain at the project site a copy of each referenced document that prescribes execution requirements.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Delivery and Acceptance Requirements:
 - 1. Accept valves on site in shipping containers with labeling in place.
 - 2. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- B. Storage and Handling Requirements:
 - 1. In addition to requirements specified in Division 01, stored material shall be readily accessible for inspection by Architect until installed.
 - 2. Store items subject to moisture damage in dry, heated spaces.

1.06 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Manufacturer Warranty:
 - 1. Provide certificates of warranty for each piece of equipment made out in favor of the Owner.
- C. Special Warranty:
 - 1. Guarantee mechanical systems to be free from noise and vibration in operation that may develop from failure to construct system in accordance with Contract Documents.
 - 2. If mechanical sub-contractor with offices located more than 150 miles from Project site is used, provide service / warranty work agreement for warranty period with local mechanical sub-contractor approved by Architect. Include copy of service / warranty agreement in warranty section of Operation And Maintenance Manual.

PART 2 PRODUCTS

2.01 COMPONENTS

- A. Components shall bear Manufacturer's name and trade name. Equipment and materials of same general type shall be of same make throughout work to provide uniform appearance, operation, and maintenance.

PART 3 EXECUTION

3.01 INSTALLERS

- A. Acceptable Installers:
 - 1. Meet Quality Assurance Installer Qualifications as specified in Part 1 of this specification.

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- B. Substitution Limitations: Same as specified for products; see Section 01 6000 - Product Requirements.

3.02 INSTALLERS (SELECT ONE OF THE FOLLOWING THREE OPTIONS)

- A. Approved Installers. See Section 01 4000 - Quality Requirements:
 - 1. Approved Mechanical Subcontractors shall be pre-approved in accordance with Supplementary Conditions and included in Construction Documents by Addendum.
- B. Approved Installers. See Section 01 4000 - Quality Requirements:
 - 1. Meet Quality Assurance Installer Qualifications as specified in Part 1 of this specification.

3.03 EXAMINATION

- A. Drawings:
 - 1. HVAC Drawings show general arrangement of ductwork, equipment, etc. Follow as closely as actual building construction and work of other trades will permit.
 - 2. Consider Architectural and Structural Drawings part of this work insofar as these drawings furnish information relating to design and construction of building. These drawings take precedence over HVAC Drawings.
 - 3. Because of small scale of Drawings, it is not possible to indicate all offsets, fittings, and accessories that may be required. Investigate structural and finish conditions affecting this work and arrange work accordingly, providing such fittings, valves, and accessories required to meet conditions.
- B. Verification of Conditions:
 - 1. Examine premises to understand conditions that may affect performance of work of this Division before submitting proposals for this work. Examine adjoining work on which mechanical work is dependent for efficiency and report work that requires correction.
 - 2. No subsequent allowance for time or money will be considered for any consequence related to failure to examine site conditions.
 - 3. Ensure that items to be furnished fit space available. Make necessary field measurements to ascertain space requirements including those for connections and furnish and install equipment of size and shape so final installation shall suit true intent and meaning of Contract Documents. If approval is received by Addendum or Change Order to use other than originally specified items, be responsible for specified capacities and for ensuring that items to be furnished will fit space available.
 - 4. Check that slots and openings provided under other Divisions through floors, walls, ceilings, and roofs are properly located. Perform cutting and patching caused by neglecting to coordinate with Divisions providing slots and openings at no additional cost to Owner.

3.04 PREPARATION

- A. Changes Due to Equipment Selection:
 - 1. Where equipment specified or otherwise approved requires different arrangement or connections from that shown in Contract Documents, submit drawings showing proposed installations.
 - 2. If proposed changes are approved, install equipment to operate properly and in harmony with intent of Contract Documents. Make incidental changes in piping, ductwork, supports, installation, wiring, heaters, panelboards, and as otherwise necessary.
 - 3. Provide additional motors, valves, controllers, fittings, and other equipment required for proper operation of systems resulting from selection of equipment.
 - 4. Be responsible for proper location of rough-in and connections provided under other Divisions.

3.05 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Interface With Other Work:

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1. Furnish sleeves, inserts, supports, and equipment that are to be installed by others in sufficient time to be incorporated into construction as work proceeds. Locate these items and see they are properly installed.
2. Electrical: Furnish exact location of electrical connections and complete information on motor controls to installer of electrical system.
 - a. Testing And Balancing:
 - 1) Put HVAC systems into full operation and continue their operation during each working day of testing and balancing.
 - 2) Make changes in pulleys, belts, fan speeds, and dampers or add dampers as required for correct balance as recommended by Testing And Balancing Agency and at no additional cost to Owner.
- C. Cut carefully to minimize necessity for repairs to previously installed or existing work. Do not cut beams, columns, or trusses.
- D. Locating Equipment:
 1. Arrange ducts, and equipment to permit ready access to filters, starters, motors, control components, and to clear openings of doors and access panels.
 2. Adjust locations of pipes, ducts, switches, panels, and equipment to accommodate work to interferences anticipated and encountered.
 3. Install HVAC work to permit removal of equipment and parts of equipment requiring periodic replacement or maintenance without damage to or interference with other parts of equipment or structure.
 4. Determine exact route and location of each pipe and duct before fabrication.
 - a. Right-Of-Way:
 - 1) Lines that pitch shall have right-of-way over those that do not pitch. For example, steam, steam condensate, and drains shall normally have right-of-way.
 - 2) Lines whose elevations cannot be changed shall have right-of-way over lines whose elevations can be changed.
 - b. Offsets, Transitions, and Changes in Direction:
 - 1) Make offsets, transitions, and changes in direction in pipes and ducts as required to maintain proper head room and pitch of sloping lines whether or not indicated on Drawings.
 - 2) Furnish and install all traps, air vents, sanitary vents, and devices as required to effect these offsets, transitions, and changes in direction.
- E. Penetration Firestops:
 1. Install Penetration Firestop System appropriate for penetration at mechanical systems penetrations through walls, ceilings, roofs, and top plates of walls.
- F. Sealants:
 1. Seal openings through building exterior caused by penetrations of elements of HVAC systems.
 2. Furnish and install acoustical sealant to seal penetrations through acoustically insulated walls and ceilings.

3.06 REPAIR / RESTORATION

- A. Each Section of this Division shall bear expense of cutting, patching, repairing, and replacing of work of other Sections required because of its fault, error, tardiness, or because of damage done by it:
 1. Patch and repair walls, floors, ceilings, and roofs with materials of same quality and appearance as adjacent surfaces unless otherwise shown.
 2. Surface finishes shall exactly match existing finishes of same materials.

3.07 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Field Tests:

1. Perform tests on mechanical piping systems. Furnish devices required for testing purposes.
- C. Non-Conforming Work:
 1. Replace material or workmanship proven defective with sound material at no additional cost to Owner.
 2. Repeat tests on new material, if requested.

3.08 SYSTEM START-UP

- A. Off-Season Start-up:
 1. If Substantial Completion inspection occurs during heating season, schedule spring start-up of cooling systems. If inspection occurs during cooling season, schedule autumn start-up for heating systems.
 2. Notify Owner seven days minimum before scheduled start-up.
 3. Time will be allowed to completely service, test, check, and off-season start systems. During allowed time, train Owner's representatives in operation and maintenance of system.
 4. At end of off-season start-up, furnish Owner with letter confirming that above work has been satisfactorily completed.
- B. Preparations that are to be completed before start up and operation include, but are not limited to, following:
 1. Dry out electric motors and other equipment to develop and properly maintain constant insulation resistance.
 2. Make adjustments to insure that:
 - a. Equipment alignments and clearances are adjusted to allowable tolerances.
 - b. Nuts and bolts and other types of anchors and fasteners are properly and securely fastened.
 - c. Packed, gasketed, and other types of joints are properly made up and are tight and free from leakage.
 - d. Miscellaneous alignments, tightenings, and adjustments are completed so systems are tight and free from leakage and equipment performs as intended.
 3. Motors and accessories are completely operable.
 4. Inspect and test electrical circuitry, connections, and voltages to be properly connected and free from shorts.
 5. Adjust drives for proper alignment and tension.
 6. Make certain filters in equipment for moving air are new and of specified type.
 7. Properly lubricate and run-in bearings in accordance with Manufacturer's directions and recommendations.

3.09 CLEANING

- A. Clean exposed piping, ductwork, and equipment.
- B. No more than one week before Final Inspection, flush out bearings and clean other lubricated surfaces with flushing oil. Provide best quality and grade of lubricant specified by Equipment Manufacturer.
- C. Replace filters in equipment for moving air with new filters of specified type no more than one week before Final Inspection.
- D. See Section 01 7419 - Construction Waste Management and Disposal, for additional requirements.

3.10 CLOSEOUT ACTIVITIES

- A. See Section 01 7800 - Closeout Submittals, for closeout submittals.
 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
 - a. Operations and Maintenance Data (Modify and add to requirements of Section 01 7800):

2. At beginning of HVAC section of Operations And Maintenance Manual, provide master index showing items included.
3. Provide name, address, and phone number of Architect, Architect's Mechanical Engineer, General Contractor, and HVAC, Sheet Metal, Refrigeration, and Temperature Control subcontractors.
4. Identify maintenance instructions by using same equipment identification used in Contract Drawings. Maintenance instructions shall include:
5. List of HVAC equipment used indicating name, model, serial number, and nameplate data of each item together with number and name associated with each system item.
6. Manufacturer's maintenance instructions for each piece of HVAC equipment installed in Project. Instructions shall include name of vendor, installation instructions, parts numbers and lists, operation instructions of equipment, and maintenance and lubrication instructions.
7. Summary list of mechanical equipment requiring lubrication showing name of equipment, location, and type and frequency of lubrication.
8. Manual for Honeywell thermostat used and published by Honeywell.
9. Provide operating instructions to include:
 - a. General description of each HVAC system.
 - b. Step by step procedure to follow in putting each piece of HVAC equipment into operation.
 - c. Provide diagrams for electrical control system showing wiring of items such as smoke detectors, fuses, interlocks, electrical switches, and relays.
- B. See Section 01 7900 - Demonstration and Training, for additional requirements.
- C. Instruction of Owner:
- D. Instruct building maintenance personnel and Stake Physical Facilities Representative in operation and maintenance of mechanical systems utilizing Operation And Maintenance Manual when so doing.
- E. Instruct building maintenance personnel and Facility Manager in operation and maintenance of mechanical systems utilizing Operation And Maintenance Manual when so doing.
- F. Conduct instruction period after Substantial Completion inspection when systems are properly working and before final payment is made.
- G. Demonstrate proper operation of equipment to Owner's designated representative.
- H. Demonstration: Demonstrate operation of system to Owner's personnel.
 1. Use operation and maintenance data as reference during demonstration.
 2. Conduct walking tour of project.
 3. Briefly describe function, operation, and maintenance of each component.
- I. Training: Train Owner's personnel on operation and maintenance of system.
 1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
 2. Provide minimum of two hours of training.
 3. Instructor: Manufacturer's training personnel.
 4. Location: At project site.
- J. Warranty Documentation:
- K. Include copies of warranties required in individual Sections of Division 23.
- L. Manufacturers documentation:
- M. Record Documentation:
- N. Copies of approved shop drawings

3.11 PROTECTION

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- A. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system. Cap or plug open ends of pipes and equipment to keep dirt and other foreign materials out of system. Do not use plugs of rags, wool, cotton waste, or similar materials.
- B. Do not operate pieces of equipment used for moving supply air without proper air filters installed properly in system. Install temporary filters or coverings on all return grills.

END OF SECTION

**SECTION 23 0713
DUCT INSULATION**

PART 1 GENERAL

1.01 SECTION INCLUDES

1.02 SUMMARY

- A. Includes But Not Limited To:
 - 1. Furnish and install thermal wrap duct insulation as described in Contract Documents.

1.03 RELATED REQUIREMENTS

1.04 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.
- B. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible 2021.
- C. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials Current Edition, Including All Revisions.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
- C. Samples: Submit two samples of any representative size illustrating each insulation type.
- D. Manufacturer's Instructions: Indicate installation procedures necessary to ensure acceptable workmanship and that installation standards will be achieved.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section with not less than three years of documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified in this section, with minimum [] years of experience and approved by manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site in original factory packaging, labelled with manufacturer's identification, including product density and thickness.
- B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.08 FIELD CONDITIONS

- A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.
- B. Maintain temperature during and after installation for minimum period of 24 hours.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.
- B. Manufacturers contact list

2.02 THERMAL WRAP DUCT INSULATION

- A. 1-1/2 inch (38 mm) or 3 inch (76 mm) thick fiberglass with factory-laminated, reinforced aluminum foil scrim kraft facing and density of 0.75 lb / per cu ft (12 kg / per cu m).
- B. Thermal Conductivity: 0.27 BTU in/HR SF deg F at 75 deg F (24 deg C) maximum.

- C. Acceptable Products:
 - 1. Type 75 standard duct insulation by Certainteed St Gobain.
 - 2. Microlite FSK by Johns-Manville.
 - 3. Duct Wrap FSK by Knauf Fiber Glass.
 - 4. Alley Wrap FSK by Manson Insulation Inc.
 - 5. FRK by Owens-Corning.
 - 6. Equal as approved by Architect before bidding. See Section 01 6200.
- D. ASJ Adhesive, and FSK and PVDC Jacket Adhesive:
 - 1. For indoor applications:
 - a. Provide adhesive that has a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 EXECUTION

3.01 EXAMINATION

- A. Test ductwork for design pressure prior to applying insulation materials.
- B. Verify that surfaces are clean, foreign material removed, and dry.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with NAIMA National Insulation Standards.
- C. Insulated Ducts Conveying Air Below Ambient Temperature:
 - 1. Provide insulation with vapor barrier jackets.
 - 2. Finish with tape and vapor barrier jacket.
 - 3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
 - 4. Insulate entire system, including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.
- D. Insulated Ducts Conveying Air Above Ambient Temperature:
 - 1. Provide with or without standard vapor barrier jacket.
 - 2. Insulate fittings and joints. Where service access is required, bevel and seal ends of insulation.
- E. Ducts Exposed in Mechanical Equipment Rooms or Finished Spaces (below 10 feet above finished floor): Finish with canvas jacket sized for finish painting.
- F. Exterior Applications: Provide insulation with vapor barrier jacket. Cover with outdoor jacket finished.
- G. External Duct Insulation Application:
 - 1. Secure insulation with vapor barrier with wires and seal jacket joints with vapor barrier adhesive or tape to match jacket.
 - 2. Secure insulation without vapor barrier with staples, tape, or wires.
 - 3. Install without sag on underside of duct. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift duct off trapeze hangers and insert spacers.
 - 4. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.
 - 5. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.
- H. Duct and Plenum Liner Application:
 - 1. Adhere insulation with adhesive for 90 percent coverage.
 - 2. Secure insulation with mechanical liner fasteners. Refer to SMACNA (DCS) for spacing.
 - 3. Seal and smooth joints. Seal and coat transverse joints.
 - 4. Seal liner surface penetrations with adhesive.
 - 5. Duct dimensions indicated are net inside dimensions required for airflow. Increase duct size to allow for insulation thickness.

END OF SECTION

Helena Distribution Store – Project # 89018312501	23 0713 - 2	Duct Insulation
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**SECTION 23 3100
HVAC DUCTS AND CASINGS**

PART 1 GENERAL

1.01 SECTION INCLUDES

1.02 RELATED REQUIREMENTS

- A. Section 23 0713 - Duct Insulation: External insulation and duct liner.
- B. Section 23 3300 - Air Duct Accessories.
- C. Section 23 3700 - Air Outlets and Inlets: Fabric air distribution devices.

1.03 REFERENCE STANDARDS

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2022.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.
- C. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems 2021.
- D. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible 2021.
- E. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors current edition, including all revisions.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience, and approved by manufacturer.
- B. Installer Qualifications: Company specializing in performing the type of work specified in this section, with minimum three years of documented experience.

1.05 FIELD CONDITIONS

- A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.
- B. Maintain temperatures within acceptable range during and after installation of duct sealants.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Provide UL Class 1 ductwork, fittings, hangers, supports, and appurtenances in accordance with NFPA 90A and SMACNA (DCS) guidelines unless stated otherwise.
- B. Provide metal duct unless otherwise indicated. Fibrous glass duct can be substituted at the Contractor's option.
- C. Acoustical Treatment: Provide sound-absorbing liners and sectional silencers for metal-based ducts in compliance with Section 23 3319.
- D. Duct Shape and Material in accordance with Allowed Static Pressure Range:
- E. Duct Sealing and Leakage in accordance with Static Pressure Class:
- F. Duct Fabrication Requirements:
 - 1. Duct and Fitting Fabrication and Support: SMACNA (DCS) including specifics for continuously welded round and oval duct fittings.
 - 2. Use reinforced and sealed sheet-metal materials at recommended gauges for indicated operating pressures or pressure class.
 - 3. Construct tees, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows must be used, provide airfoil turning vanes of perforated metal with glass fiber insulation.

4. Provide turning vanes of perforated metal with glass fiber insulation when acoustical lining is indicated.
5. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
6. Provide turning vanes of perforated metal with glass fiber insulation when an acoustical lining is required.
7. Where ducts are connected to exterior wall louvers and duct outlet is smaller than louver frame, provide blank-out panels sealing louver area around duct. Use same material as duct, painted black on exterior side; seal to louver frame and duct.

2.02 MATERIALS

- A. Galvanized Steel for Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 coating.
- B. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.
 1. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts.
 2. Surface Burning Characteristics: Flame spread index of zero and smoke developed index of zero, when tested in accordance with ASTM E84.
 3. Manufacturers and Products: Approved
 - a. Carlisle HVAC Products; Hardcast Iron-Grip 601 Water Based Duct Sealant: www.carlislehvac.com/#sle.
 - b. Duct Butter or ButterTak by Cain Manufacturing Co Inc, Pelham, AL www.cainmfg.com.
 - c. DP 1010, DP 1030 or DP 1015 by Design Polymerics, Fountain Valley, CA www.designpoly.com.
 - d. PROseal, FIBERseal, EVERseal, or EZ-seal by Ductmate Industries, Inc., Charleroi, PA www.ductmate.com.
 - e. SAS by Duro Dyne, Bay Shore, NY or Duro Dyne Canada, Lachine, QB www.durodyne.com.
 - f. Iron Grip 601 by Hardcast Inc, Wylie, TX www.hardcast.com.
 - g. MTS100 or MTS 200 by Hercules Mighty Tough, Denver CO, www.herculesindustries.com.
 - h. 15-325 by Miracle / Kingco, Div ITW TACC, Rockland, MA www.taccint.com.
 - i. 44-39 by Mon-Eco Industries Inc, East Brunswick, NJ www.mon-ecoindustries.com.
 - j. Airseal Zero by Polymer Adhesive Sealant Systems Inc, Weatherford, TX www.polymeradhesives.com.
 - k. Airseal #22 Water Base Duct Sealer by Polymer Adhesive Sealant Systems Inc, Weatherford, TX
 - l. www.polymeradhesives.com

2.03 DUCTWORK FABRICATION

- A. Fabricate and support in accordance with SMACNA (DCS) and as indicated in contract documents.
- B. Provide duct material, gauges, reinforcing, and sealing for operating pressures indicated.
- C. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
- D. Fabricate continuously welded round and oval duct fittings in accordance with SMACNA (DCS).

2.04 METAL DUCTS

- A. Material Requirements:

Helena Distribution Store – Project # 89018312501	23 3100 - 2	HVAC Ducts and Casings
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1. Galvanized Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 coating.
- B. Flexible Ducts: 2 layer black polymer film supported by helically wound spring steel wire.
 1. Insulation: Fiberglass insulation with polyethylene vapor barrier film.
 2. Pressure Rating: 4 inches WG positive and 0.5 inches WG negative.
 3. Maximum Velocity: 4000 fpm.
 4. Temperature Range: Minus 20 degrees F to 175 degrees F.
 5. Manufacturers:
 - a. JP Lamborn Co., Fresno CA www.jpflex.com.
 - b. Flexmaster USA Inc, Houston, TX www.flexmasterusa.com or Flexmaster Canada Ltd, Richmond Hill, ON (905) 731-9411.
 - c. Thermaflex by Flexible Technologies, Abbeville, SC or Mississauga, ON www.thermaflex.net.
 6. Products
 - a. PR-25 by JP Lamborn.
 - b. Flex-Vent KP by Thermaflex by Flexible Technologies.
 - c. Type 1B Insulated by Flexmaster
- C. Cinch/Draw Bands: Nylon, 3/8 inch (9.5 mm) removable and reusable type
 1. Listed and labeled in accordance with Standard UL 181B and labeled 'UL 181 B-C'.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install, support, and seal ducts in accordance with SMACNA (DCS).
- B. During construction, provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering the ductwork system.
- C. Flexible Ducts: Connect to metal ducts with draw bands.
 1. Install duct in fully extended condition free of sags and kinks, using 72 inch (1 800 mm) maximum lengths.
 2. Make duct connections by coating exterior of duct collar for 3 inches (75 mm) with duct sealer and securing duct in place over sheet metal collar with specified draw/cinch bands.
- D. Duct sizes indicated are precise inside dimensions. For lined ducts, maintain sizes inside lining.
- E. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

END OF SECTION

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Helena Distribution Store – Project # 89018312501	23 3100 - 4	HVAC Ducts and Casings
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**SECTION 23 3300
AIR DUCT ACCESSORIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Duct access doors.
- B. Duct test holes.
- C. Flexible duct connectors.
- D. Volume control dampers.
- E. Low leakage (Class 1A) control dampers.
- F. Miscellaneous products:
- G. Acoustical Liner System
 - 1. Fasteners
- H. Flexible Equipment Connections
- I. Dampers and Damper Accessories
 - 1. Duct opening closure film.
 - 2. Concealed Ceiling Damper Regulators
 - 3. Dampers
 - a. Volume Dampers
- J. Air Turns
- K. Branch Tap for Flexible Ductwork

1.02 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.
- B. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems 2021.
- C. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible 2021.

1.03 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

PART 2 PRODUCTS

2.01 MANUFACTURES

- A. AGM Industries, Brockton, MA www.agmind.com.
- B. Air Balance Inc, Holland, OH www.airbalance.com.
- C. Air Filters Inc, Baltimore, MD www.afinc.com.
- D. Air-Rite Manufacturing, Bountiful, UT (801) 295-2529.
- E. American Warming & Ventilating, Holland, OH www.american-warming.com.
- F. Arrow United Industries, Wyalusing, PA www.arrowunited.com.
- G. Cain Manufacturing Company Inc, Pelham, AL www.cainmfg.com.
- H. C & S Air Products, Fort Worth, TX www.csairproducts.com.
- I. CertainTeed Corp, Valley Forge, PA www.certainteed.com.
- J. Cesco Products, Florence, KY www.cescoproducts.com.
- K. Daniel Manufacturing, Ogden, UT (801) 622-5924.
- L. Design Polymeric, Fountain Valley, CA www.designpoly.com.

- M. Ductmate Industries Inc, East Charleroi, PA www.ductmate.com.
- N. Duro Dyne, Bay Shore, NY www.durodyne.com.
- O. Dyn Air Inc. Lachine, QB www.dynair.ca
- P. Elgen Manufacturing Company, Inc. East Rutherford, NJ www.elgenmfg.com
- Q. Flexmaster USA Inc, Houston, TX www.flexmasterusa.com.
- R. Greenheck Corp, Schofield, WI www.greenheck.com.
- S. Gripnail Corp, East Providence, RI www.gripnail.com.
- T. Hardcast Inc, Wylie, TX www.hardcast.com.
- U. Hercules Industries, Denver, CO, www.herculesindustries.com.
- V. Honeywell Inc, Minneapolis, MN www.honeywell.com.
- W. Industrial Acoustics Co, Bronx, NY www.industrialacoustics.com.
- X. Johns-Manville, Denver, CO www.jm.com.
- Y. Kees Inc, Elkhart Lake, WI www.kees.com.
- Z. Knauf Fiber Glass, Shelbyville, IN www.knauffiberglass.com.
- AA. Manson Insulation Inc, Brossard, QB www.isolationmanson.com.
- BB. Metco Inc, Salt Lake City, UT (801) 467-1572 www.metcospiral.com.
- CC. Miracle / Kingco, Rockland, MA www.taccint.com.
- DD. Mon-Eco Industries Inc, East Brunswick, NJ www.mon-ecoindustries.com.
- EE. Nailor Industries Inc, Houston, TX www.nailor.com.
- FF. Owens Corning, Toledo, OH www.owenscorning.com.
- GG. Polymer Adhesive Sealant Systems Inc, Irving, TX www.polymeradhesives.com.
- HH. Pottorff Company, Fort Worth, TX www.pottorff.com.
- II. Ruskin Manufacturing, Kansas City, MO www.ruskin.com.
- JJ. Sheet Metal Connectors Inc, Minneapolis, MN www.smconnectors.com.
- KK. Tamco, Stittsville, ON www.tamco.ca.
- LL. Techno Adhesive, Cincinnati, OH www.technoadhesives.com.
- MM. Titus, Richardson, TX (972) 699-1030. www.titus-hvac.com
- NN. McGill AirSeal, Columbus, OH www.mcgillairseal.com.
- OO. United Enertech Corp, Chattanooga, TN www.unitedenertech.com.
- PP. Utemp Inc, Salt Lake City, UT (801) 978-9265.
- QQ. Ventfabrics Inc, Chicago, IL www.ventfabrics.com.
- RR. Ward Industries, Grand Rapids MI www.wardind.com.
- SS. Young Regulator Co, Cleveland, OH www.youngregulator.com

2.02

ACOUSTICAL LINER SYSTEM:

- A. Duct Liner:
 - 1. One inch (25 mm) thick, 1-1/2 lb (0.68 kg) density fiberglass conforming to requirements of ASTM C1071. Liner will not support microbial growth when tested in accordance with ASTM C1338.
 - 2. Approved Products.
 - a. ToughGard by CertainTeed.
 - b. Duct Liner E-M by Knauf Fiber Glass.
 - c. Akousti-Liner by Manson Insulation.
 - d. Quiet R by Owens Corning.

- e. Linacoustic RC by Johns-Manville.
- B. Adhesive:
 - 1. For indoor applications:
 - a. Provide adhesive that has a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 2. Approved Water-Based Products.
 - a. Cain: Hydrotak.
 - b. Design Polymerics: DP2501 or DP2502 (CMCL-2501).
 - c. Duro Dyne: WSA.
 - d. Elgen: A-410-WB.
 - e. Hardcast: Coil-Tack.
 - f. Hercules: Mighty Tough Adhesives MTA500 or MTA600.
 - g. Miracle / Kingco: PF-101.
 - h. Mon-Eco: 22-67 or 22-76.
 - i. Polymer Adhesive: Glasstack #35.
 - j. Techno Adhesive: 133.
 - k. McGill AirSeal: Uni-tack.
 - 3. Approved Solvent-Based (non-flammable) Products.
 - a. Cain: Safetak.
 - b. Duro Dyne: FPG.
 - c. Hardcast: Glas-Grip 648-NFSE.
 - d. Miracle / Kingco: PF-91.
 - e. Mon-Eco: 22-24.
 - f. Polymer Adhesive: Q-Tack.
 - g. Techno Adhesive: 'Non-Flam' 106.
 - 4. Approved Solvent-Based (flammable) Products.
 - a. Cain: HV200.
 - b. Duro Dyne: MPG.
 - c. Hardcast: Glas-Grip 636-SE.
 - d. Miracle / Kingco: PF-96.
 - e. Mon-Eco: 22-22.
 - f. Polymer Adhesive: R-Tack.
 - g. Techno Adhesive: 'Flammable' 106.
- C. Fasteners:
 - 1. Adhesively secured fasteners not allowed.
- D. Approved Products.
 - 1. AGM Industries: 'DynaPoint' Series RP-9 pin.
 - 2. Cain.
 - 3. Duro Dyne.
 - 4. Gripnail: May be used if each nail is installed by 'Grip Nail Air Hammer' or by 'Automatic Fastener Equipment' in accordance with Manufacturer's recommendations.

2.03 CONCEALED CEILING DAMPER REGULATORS:

- A. Approved Products.
 - 1. Cain.
 - 2. Duro Dyne.
 - 3. Elgen.
 - 4. Metco Inc.
 - 5. Ventfabrics: 666 Ventlok.
 - 6. Young: 301.

2.04 VOLUME DAMPERS:

- A. Rectangular Duct:

1. Factory-manufactured 16 ga (1.6 mm) galvanized steel, single blade and opposed blade type with 3/8 inch (9.5 mm) axles and end bearings. Blade width 8 inches (200 mm) maximum. Blades shall have 1/8 inch (3 mm) clearance all around.
 2. Damper shall operate within acoustical duct liner.
 3. Provide channel spacer equal to thickness of duct liner.
 4. Dampers above removable ceiling and in Mechanical Rooms shall have locking quadrant on bottom or side of duct. Otherwise, furnish with concealed ceiling damper regulator and cover plate.
 5. Approved Products.
 - a. Air-Rite: Model CD-2.
 - b. American Warming: VC-2-AA.
 - c. Arrow: OBDAF-207.
 - d. C & S: AC40.
 - e. Cesco: AGO.
 - f. Daniel: CD-OB.
 - g. Greenheck: VCD-20.
 - h. Nailor: 1810 or 1820.
 - i. Pottorff: CD-42.
 - j. Ruskin: MD-35.
 - k. United Enertech: MD-115.
 - l. Utemp: CD-OB.
- B. Round Duct:
1. Factory-manufactured 20 ga (1.0 mm) galvanized steel, single blade with 3/8 inch (9.5 mm) axles and end bearings.
 2. For use in outside air ducts.
 3. Approved Products.
 - a. Air Balance: Model AC-22.
 - b. Air-Rite: Model CD-8.
 - c. American Warming: V-22.
 - d. Arrow: Type-70.
 - e. C & S: AC21R.
 - f. Cesco: MGG.
 - g. Nailor: 1890.
 - h. Pottorff: CD-21R.
 - i. Ruskin: MDRS-25.
 - j. United Enertech: RD.

2.05 AIR TURNS:

- A. Single thickness vanes. Double thickness vanes not acceptable.
- B. 4-1/2 inch (115 mm) wide vane rail. Junior vane rail not acceptable.

2.06 BRANCH TAP FOR FLEXIBLE DUCTWORK:

- A. Factory-manufactured rectangular-to-round 45 degree leading tap fabricated of 24 ga (0.635 mm) zinc-coated lock-forming quality steel sheets meeting requirements of ASTM A653, with G-90 coating.
- B. One inch wide mounting flange with die formed corner clips, pre-punched mounting holes, and adhesive coated gasket.
- C. Manual Volume Damper:
 1. Single blade, 22 ga (0.79 mm) minimum
 2. 3/8 inch (9.5 mm) minimum square rod with brass damper bearings at each end.
 3. Heavy-duty locking quadrant on 1-1/2 inch (38 mm) high stand-off mounting bracket attached to side of round duct.
- D. Approved Products.

1. ST-1HD by Air-Rite:
2. Nylon damper bearings approved for Air-Rite.
3. STO by Flexmaster.
4. HET by Sheet Metal Connectors

2.07 DUCT ACCESS DOORS

- A. General:
 1. Factory built insulated access door with hinges and sash locks, as necessary. Construction shall be galvanized sheet metal, 24 ga (0.635 mm) minimum.
 2. Fire and smoke damper access doors shall have minimum clear opening of 12 inches (300 mm) square or larger as shown on Drawings.
- B. Rectangular Ducts:
 1. Approved Products.
 - a. Air Balance: Fire/Seal FSA 100.
 - b. Air-Rite: Model HAD-2.
 - c. Cesco: HDD.
 - d. Elgen: TAB Type / Hinge and Cam.
 - e. Flexmaster: Spin Door.
 - f. Kees: ADH-D.
 - g. Nailor: 08SH.
 - h. Pottorff: 60-HAD.
 - i. Ruskin: ADH-24.
 - j. United Enertech: L-95.
- C. Round Ducts:
 1. Approved Products.
 - a. Ductmate: 'Sandwich' Access Door.
 - b. Elgen: Sandwich Access Door.
 - c. Kees: ADL-R.
 - d. Nailor: 0809.
 - e. Pottorff: RAD.
 - f. Ruskin: ADR.
 - g. Ward: DSA.

2.08 DUCT TEST HOLES

- A. Temporary Test Holes: Cut or drill in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.

2.09 FLEXIBLE EQUIPMENT DUCT CONNECTORS

- A. Fabricate in accordance with SMACNA (DCS) and as indicated.
- B. Flexible Duct Connections: Fabric crimped into metal edging strip.
 1. Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 30 oz/sq yd.
 - a. Net Fabric Width: Approximately 2 inches wide.
 2. Metal: 3 inches wide, 24 gauge, 0.0239 inch thick galvanized steel.
- C. Approved Products
 1. Cain: N-100.
 2. Duro Dyne: MFN.
 3. Dyn Air: CPN with G-90 galvanized off-set seam.
 4. Elgen: ZLN / SDN.
 5. Ventfabrics: Ventglas.
 6. Ductmate: ProFlex.

2.10 MISCELLANEOUS PRODUCTS

- A. Duct Opening Closure Film: Mold-resistant, self-adhesive film to keep debris out of ducts during construction.
 - 1. Thickness: 2 mils, minimum
 - 2. High tack water based adhesive.
 - 3. UV stable light blue color.
 - 4. Elongation Before Break: 325 percent, minimum.
 - 5. Manufacturers:
- B. Duct Hangers:
 - 1. One inch (25 mm) by 18 ga (1.27 mm) galvanized steel straps or steel rods as shown on Drawings, and spaced not more than 96 inches (2 400 mm) apart. Do not use wire hangers
 - 2. Attaching screws at trusses shall be 2 inch (50 mm) No. 10 round head wood screws. Nails not allowed.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Furnish and install acoustic lining in following types of rectangular ducts unless noted otherwise on Contract Documents:
 - 1. Supply air.
 - 2. Return air.
 - 3. Mixed air.
 - 4. Transfer air.
 - 5. Relief air.
 - 6. Exhaust air.
 - 7. Elbows, fittings, and diffuser drops greater than 12 inches (300 mm) in length.
- B. Do not install acoustic lining in round ducts.
- C. Flexible Connections: Install flexible inlet and outlet duct connections to each furnace.
- D. Access Doors In Ducts:
- E. Install at each manual outside air damper and at each motorized damper. Locate doors within 6 inches (150 mm) of installed dampers.
- F. Install within 6 inches (150 mm) of fire dampers and in Mechanical Room if possible. Install on side of duct that allows easiest access to damper.
- G. Dampers And Damper Accessories:
- H. Install concealed ceiling damper regulators.
- I. Paint cover plates to match ceiling tile.
- J. Do not install damper regulators for dampers located directly above removable ceilings or in Mechanical Rooms.
- K. Provide each take-off with an adjustable volume damper to balance that branch.
- L. Anchor dampers securely to duct.
- M. Install dampers in main ducts within insulation.
- N. Dampers in branch ducts shall fit against sheet metal walls, bottom and top of duct, and be securely fastened. Cut duct liner to allow damper to fit against sheet metal.
- O. Where concealed ceiling damper regulators are installed, provide cover plate.
- P. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA (DCS). See Section 23 3100 for duct construction and pressure class.
- Q. Provide duct test holes where indicated and required for testing and balancing purposes.
- R. At fans and motorized equipment associated with ducts, provide flexible duct connections immediately adjacent to the equipment.

- S. At equipment supported by vibration isolators, provide flexible duct connections immediately adjacent to the equipment.
- T. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Install minimum two duct widths from duct take-off.
- U. Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.

END OF SECTION

Helena Distribution Store – Project # 89018312501	23 3300 - 7	Air Duct Accessories
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**SECTION 23 3700
AIR OUTLETS AND INLETS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Registers/grilles:
- B. Fabric air distribution devices.
- C. Vents

1.02 SUMMARY

- A. Includes But Not Limited To:
 - 1. Furnish and install diffusers, registers, and grilles connected to ductwork as described in Contract Documents.
 - 2. Furnish and install louvers connected to ductwork as described in Contract Documents.

1.03 RELATED REQUIREMENTS

- A. Section 09 9123 - Interior Painting: Painting of ducts visible behind outlets and inlets.
- B. Section 23. 3100 HVAC ducts and casings.

1.04 REFERENCE STANDARDS

- A. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating 2012 (Reapproved 2015).
- B. ASHRAE Std 70 - Method of Testing the Performance of Air Outlets and Air Inlets 2006 (Reaffirmed 2021).
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.
- D. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems 2021.
- E. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems 2021.
- F. SMACNA (ASMM) - Architectural Sheet Metal Manual 2012.
- G. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials Current Edition, Including All Revisions.
- H. UL 2518 - Standard for Safety Air Dispersion Systems Current Edition, Including All Revisions.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.
- C. Samples: Submit two of each required air outlet and inlet type.
- D. Project Record Documents: Record actual locations of air outlets and inlets.

1.06 QUALITY ASSURANCE

- A. Test and rate air outlet and inlet performance in accordance with ASHRAE Std 70.
- B. Test and rate louver performance in accordance with AMCA 500-L.
- C. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Carnes, a division of Carnes Company Inc; www.carnes.com/#sle.

- B. Krueger-HVAC; www.krueger-hvac.com/#sle.
- C. Metalaire, a brand of Metal Industries Inc; www.metalaire.com/#sle.
- D. Price Industries; www.price-hvac.com/#sle.
- E. Titus, a brand of Air Distribution Technologies; www.titus-hvac.com/#sle.
- F. Tuttle and Bailey; www.tuttleandbailey.com/#sle.

2.02 CEILING DIFFUSERS

- A. Finish: Off-white baked enamel.
- B. Approved Products
 - 1. Carnes: SKSA.
 - 2. J & J: R-1400.
 - 3. Krueger: SH.
 - 4. Metal*Aire: 5500S.
 - 5. Nailor: 6500B.
 - 6. Price: SMD-6.
 - 7. Titus: TDC-6.
 - 8. Tuttle & Bailey: M.

2.03 CEILING EXHAUST AND RETURN REGISTERS/GRILLES

- A. Finish: Off-white baked enamel.
- B. 1/2 inch (12.7 mm) spacing.
- C. See Contract Documents for location of filter grilles.
- D. Approved Products
 - 1. Carnes: RSLA.
 - 2. J & J: S90H.
 - 3. Krueger: S85H.
 - 4. Metal*Aire: SRH.
 - 5. Nailor: 6155H.
 - 6. Price: 535.
 - 7. Titus: 355RL or 355 RS.
 - 8. Tuttle & Bailey: T75D.

2.04 SIDEWALL SUPPLY REGISTERS/GRILLES

- A. Finish: Off-white baked enamel.
- B. Removable core.
- C. Double deflection.
- D. Set sidewall supply register blades at 15 degrees upward deflection
- E. Approved Products
 - 1. Krueger: 5815.
 - 2. Metal*Aire: 42C.
 - 3. Nailor: 51RCD.
 - 4. Price: RCG-DVS.
 - 5. Titus: 1707.
 - 6. Tuttle & Bailey: AVF.

2.05 LOW SIDEWALL RETURN GRILLS

- A. Finish: Off-white baked enamel.
- B. 38- or 45-degree deflection.
- C. Approved Products
 - 1. Carnes: RSHA.

2. J & J: S-590.
3. Krueger: S480H.
4. Metal*Aire: HD-RH.
5. Nailor: 6145H-HD.
6. Price: 91.
7. Titus: 33RL or 33RS.
8. Tuttle & Bailey: T115D.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Comply with SMACNA (ASMM) for flashing/counterflashing of roof penetrations and supports for roof curbs and roof mounted equipment.
- C. Check location of outlets and inlets and make necessary adjustments in position to comply with architectural features, symmetry, and lighting arrangement.
- D. Install diffusers to ductwork with airtight connection.
- E. Anchor all items securely
- F. Louvers
 1. Anchor securely into openings.
 2. Where louvers touch masonry or dissimilar metals, protect with heavy coat of asphaltum paint.
- G. Provide balancing dampers on duct take-off to diffusers and grilles and registers, despite whether dampers are specified as part of diffuser, or grille and register assembly.
- H. Paint ductwork visible behind air outlets and inlets matte black. Refer to Section 09 9123.
- I. Set sidewall supply register blades at 15 degrees upward deflection

END OF SECTION

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**SECTION 26 0500
COMMON WORK RESULTS FOR ELECTRICAL**

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Section 01 3216 - Construction Progress Schedule: Scheduling of equipment and materials removed by Owner.
- B. Section 01 4000 - Quality Requirements
- C. Section 02 4100 - Demolition: Salvage of existing electrical items to be reused or recycled.
- D. Section 07 8400 - Firestopping: Quality of Penetration Firestop Systems to be used on Project and submittal requirements.

1.02 REFERENCES

- A. National Fire Protection Association / American National Standards Institute: NFPA 70 National Electric Code (NEC).
- B. National Electrical Manufacturing Association Standards (NEMA): NEMA 250, 'Enclosure for Electrical Equipment (1000 Volts Maximum)'.

1.03 SUMMARY

- A. Section Includes:
 - 1. Electrical equipment coordination and installation.
 - 2. Firestopping.

1.04 SUBMITTALS

- A. Refer to individual material specification sections for submittal requirements.

1.05 COORDINATION

- A. Coordinate arrangement, mounting, and support of electrical equipment:
 - 1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
 - 2. So connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.
- B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.
- C. Coordinate installation of required supporting devices and set sleeves under site elements and paving components as they are constructed.

1.06 QUALIFICATIONS

- A. Requirements of Section 01 4000 - Quality Requirements applies, but not limited to following:
 - 1. Electrical Subcontractor:
 - a. Company specializing in performing work of this project.
 - b. Minimum five (5) years experience in electrical installations.
 - c. Minimum five (5) satisfactorily completed installations in past three (3) years of projects similar in size, scope, and complexity required for this project before bidding.
 - d. Upon request, submit documentation.
 - 2. Installer:
 - a. Licensed in state where work is to be performed.
 - b. Designate one (1) individual as project foreman who shall be on site at all times during installation and experienced with installation procedures required for this project. Foreman shall have at least a journeyman's electrician license.
 - c. Upon request, submit documentation.
 - d. Approved Installers:

- 1) Approved Electrical Subcontractor shall be pre-approved in accordance with Supplementary Conditions and included in Construction Documents by Addendum.

PART 2 PRODUCTS

2.01 DESIGN CRITERIA

- A. Equipment provided under following Sections shall be by the same Manufacturer:
 1. Section 26 2416 - Panelboards

2.02 SLEEVE SEALS

- A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
 1. Sealing Elements: EPDM or NBR interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
 2. Pressure Plates: Carbon steel. Include two for each sealing element.
 3. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.
- B. Manufacturers:
 1. OZ-Gedney type WSK.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification Of Conditions:
 1. Confirm dimensions, ratings, and specifications of equipment to be installed and coordinate these with site dimensions and with other Sections.

3.02 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

- A. Comply with NECA 1.
- B. Comply with applicable provisions of Occupational Safety and Health Act (OSHA), NFPA Standards and Pamphlets, NEIS Standards, and common work place practice.
- C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.
- D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
- E. Locations of electrical equipment shown on Drawings are approximate only. Field verify actual locations for proper installation.
- F. Coordinate electrical equipment locations and conduit runs with those providing equipment to be served before installation or rough in.
 1. Notify Architect of conflicts before beginning work.
 2. Coordinate locations of power and lighting outlets in mechanical rooms and other areas with mechanical equipment, piping, ductwork, cabinets, etc, so they will be readily accessible and functional.
- G. Work related to other trades which is required under this Division, such as cutting and patching, trenching, and backfilling, shall be performed according to standards specified in applicable Sections.

3.03 FIELD QUALITY CONTROL

- A. Test systems and demonstrate equipment as working and operating properly. Notify Architect before test. Rectify defects at no additional cost to Owner.

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- B. Measure current for each phase of each motor under actual final load operation, i.e. after air balance is completed for fan units, etc. Record this information along with full-load nameplate current rating and size of thermal overload unit installed for each motor.
- C. Refer to individual equipment and material specification sections for additional testing requirements.

3.04 CLEANING

- A. Remove abandoned raceways, conductors, apparatus, and lighting fixtures promptly from site and dispose of legally.

3.05 CLOSEOUT ACTIVITIES

- A. Training:
 1. Provide instructor to train Owner's maintenance personnel in operation and maintenance of electrical equipment and systems. Factory representatives shall assist this instruction as necessary.
 2. Schedule instruction period at time of final inspection.
 3. Refer to individual material and equipment specification sections for additional training requirements.

3.06 FIRESTOPPING

- A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electrical installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Section 07 8400 - Firestopping.

END OF SECTION

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SECTION 26 0519
LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Single conductor building wire.
- B. Nonmetallic-sheathed cable.
- C. Metal-clad cable.
- D. Wiring connectors.
- E. Electrical tape.
- F. Heat shrink tubing.
- G. Oxide inhibiting compound.
- H. Wire pulling lubricant.
- I. Cable ties.

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.
- B. Section 26 0500 - Common Work Results for Electrical

1.03 REFERENCE STANDARDS

- A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire 2013 (Reapproved 2018).
- B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft 2011 (Reapproved 2017).
- C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes 2010, with Editorial Revision (2020).
- D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation 2004 (Reapproved 2020).
- E. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape 2017.
- F. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- G. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy 2021.
- H. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems 2021.
- I. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
 - 1. Article 334, 'Non-Metallic-Sheathed Cable, Types NM, NMC And NMS'.
- J. UL 4 - Armored Cable Current Edition, Including All Revisions.
- K. UL 44 - Thermoset-Insulated Wires and Cables Current Edition, Including All Revisions.
- L. UL 83 - Thermoplastic-Insulated Wires and Cables Current Edition, Including All Revisions.
- M. UL 267 - Outline of Investigation for Wire-Pulling Compounds Most Recent Edition, Including All Revisions.
- N. UL 486A-486B - Wire Connectors Current Edition, Including All Revisions.
- O. UL 486C - Splicing Wire Connectors Current Edition, Including All Revisions.
- P. UL 486D - Sealed Wire Connector Systems Current Edition, Including All Revisions.

- Q. UL 493 - Thermoplastic-Insulated Underground Feeder and Branch-Circuit Cables Current Edition, Including All Revisions.
- R. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape Current Edition, Including All Revisions.
- S. UL 719 - Nonmetallic-Sheathed Cables Current Edition, Including All Revisions.
- T. UL 1569 - Metal-Clad Cables Current Edition, Including All Revisions.

1.04 DEFINITIONS

- A. Line Voltage: Over 70 Volts.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
 - 2. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.
 - 3. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.06 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for conductors and cables, including detailed information on materials, construction, ratings, listings, and available sizes, configurations, and stranding.
- B. Design Data: Indicate voltage drop and ampacity calculations for aluminum conductors substituted for copper conductors. Include proposed modifications to raceways, boxes, wiring gutters, enclosures, etc. to accommodate substitute conductors.
- C. Project Record Documents: Record actual installed circuiting arrangements. Record actual routing for underground circuits.

1.07 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

1.09 FIELD CONDITIONS

- A. Do not install or otherwise handle thermoplastic-insulated conductors at temperatures lower than 14 degrees F, unless otherwise permitted by the manufacturer's instructions. When installation below this temperature is unavoidable, notify the Architect and obtain direction before proceeding with work.

PART 2 PRODUCTS

2.01 CONDUCTOR AND CABLE APPLICATIONS

- A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.
- B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.

- C. Nonmetallic-sheathed cable is permitted only as follows:
 - 1. Where not otherwise restricted, may be used:
 - a. For branch circuit wiring in dry locations within structures permitted to be of Types III, IV, and V construction, where fully sprinklered.
 - 2. In addition to other applicable restrictions, may not be used:
 - a. Where exposed to view.
 - b. Where exposed to damage.
 - c. For damp, wet, or corrosive locations.
 - d. Where in contact with earth.
 - e. Above suspended ceilings.
 - f. Where in contact with concrete.
 - g. Where restricted by NFPA 70 Article 334.
- D. Metal-clad cables are permitted only as follows:
 - 1. Where not otherwise restricted, may be used:
 - a. Where concealed above accessible ceilings for final connections from junction boxes to luminaires.
 - b. Where concealed in hollow stud walls, above accessible ceilings, and under raised floors for branch circuits up to 20 A.
 - 1) Exception: Provide single conductor building wire in raceway for circuit homerun from first outlet to panelboard.
 - 2. In addition to other applicable restrictions, may not be used:
 - a. Where not approved for use by the authority having jurisdiction.
 - b. Where exposed to view.
 - c. Where exposed to damage.
 - d. Where in contact with earth.
 - e. Where in contact with concrete.
 - f. For damp, wet, or corrosive locations, unless provided with a PVC jacket listed as suitable for those locations.
 - g. For isolated ground circuits, unless provided with an additional isolated/insulated grounding conductor.

2.02 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.
- D. Comply with NEMA WC 70.
- E. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.
- F. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.
- G. Conductors for Grounding and Bonding: Also comply with Section 26 0526.
- H. Conductor Material:
 - 1. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.
 - 2. Provide copper conductors except where aluminum conductors are specifically indicated or permitted for substitution. Conductor sizes indicated are based on copper unless specifically indicated as aluminum. Conductors designated with the abbreviation "AL" indicate aluminum.
 - a. Substitution of aluminum conductors for copper is permitted, when approved by Owner and authority having jurisdiction, only for the following:
 - 1) Services: Copper conductors' size #6 and larger.
 - 2) Feeders: Copper conductors size #6 and larger.

- b. Where aluminum conductors are substituted for copper, comply with the following:
 - 1) Size aluminum conductors to provide, when compared to copper sizes indicated, equivalent or greater ampacity and equivalent or less voltage drop.
 - 2) Increase size of raceways, boxes, wiring gutters, enclosures, etc. as required to accommodate aluminum conductors.
 - 3. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
 - 4. Tinned Copper Conductors: Comply with ASTM B33.
 - I. Minimum Conductor Size:
 - 1. Branch Circuits: 12 AWG.
 - a. Exceptions:
 - 1) 20 A, 120 V circuits longer than 75 feet: 10 AWG, for voltage drop.
 - 2) 20 A, 277 V circuits longer than 150 feet: 10 AWG, for voltage drop.
 - J. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
 - K. Conductor Color Coding:
 - 1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
 - 2. Color Coding Method: Integrally colored insulation.
 - a. Conductors, size 4 AWG and larger, may have black insulation color coded using vinyl color coding electrical tape.
 - 3. Color Code:
 - a. 480Y/277 V, 3 Phase, 4 Wire System:
 - 1) Phase A: Brown.
 - 2) Phase B: Orange.
 - 3) Phase C: Yellow.
 - 4) Neutral/Grounded: Gray.
 - b. 208Y/120 V, 3 Phase, 4 Wire System:
 - 1) Phase A: Black.
 - 2) Phase B: Red.
 - 3) Phase C: Blue.
 - 4) Neutral/Grounded: White.
 - c. Ground equipment, All Systems: Green.

2.03 WIRING CONNECTORS

- A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.
- B. Connectors for Grounding and Bonding: Comply with Section 26 0526.
- C. Wiring Connectors for Splices and Taps:
 - 1. Copper Conductors Size 8 AWG and Smaller: Use re-usable compression connectors.
 - 2. Copper Conductors Size 6 AWG and Larger: Use compression connectors.
 - 3. Connections Outside Building: Watertight steel spring wire connections with waterproof, non-hardening sealant.
- D. Wiring Connectors for Terminations:
 - 1. Provide terminal lugs for connecting conductors to equipment furnished with terminations designed for terminal lugs.
 - 2. Provide compression adapters for connecting conductors to equipment furnished with mechanical lugs when only compression connectors are specified.

3. Where over-sized conductors are larger than the equipment terminations can accommodate, provide connectors suitable for reducing to appropriate size, but not less than required for the rating of the overcurrent protective device.
 4. Provide motor pigtail connectors for connecting motor leads in order to facilitate disconnection.
 5. Copper Conductors Size 8 AWG and Larger: Use mechanical connectors or compression connectors where connectors are required.
 6. Stranded Conductors Size 10 AWG and Smaller: Use crimped terminals for connections to terminal screws.
 7. Conductors for Control Circuits: Use crimped terminals for all connections.
- E. Do not use insulation-piercing or insulation-displacement connectors designed for use with conductors without stripping insulation.
- F. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F for standard applications and 302 degrees F for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.
1. Manufacturers:
 - a. 3M: www.3m.com/sle.
 - b. NSI Industries LLC: www.nsiindustries.com/sales.
- G. Push-in Wire Connectors: Rated 600 V, 221 degrees F.
1. Manufacturers:
 - a. Ideal Industries, Inc: www.idealindustries.com/sle.
 - b. NSI Industries LLC: www.nsiindustries.com/sales.
- H. Mechanical Connectors: Provide bolted type or set-screw type.
1. Manufacturers:
 - a. Burndy LLC: www.burndy.com/sales.
 - b. IlSCO: www.ilsco.com/sle.
 - c. Thomas & Betts Corporation: www.tnb.com/sle.
- I. Compression Connectors: Provide circumferential type or hex type crimp configuration.
- J. Crimped Terminals: Nylon-insulated, with insulation grip and terminal configuration suitable for connection to be made.
1. Manufacturers:
 - a. Burndy LLC: www.burndy.com/sales.
 - b. Thomas & Betts Corporation: www.tnb.com/sle.
- K. Power Distribution Block: Terminals suitable for use with 75°F (24°C) copper conductors.
1. 16323 by Cooper Bussmann, Ellisville, MO www.bussmann.com
 2. LBA363106 by Square D Co, Palatine, IL www.us.squared.com.
 3. Substitutions: See Section 01 6000 - Product Requirements

2.04 ACCESSORIES

- A. Electrical Tape:
1. Manufacturers:
 - a. 3M: www.3m.com/sle.
 2. Vinyl Color Coding Electrical Tape: Integrally colored to match color code indicated; listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; suitable for continuous temperature environment up to 221 degrees F.
 3. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F and suitable for continuous temperature environment up to 221 degrees F.
 4. Rubber Splicing Electrical Tape: Ethylene Propylene Rubber (EPR) tape, complying with ASTM D4388; minimum thickness of 30 mil; suitable for continuous temperature environment up to 194 degrees F and short-term 266 degrees F overload service.

5. Electrical Filler Tape: Rubber-based insulating moldable putty, minimum thickness of 125 mil; suitable for continuous temperature environment up to 176 degrees F.
 6. Varnished Cambric Electrical Tape: Cotton cambric fabric tape, with or without adhesive, oil-primed and coated with high-grade insulating varnish; minimum thickness of 7 mil; suitable for continuous temperature environment up to 221 degrees F.
 7. Moisture Sealing Electrical Tape: Insulating mastic compound laminated to flexible, all-weather vinyl backing; minimum thickness of 90 mil.
- B. Heat Shrink Tubing: Heavy-wall, split-resistant, with factory-applied adhesive; rated 600 V; suitable for direct burial applications; listed as complying with UL 486D.
1. Manufacturers:
 - a. 3M: www.3m.com/sle.
 - b. Burndy LLC: www.burndy.com/sales.
- C. Wire Pulling Lubricant:
1. Listed and labeled as complying with UL 267.
 2. Suitable for use with conductors/cables and associated insulation/jackets to be installed.
 3. Suitable for use at installation temperature.
- D. Cable Ties: Material and tensile strength rating suitable for application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that the interior of building has been protected from weather.
- B. Verify that work likely to damage wire and cable has been completed.
- C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.
- D. Verify that field measurements are as indicated.
- E. Verify that conditions are satisfactory for installation prior to starting work.
- F. Verify that the raceway system is complete, and cabinets and outlet boxes are free of foreign matter and moisture.

3.02 PREPARATION

- A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

3.03 INSTALLATION

- A. Circuiting Requirements:
 1. Unless dimensioned, circuit routing indicated is diagrammatic.
 2. When circuit destination is indicated without specific routing, determine exact routing required.
 3. Install circuits as shown in Panel Schedules. Group circuit homeruns to panels as shown on Contract Drawings.
 4. Arrange circuiting to minimize splices. Conductors and cables shall be continuous from outlet to outlet.
 5. Include circuit lengths required to install connected devices within 10 ft of location indicated.
 6. Maintain separation of Class 1, Class 2, and Class 3 remote-control, signaling, and power-limited circuits in accordance with NFPA 70.
 7. Maintain separation of wiring for emergency systems in accordance with NFPA 70.
 8. Install wiring of different voltage systems in separate conduits.
 9. Circuiting Adjustments: Unless otherwise indicated, when branch circuits are indicated as separate, combining them together in a single raceway is permitted, under the following conditions:

- a. Provide no more than six current-carrying conductors in a single raceway. Dedicated neutral conductors are considered current-carrying conductors.
 - b. Increase size of conductors as required to account for ampacity derating.
 - c. Size raceways, boxes, etc. to accommodate conductors.
- 10. Common Neutrals: Unless otherwise indicated, sharing of neutral/grounded conductors among up to three single phase branch circuits of different phases installed in the same raceway is not permitted. Provide dedicated neutral/grounded conductor for each individual branch circuit.
- B. Install products in accordance with manufacturer's instructions.
- C. Perform work in accordance with NECA 1 (general workmanship).
- D. Install a nonmetallic-sheathed cable (Type NM-B) in accordance with NECA 121.
- E. Install underground feeder and branch-circuit cable (Type UF-B) in accordance with NECA 121.
- F. Install armored cable (Type AC) in accordance with NECA 120.
- G. Install metal-clad cable (Type MC) in accordance with NECA 120.
- H. Pre-wired 3/8-inch flexible fixture whips: Allowed only for connection to recessed lighting fixtures, lengths not to exceed 72 inches.
- I. Installation in Raceway:
 - 1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
 - 2. Pull all conductors and cables together into the raceway at same time.
 - 3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
 - 4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.
- J. Exposed Cable Installation (only where specifically permitted):
 - 1. Route cables parallel or perpendicular to building structural members and surfaces.
 - 2. Protect cables from physical damage.
- K. Line Voltage Cable Installation:
 - 1. Where installing in framing, do not bore holes in joists or beams outside center 1/3 of member depth or within 24 inches (600 mm) of bearing points. Do not bore holes in vertically framing members outside center 1/3 of member width. Holes shall be one inch diameter maximum.
 - 2. Conceal cables within ceilings and walls of finished areas. Cables may be exposed in unfinished areas but not run on floors of mechanical equipment spaces or in such a way that they obstruct access to, operation of, or servicing of equipment.
 - 3. Install exposed cables parallel to or at right angles to building structure lines.
 - 4. Keep cables 6 inches (150 mm) minimum from hot water pipes.
 - 5. Do not support cables from mechanical ducts or duct supports without Architect's written approval.
 - 6. Do not bore holes in vertical truss members or notch structural members for cable installation.
- L. Parallel Conductors: Install conductors of the same length and terminate in the same manner.
- M. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.
 - 1. Installation Above Suspended Ceilings: Do not provide support from the ceiling support system. Do not provide support from ceiling grid or allow conductors and cables to lay on ceiling tiles.
- N. Terminate cables using suitable fittings.

1. Armored Cable (Type AC):
 - a. Use listed fittings and anti-short, insulating bushings.
 - b. Cut cable armor only using specialized tools to prevent damaging conductors or insulation. Do not use hacksaw or wire cutters to cut armor.
2. Metal-Clad Cable (Type MC):
 - a. Use listed fittings.
 - b. Cut cable armor only using specialized tools to prevent damaging conductors or insulation. Do not use hacksaw or wire cutters to cut armor.
- O. Install conductors with a minimum of 12 inches of slack at each outlet.
- P. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.
- Q. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.
- R. Make wiring connections using specified wiring connectors.
 1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
 2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
 3. Do not remove conductor strands to facilitate insertion into connector.
 4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.
 5. Mechanical Connectors: Secure connections according to manufacturers' recommended torque settings.
 6. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- S. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.
 1. Dry Locations: Use insulating covers specifically designed for connectors, electrical tape, or heat shrink tubing.
 - a. For taped connections, first apply adequate amount of rubber splicing electrical tape or electrical filler tape, followed by outer covering of vinyl insulating electrical tape.
 - b. For taped connections likely to require re-entering, including motor leads, first apply varnished cambric electrical tape, followed by adequate amount of rubber splicing electrical tape, followed by outer covering of vinyl insulating electrical tape.
 2. Damp Locations: Use insulating covers specifically designed for connectors, electrical tape, or heat shrink tubing.
 - a. For connections with insulating covers, apply outer covering of moisture sealing electrical tape.
 - b. For taped connections, follow same procedure as for dry locations but apply outer covering of moisture sealing electrical tape.
 3. Wet Locations: Use heat shrink tubing.
- T. Insulate ends of spare conductors using vinyl insulating electrical tape.
- U. Field-Applied Color Coding: Where vinyl color coding electrical tape is used in lieu of integrally colored insulation as permitted in Part 2 under "Color Coding", apply half overlapping turns of tape at each termination and at each location conductors are accessible.
- V. Identify conductors and cables in accordance with Section 26 0553.
- W. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.
- X. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Perform inspections and tests listed in NETA ATS, Section 7.3.2. The insulation resistance test is required for all conductors. The resistance test for parallel conductors listed as optional is not required.
 - 1. Disconnect surge protective devices (SPDs) prior to performing any high potential testing. Replace SPDs damaged by performing high potential testing with SPDs connected.
- C. Correct deficiencies and replace damaged or defective conductors and cables.

END OF SECTION

**SECTION 26 0523
CONTROL-VOLTAGE ELECTRICAL CABLES**

PART 1 GENERAL

1.01 SUMMARY

- A. Includes But Not Limited To:
 - 1. Furnish and install control-voltage electrical cables as described in Contract Documents.

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.
- B. Section 23 0913 - Instrumentation and Control Devices for HVAC.
- C. Section 26 0500 - Common Work Results for Electrical.
- D. Section 26 0553 - Identification for Electrical Systems: Identification of products and requirements.
- E. Section 26 0923 - Lighting Control Devices.

1.03 DEFINITIONS

- A. Control Voltage: 70 Volts and under.

PART 2 PRODUCTS

2.01 SYTEM

- A. Manufacturers:
 - 1. Approved Cable Manufacturers. See Section:
 - a. Alpha Wire Co, Elizabeth, NJ www.alphawire.com.
 - b. Belden Wire & Cable Co, Richmond, IN www.belden.com.
 - c. Liberty Wire & Cable, Colorado Springs, CO www.libertycable.com.
 - d. West Penn Wire Corp, Washington, PA www.westpenn-cdt.com.
- B. Components:
 - 1. Building Control System Cables.
 - a. CAT 5E, 24 AWG, solid bare copper, four pair, UTP, white cable jacket.
 - b. Sheath Colors:
 - 1) Lighting Control: Yellow.
 - c. Meet requirements of EIA / TIA 568 Standard.
 - 2. Lighting Control Cables and Conductors:
 - a. Provide cable per Lighting Control Panel Manufacturer's recommendations and requirements.
 - b. Lighting Control Cables run in same raceway as line voltage cables shall have same insulation voltage rating as line voltage conductors.
 - c. Cable Jacket shall be yellow.

PART 3 EXECUTION

3.01 INSTALLATION

- A. General:
 - 1. Cables shall be continuous and without splices from source to outlet.
 - 2. Conceal cables within ceilings and walls of finished areas. Cables may be exposed in unfinished areas but not run on floors of mechanical equipment spaces or in such a way that they obstruct access to, operation of, or servicing of equipment unless otherwise indicated in Contract Drawings.
 - 3. Run cables in raceway as indicated on Contract Drawings.
 - 4. Run exposed cables parallel to or at right angles to building structure lines.
 - 5. Keep cables 6 inch (150 mm) minimum from hot water pipes.

6. Support cables using approved staples, cable ties, straps, hangers, or similar fittings spaced every 3 feet (900 mm).
 7. Where installing in framing, do not bore holes in joists or beams outside center 1/3 of member depth or within 24 inches (600 mm) of bearing points. Do not bore holes in vertical framing members outside center 1/3 of member width. Holes shall be 1/2-inch (13 mm) diameter maximum.
 8. Bundle only cables of same systems together.
 9. Install cables in raceway. Run cables of different systems in separate conduits.
 10. Do not run cables within 10 inches (255 mm) of line voltage conductors/raceways.
 11. Extend cables 18 inches (450 mm) from wall or ceiling at all outlet locations. Extend cables to twice vertical length of cabinet at each cabinet location.
 12. Pulling cables into conduit:
 - a. Do not pull cables until raceway system is complete and cabinets and outlet boxes are free of foreign matter and moisture.
 - b. Do not use heavy mechanical means for pulling cables.
 - c. Use only listed wire pulling lubricants.
 13. Prohibited procedures:
 - a. Boring holes for installation of cables in vertical truss members.
 - b. Notching of structural members for installation of cables.
- B. Control Cables:
1. For cables not installed in raceway, do not run cables within 10 inches (255 mm) of line voltage conductors / raceways. Also, maintain 10 inches (255 mm) minimum between following exposed cable groups:
 - a. Microphone cables.
 - b. CAT-6, sound system control, telephone, video, or ATC cables.
 - c. Loudspeaker cables.

END OF SECTION

**SECTION 26 0529
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Support and attachment requirements and components for equipment, conduit, cable, boxes, and other electrical work.

1.02 RELATED REQUIREMENTS

- A. Section 05 5000 - Metal Fabrications: Materials and requirements for fabricated metal supports.
- B. Section 26 0533.13 - Conduit for Electrical Systems: Additional support and attachment requirements for conduits.
- C. Section 26 0533.16 - Boxes for Electrical Systems: Additional support and attachment requirements for boxes.
- D. Section 26 5100 - Interior Lighting: Additional support and attachment requirements for interior luminaires.

1.03 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.
- C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel 2019.
- D. MFMA-4 - Metal Framing Standards Publication 2004.
- E. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- F. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate sizes and arrangement of supports and bases with actual equipment and components to be installed.
 - 2. Coordinate work to provide additional framing and materials required for installation.
 - 3. Coordinate compatibility of support and attachment components with mounting surfaces at installed locations.
 - 4. Coordinate arrangement of supports with ductwork, piping, equipment and other potential conflicts.
 - 5. Notify Architect of conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for channel/strut framing systems, nonpenetrating rooftop supports, and post-installed concrete/masonry anchors.

1.06 QUALITY ASSURANCE

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

Helena Distribution Store – Project # 89018312501	26 0529 - 1	Hangers and Supports for Electrical Systems
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- A. General Requirements:
 - 1. Comply with the following. Where requirements differ, comply with most stringent.
 - a. NFPA 70.
 - b. Requirements of authorities having jurisdiction.
 - 2. Provide the required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for complete installation of electrical work.
 - 3. Provide products listed, classified, and labeled as suitable for purpose intended, where applicable.
 - 4. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for load to be supported with minimum safety factor of [____]. Include consideration for vibration, equipment operation, and shock loads where applicable.
 - 5. Do not use products for applications other than as permitted by NFPA 70 and product listing.
 - 6. Steel Components: Use corrosion-resistant materials suitable for environment where installed.
 - a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
 - b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.
 - c. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
 - d. Galvanized Steel: Hot dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- B. Conduit and Cable Supports: Straps and clamps suitable for conduit or cable to be supported.
 - 1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
 - 2. Conduit Clamps: Bolted type unless otherwise indicated.
- C. Outlet Box Supports: Hangers and brackets suitable for boxes to be supported.
- D. Metal Channel/Strut Framing Systems:
 - 1. Description: Factory-fabricated, continuous-slot, metal channel/strut and associated fittings, accessories, and hardware required for field assembly of supports.
 - 2. Comply with MFMA-4.
 - 3. Channel Material:
 - a. Indoor Dry Locations: Use painted steel, zinc-plated steel, or galvanized steel.
 - b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel.
 - 4. Minimum Channel Thickness: Steel sheet, 12-gauge, 0.1046 inch.
 - 5. Minimum Channel Dimensions: 1-5/8 inch wide by 13/16 inch high.
- E. Hanger Rods: Threaded, zinc-plated steel unless otherwise indicated.
 - 1. Minimum Size, Unless Otherwise Indicated or Required:
 - a. Trapeze Support for Multiple Conduits: 3/8-inch diameter.
- F. Anchors and Fasteners:
 - 1. Unless otherwise indicated and where not otherwise restricted, use anchor and fastener types indicated for specified applications.
 - 2. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
 - 3. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
 - 4. Hollow Masonry: Use toggle bolts.
 - 5. Hollow Stud Walls: Use toggle bolts.
 - 6. Steel: Use beam clamps, machine bolts, or welded threaded studs.
 - 7. Sheet Metal: Use sheet metal screws.
 - 8. Wood: Use wood screws.
 - 9. Plastic and lead anchors are not permitted.
 - 10. Powder-actuated fasteners are not permitted.

PART 3 EXECUTION

Helena Distribution Store – Project # 89018312501	26 0529 - 2	Hangers and Supports for Electrical Systems
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3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive support and attachment components.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install hangers and supports in accordance with NECA 1.
- C. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
- D. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.
- E. Unless specifically indicated or approved by Architect, do not provide support from roof deck.
- F. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- G. Equipment Support and Attachment:
 - 1. Use metal, fabricated supports or supports assembled from metal channel/strut to support equipment as required.
 - 2. Use metal channel/strut secured to studs to support equipment surface mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
 - 3. Use metal channel/strut to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
 - 4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- H. Conduit Support and Attachment: See Section 26 0533.13 for additional requirements.
- I. Box Support and Attachment: See Section 26 0533.16 for additional requirements.
- J. Interior Luminaire Support and Attachment: See Section 26 5100 for additional requirements.
- K. Exterior Luminaire Support and Attachment: See Section 26 5600 for additional requirements.
- L. Secure fasteners in accordance with manufacturer's recommended torque settings.
- M. Remove temporary supports.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements for additional requirements.
- B. Inspect support and attachment components for damage and defects.
- C. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
- D. Correct deficiencies and replace damaged or defective support and attachment components.

END OF SECTION

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**A. SECTION 26 0533.13
CONDUIT FOR ELECTRICAL SYSTEMS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Galvanized steel rigid metal conduit (RMC).
- B. Galvanized steel intermediate metal conduit (IMC).
- C. Flexible metal conduit (FMC).
- D. Liquid tight flexible metal conduit (LFMC).
- E. Galvanized steel electrical metallic tubing (EMT).
- F. Rigid polyvinyl chloride (PVC) conduit.
- G. Electrical nonmetallic tubing (ENT).
- H. Liquid tight flexible nonmetallic conduit (LFNC).

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.
- B. Section 26 0500 - Common Work Results for Electrical: Sleeve seals for conduit penetrations.
- C. Section 26 0526 - Grounding and Bonding for Electrical Systems.
 - 1. Includes additional requirements for fittings for grounding and bonding.
- D. Section 26 0529 - Hangers and Supports for Electrical Systems.
- E. Section 26 0553 - Identification for Electrical Systems: Identification of products and requirements.

1.03 REFERENCE STANDARDS

- A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC) 2020.
- B. ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S) 2020.
- C. ANSI C80.6 - American National Standard for Electrical Intermediate Metal Conduit 2018.
- D. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- E. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT) 2020.
- F. NECA 111 - Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC) 2017.
- G. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable 2014.
- H. NEMA RN 1 - Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Metal Conduit and Intermediate Metal Conduit 2018.
- I. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit 2020.
- J. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing 2021.
- K. NEMA TC 13 - Electrical Nonmetallic Tubing (ENT) 2014 (Reaffirmed 2019).
- L. NEMA TC 14 (SERIES) - Reinforced Thermosetting Resin Conduit and Fittings Series 2015.
- M. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- N. UL 1 - Flexible Metal Conduit Current Edition, Including All Revisions.
- O. UL 6 - Electrical Rigid Metal Conduit-Steel Current Edition, Including All Revisions.
- P. UL 6A - Electrical Rigid Metal Conduit-Aluminum, Red Brass, and Stainless-Steel Current Edition, Including All Revisions.
- Q. UL 360 - Liquid-Tight Flexible Metal Conduit Current Edition, Including All Revisions.

- R. UL 514B - Conduit, Tubing, and Cable Fittings Current Edition, Including All Revisions.
- S. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings Current Edition, Including All Revisions.
- T. UL 797A - Electrical Metallic Tubing - Aluminum and Stainless-Steel Current Edition, Including All Revisions.
- U. UL 797 - Electrical Metallic Tubing-Steel Current Edition, Including All Revisions.
- V. UL 1242 - Electrical Intermediate Metal Conduit-Steel Current Edition, Including All Revisions.
- W. UL 1653 - Electrical Nonmetallic Tubing Current Edition, Including All Revisions.
- X. UL 1660 - Liquid-Tight Flexible Nonmetallic Conduit Current Edition, Including All Revisions.
- Y. UL 2419 - Outline of Investigation for Electrically Conductive Corrosion Resistant Compounds Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate minimum sizes of conduits with actual type and quantity of conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
 - 2. Coordinate arrangement of conduits with structural members, ductwork, piping, equipment, and other potential conflicts.
 - 3. Verify exact conduit termination locations required for boxes, enclosures, and equipment.
 - 4. Coordinate work to provide roof penetrations that preserve integrity of roofing system and do not void roof warranty.
 - 5. Notify Architect of conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not begin installation of conductors and cables until installation of conduit between termination points is complete.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittals procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conduits and fittings.

1.06 QUALITY ASSURANCE

- A. Product Listing Organization Qualifications: Organization recognized by OSHA as Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store conduit and fittings in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 CONDUIT APPLICATIONS

- A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70, manufacturer's instructions, and product listing.
- B. Unless otherwise indicated and where not otherwise restricted, use conduit types indicated for specified applications. Where more than one listed application applies, comply with most restrictive requirements. Where conduit type for particular application is not specified, use galvanized steel rigid metal conduit.
- C. Concealed Within Hollow Stud Walls: Use electrical metallic tubing (EMT) or Electrical non-metallic tubing (ENT).
- D. Concealed Above Accessible Ceilings: Use electrical metallic tubing (EMT) or Electrical non-metallic tubing (ENT).

- E. Interior, Damp or Wet Locations: Use intermediate metal conduit (IMC).
- F. Connections to Luminaires Above Accessible Ceilings: Use flexible metal conduit or liquid tight flexible non-metallic conduit (LFNC).
 - 1. Maximum Length: 6 feet.
- G. Flexible Connections to Vibrating Equipment:
 - 1. Dry Locations: Use flexible metal conduit (FMC).
 - 2. Damp, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit (LFMC).
 - 3. Maximum Length: 3 feet unless otherwise indicated.
 - 4. Vibrating equipment includes, but is not limited to:
 - a. Transformers.
 - b. Motors.
- H. Fished in existing walls, where necessary: use flexible metal conduit (fmc), galvanized steel electrical metallic tubing (emt)

2.02 CONDUIT - GENERAL REQUIREMENTS

- A. Comply with NFPA 70.
- B. Existing Work: Where existing conduits are indicated to be reused, they may be reused only where they comply with specified requirements, are free from corrosion, and integrity is verified by pulling mandrel through them.
- C. Fittings for Grounding and Bonding: See Section 26 0526 for additional requirements.
- D. Provide conduit, fittings, supports, and accessories required for complete raceway system.
- E. Provide products listed, classified, and labeled as suitable for purpose intended.
- F. Minimum Conduit Size, Unless Otherwise Indicated:
 - 1. For exterior use: 3/4 inch (21 mm)
 - 2. For interior use: 1/2 inch (16 mm)
- G. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

- A. Manufacturers:
 - 1. Allied Tube & Conduit, a division of Atkore International: www.alliedeg.com/#sle.
 - 2. Nucor Tubular Products: www.nucortubular.com/sle.
 - 3. Wheatland Tube, a division of Zekelman Industries: www.wheatland.com/sales.
- B. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.
- C. Fittings:
 - 1. Manufacturers:
 - a. Bridgeport Fittings Inc: www.bptfittings.com/sle.
 - b. Emerson Electric Co; O-Z/Gedney: www.emerson.com/sle.
 - 2. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 6.
 - 3. Material: Use steel or malleable iron.

2.04 GALVANIZED STEEL INTERMEDIATE METAL CONDUIT (IMC)

- A. Manufacturers:
 - 1. Allied Tube & Conduit, a division of Atkore International: www.alliedeg.com/#sle.
 - 2. Nucor Tubular Products: www.nucortubular.com/sle.
- B. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.
- C. Fittings:

1. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 1242.
2. Material: Use steel or malleable iron.
3. Connectors and Couplings: Use threaded type fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.

2.05 FLEXIBLE METAL CONDUIT (FMC)

- A. Manufacturers:
 1. AFC Cable Systems, Inc: www.afcweb.com.
 2. Electri-Flex Company: www.electriflex.com.
 3. International Metal Hose: www.metalhose.com.
- B. Description: NFPA 70, Type FMC standard-wall steel flexible metal conduit listed and labeled as complying with UL 1 and listed for use in classified firestop systems.
- C. Fittings:
 1. Manufacturers:
 - a. Bridgeport Fittings, LLC: www.bptfittings.com/sle.
 - b. Emerson Electric Co; O-Z/Gedney: www.emerson.com/sle.
 2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 3. Material: Use steel.

2.06 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

- A. Manufacturers:
 1. AFC Cable Systems, Inc: www.afcweb.com.
 2. Electri-Flex Company: www.electriflex.com.
 3. International Metal Hose: www.metalhose.com.
- B. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.
- C. Fittings:
 1. Manufacturers:
 - a. Bridgeport Fittings, LLC: www.bptfittings.com/sle.
 - b. Emerson Electric Co; O-Z/Gedney: www.emerson.com/sle.
 2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 3. Material: Use steel or malleable iron.

2.07 GALVANIZED STEEL ELECTRICAL METALLIC TUBING (EMT)

- A. Manufacturers:
 1. Allied Tube & Conduit: www.alliedeg.com.
 2. Nucor Tubular Products: www.nucortubular/sle.
 3. Wheatland Tube Company: www.wheatland.com.
- B. Description: NFPA 70, Type EMT galvanized steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.
- C. Fittings:
 1. Manufacturers:
 - a. Bridgeport Fittings, LLC: www.bptfittings.com/sle.
 - b. Emerson Electric Co; O-Z/Gedney: www.emerson.com/sle.
 2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 3. Material: Use steel.
 - a. Do not use die cast zinc fittings.
 4. Connectors and Couplings: Use compression (gland) or set-screw type.
 - a. Do not use indenter type connectors and couplings.

5. Damp or Wet Locations, Where Permitted: Use fittings listed for use in wet locations.

2.08 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

- A. Manufacturers:
 - 1. Cantex Inc: www.cantexinc.com/sle.
 - 2. JM Eagle: www.jmeagle.com/sale.
- B. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 40 unless otherwise indicated, Schedule 80 where subject to physical damage; rated for use with conductors rated 90 degrees C.
- C. Fittings:
 - 1. Manufacturer: Same as manufacturer of conduit to be connected.
 - 2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.

2.09 ELECTRICAL NONMETALLIC TUBING (ENT)

- A. Manufacturers:
 - 1. Cantex Inc: www.cantexinc.com/sle.
- B. Description: NFPA 70, Type ENT electrical nonmetallic tubing complying with NEMA TC 13 and listed and labeled as complying with UL 1653.
- C. Fittings:
 - 1. Manufacturer: Same as manufacturer of ENT to be connected.
 - 2. Use solvent-welded type fittings.
 - 3. Solvent-Welded Fittings: Rigid PVC fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; suitable for use with ENT.

2.10 LIQUIDTIGHT FLEXIBLE NONMETALLIC CONDUIT (LFNC)

- A. Manufacturers:
 - 1. AFC Cable Systems, a division of Atkore International: www.afcweb.com/sale.
 - 2. Electri-Flex Company: www.electriflex.com/sle.
 - 3. IPEX, a division of Aliaxis: www.ipexna.com/sle.
- B. Description: NFPA 70, Type LFNC liquidtight flexible nonmetallic conduit listed and labeled as complying with UL 1660.
- C. Fittings:
 - 1. Manufacturer: Same as manufacturer of conduit to be connected.
 - 2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B; suitable for type of conduit to be connected.

2.11 PROHIBITED FITTING MATERIALS

- A. The following fitting type are not permitted: crimp-on, tap-on, indenter, and cast set-screw fittings for EMT.
- B. Spray (aerosol) PVC cement.

2.12 ACCESSORIES

- A. Corrosion Protection Tape: PVC-based, minimum thickness of 20 mil, 0.020 inch.
- B. Conduit Joint Compound: Corrosion-resistant, electrically conductive compound listed as complying with UL 2419; suitable for use with conduit to be installed.
- C. Solvent Cement for PVC Conduit and Fittings: As recommended by manufacturer of conduit and fittings to be installed.
 - 1. Spray (aerosol) PVC cement is not permitted.
- D. Pull Strings: Use nylon or polyester tape with average breaking strength of not less than 1,250 lbf.

- E. Sealing Compound for Hazardous/Classified Location Sealing Fittings: Listed for use with particular fittings to be installed.
- F. Duct Bank Spacers: Nonmetallic; designed for maintaining conduit/duct spacing for concrete encasement in open trench installation; suitable for conduit/duct arrangement to be installed.
- G. Expansion Fittings: Designed to allow for expansion and contraction in a run of conduit, suitable for type of conduit installed.
 - 1. Products:
 - a. Hot Dip Galvanized: O-Z/Gedney (Emerson) type AX.
 - b. PVC: Carlon type E945.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive conduits.
- C. Verify that conditions are satisfactory for installation prior to starting work.
- D. Notify Architect in writing if substrates are not acceptable to install raceways and boxes.
 - 1. Commencing installation constitutes acceptance of existing conditions.

3.02 INSTALLATION

- A. Install Owner provided corner A/V equipment cabinets.
- B. Install products in accordance with manufacturer's instructions.
- C. Install conduit in accordance with NECA 1.
- D. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.
- E. Install intermediate metal conduit (IMC) in accordance with NECA 101.
- F. Install rigid polyvinyl chloride (PVC) conduit in accordance with NECA 111.
- G. Install electrical nonmetallic tubing (ENT) in accordance with NECA 111.
- H. Install liquid tight flexible nonmetallic conduit (LFNC) in accordance with NECA 111.
- I. Conduit Routing:
 - 1. Unless dimensioned, conduit routing indicated is diagrammatic.
 - 2. When conduit destination is indicated without specific routing, determine exact routing required.
 - 3. Conceal conduits unless specifically indicated to be exposed.
 - 4. Conduits in the following areas may be exposed, unless otherwise indicated:
 - a. Electrical rooms.
 - b. Mechanical equipment rooms.
 - c. Within joists in areas with no ceiling.
 - 5. Unless otherwise approved, do not route exposed conduits:
 - a. Across floors.
 - b. Across roofs.
 - c. Across top of parapet walls.
 - d. Across building exterior surfaces.
 - 6. Arrange conduit to maintain adequate headroom, clearances, and access.
 - 7. Arrange conduit to provide no more than equivalent of four 90-degree bends between pull points.
 - 8. Arrange conduit to provide no more than 150 feet between pull points.
 - 9. Route conduits above water and drain piping where possible.
 - 10. Arrange conduit to prevent moisture traps. Provide drain fittings at low points and at sealing fittings where moisture may collect.
 - 11. Maintain minimum clearance of 6 inches between conduits and piping for other systems.

12. Maintain minimum clearance of 12 inches between conduits and hot surfaces. This includes, but is not limited to:
 - a. Heaters.
 - b. Hot water piping.
 - c. Flues.
 13. Group parallel conduits in same area on common rack.
- J. Conduit Support:
1. Secure and support conduits in accordance with NFPA 70 using suitable supports and methods approved by authorities having jurisdiction; see Section 26 0529.
 2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
 3. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conduits to lay on ceiling tiles.
 4. Use metal channel/strut with accessory conduit clamps to support multiple parallel surface-mounted conduits.
 5. Use conduit clamp to support single conduit from beam clamp or threaded rod.
 6. Use trapeze hangers assembled from threaded rods and metal channel/strut with accessory conduit clamps to support multiple parallel suspended conduits.
 7. Use of wire for support of conduits is not permitted.
 8. Where conduit support intervals specified in NFPA 70 and NECA standards differ, comply with most stringent requirements.
- K. Connections and Terminations:
1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
 2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
 3. Use suitable adapters where required to transition from one type of conduit to another.
 4. Provide drip loops for liquid tight flexible conduit connections to prevent drainage of liquid into connectors.
 5. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
 6. Where spare conduits stub up through concrete floors and are not terminated in box or enclosure, provide threaded couplings equipped with threaded plugs set flush with finished floor.
 7. Provide insulating bushings, insulated throats, or listed metal fittings with smooth, rounded edges at conduit terminations to protect conductors.
 8. Secure joints and connections to provide mechanical strength and electrical continuity.
 9. Provide PVC adapters at all boxes.
- L. Penetrations:
1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
 2. Make penetrations perpendicular to surfaces unless otherwise indicated.
 3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
 4. Conceal bends for conduit risers emerging above ground.
 5. Provide suitable sealing system where conduits penetrate exterior wall below grade.
 6. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
 7. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty.

8. Install firestopping to preserve fire resistance rating of partitions and other elements; see Section 07 8400.
- M. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
 1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
 2. Where calculated in accordance with NFPA 70 for rigid polyvinyl chloride (PVC) conduit installed above ground to compensate for thermal expansion and contraction.
 3. Where conduits are subject to earth movement by settlement or frost.
- N. Conduit Sealing:
 1. Use foam conduit sealant to prevent entry of moisture and gases. This includes, but is not limited to:
 - a. Where conduits enter building from outside.
 - b. Where service conduits enter building from underground distribution system.
 - c. Where conduits enter building from underground.
 - d. Where conduits may transport moisture to contact live parts.
 2. Where conduits cross barriers between areas of potential substantial temperature differential, use foam conduit sealant at accessible point near penetration to prevent condensation. This includes, but is not limited to:
 - a. Where conduits pass from outdoors into conditioned interior spaces.
 - b. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.
- O. Provide pull string in each empty conduit and in conduits where conductors and cables are to be installed by others. Leave minimum slack of 12 inches at each end.
- P. Provide grounding and bonding; see Section 26 0526.
- Q. Identify conduits; see Section 26 0553.

3.03 PROHIBITED PROCEDURES

- A. Installation of raceway beneath or embedded in concrete, except where explicitly shown on Contract Documents.
- B. Use of wooden plugs inserted in concrete or masonry units for mounting raceway, supports, boxes, cabinets, or other equipment.
- C. Installation of raceway that has been crushed or deformed.
- D. Use of torches for bending PVC.
- E. Spray applied PVC cement.
- F. Boring holes in truss members.
- G. Notching of structural members.
- H. Supporting raceway from ceiling system support wires.
- I. Nail drive straps or tie wire for supporting raceway.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements for additional requirements.
- B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
- C. Correct deficiencies and replace damaged or defective conduits.

3.05 CLEANING

- A. Clean interior of conduits to remove moisture and foreign matter.

3.06 PROTECTION

- A. Immediately after installation of conduit, use suitable manufactured plugs to provide protection from entry of moisture and foreign material and do not remove until ready for installation of conductors.

END OF SECTION

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Helena Distribution Store – Project # 89018312501	26 0533.13 - 10	Conduit for Electrical Systems
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SECTION 26 0533.16
BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Outlet and device boxes up to 100 cubic inches, including those used as junction and pull boxes.
- B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches.
- C. Boxes and enclosures for integrated power, data, and audio/video.
- D. Floor boxes.

1.02 RELATED REQUIREMENTS

- A. Section 08 3100 - Access Doors and Panels: Panels for maintaining access to concealed boxes.
- B. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- C. Section 26 0529 - Hangers and Supports for Electrical Systems.
- D. Section 26 0533.13 - Conduit for Electrical Systems:
 - 1. Conduit bodies and other fittings.
 - 2. Additional requirements for locating boxes to limit conduit length and/or number of bends between pulling points.
- E. Section 26 0553 - Identification for Electrical Systems: Identification of products and requirements.
- F. Section 26 2726 - Wiring Devices:
 - 1. Wall plates.
 - 2. Additional requirements for locating boxes for wiring devices.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- C. NECA 130 - Standard for Installing and Maintaining Wiring Devices 2016.
- D. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable 2014.
- E. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports 2013 (Reaffirmed 2020).
- F. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations Current Edition, Including All Revisions.
- H. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations Current Edition, Including All Revisions.
- I. UL 508A - Industrial Control Panels Current Edition, Including All Revisions.
- J. UL 514A - Metallic Outlet Boxes Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.

2. Coordinate with Divisions 22 and 23 for installation of raceway for control of plumbing and HVAC equipment.
3. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
4. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.
5. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.
6. Coordinate the placement of boxes with millwork, furniture, devices, equipment, etc. installed under other sections or by others.
7. Coordinate the work with other trades to preserve insulation integrity.
8. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted boxes where indicated.
9. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for cabinets and enclosures and floor boxes.
- C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- D. Project Record Documents: Record actual locations for outlet and device boxes, pull boxes, cabinets and enclosures, floor boxes, and underground boxes/enclosures.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 1. See Section 01 6000 - Product Requirements, for additional provisions.
 2. Keys for Lockable Enclosures: Two of each different key.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.
- D. Firms regularly engaged in manufacturing of boxes for electrical systems of type and size required, whose products have been in satisfactory use in similar service for not less than ten (10) years.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 BOXES

- A. General Requirements:
 1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
 2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
 3. Provide products listed, classified, and labeled as suitable for the purpose intended.
 4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

5. Provide grounding terminals within boxes where equipment grounding conductors terminate.
- B. Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:
1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
 2. Use cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
 3. Use suitable concrete type boxes where flush-mounted in concrete.
 4. Use suitable masonry type boxes where flush-mounted in masonry walls.
 5. Use raised covers suitable for the type of wall construction and device configuration where required.
 6. Use shallow boxes where required by the type of wall construction.
 7. Do not use "through-wall" boxes designed for access from both sides of wall.
 8. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
 9. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
 10. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
 11. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes unless specifically indicated or permitted.
 12. Minimum Box Size, Unless Otherwise Indicated:
 - a. Wiring Devices 4-inch square by 2-1/8-inch deep (100 by 54 mm) trade size.: 4-inch square by 1-1/2-inch deep (100 by 38 mm) trade size.
 - b. Communications Systems Outlets: 4-inch square by 2-1/8-inch (100 by 54 mm) trade size.
 13. Wall Plates: Comply with Section 26 2726.
 14. Manufacturers:
 - a. Cooper Crouse-Hinds, a division of Eaton Corporation: www.cooperindustries.com/sales.
 - b. Hubbell Incorporated; Bell Products: www.hubbell-rtb.com/sle.
 - c. Hubbell Incorporated; RACO Products: www.hubbell-rtb.com/sales.
 - d. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/sle.
 - e. Thomas & Betts Corporation: www.tnb.com/sle.
- C. Vapor-Tight Boxes:
1. Premolded polyethylene box installed in all exterior framing walls (thermal envelope) around recessed outlet boxes.
 2. Approved Manufacturers:
 - a. Lessco Low energy Systems Supply Company, Inc. Campbellsport, WI www.lessco-airtight.com
- D. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches:
1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
 2. NEMA 250 Environment Type, Unless Otherwise Indicated:
 - a. Indoor Clean, Dry Locations: Type 1, painted steel.
 - b. Outdoor Locations: Type 3R, painted steel.
 3. Junction and Pull Boxes Larger Than 100 cubic inches:
 - a. Provide hinged-cover enclosures unless otherwise indicated.
 - b. Boxes 6 square feet and Larger: Provide hinged-cover enclosures.
 4. Cabinets and Hinged-Cover Enclosures, Other Than Junction and Pull Boxes:
 - a. Provide lockable hinged covers, all locks keyed alike unless otherwise indicated.
 - b. Back Panels: Painted steel, removable.

5. Finish for Painted Steel Enclosures: Manufacturer's standard grey unless otherwise indicated.
6. Manufacturers:
 - a. Cooper B-Line, a division of Eaton Corporation: www.cooperindustries.com/sales.
 - b. Hoffman, a brand of Pentair Technical Products: www.hoffmanonline.com/sle.
 - c. Hubbell Incorporated; Wiegmann Products: www.hubbell-wiegmann.com/sale.
- E. Boxes and Enclosures for Integrated Power, Data, and Audio/Video: Size and configuration as indicated or as required with partitions to separate services; field-connected gangable boxes may be used.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive boxes.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install boxes in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Provide separate boxes for emergency power and normal power systems.
- E. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.
- F. Flush-mount boxes in finished areas unless specifically indicated to be surface-mounted.
- G. Unless otherwise indicated, boxes may be surface-mounted where exposed conduits are indicated or permitted.
- H. Provide vapor-tight boxes where indicated in the contract documents.
 1. Carefully cut above grade vapor barrier and seal around recessed outlet boxes to minimize air infiltration.
- I. Box Locations:
 1. Locate boxes to be accessible. Provide access panels in accordance with Section 08 3100 as required where approved by the Architect.
 2. Unless dimensioned, box locations indicated are approximate.
 3. Locate boxes as required for devices installed under other sections or by others.
 - a. Switches, Receptacles, and Other Wiring Devices: Comply with Section 26 2726.
 4. Locate boxes so that wall plates do not span different building finishes.
 5. Locate boxes so that wall plates do not cross masonry joints.
 6. Unless otherwise indicated, where multiple outlet boxes are installed at the same location at different mounting heights, install along a common vertical center line.
 7. Do not install flush-mounted boxes on opposite sides of walls back-to-back. Provide minimum 6 inches horizontal separation unless otherwise indicated.
 8. Acoustic-Rated Walls: Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches horizontal separation.
 9. Fire Resistance Rated Walls: Install flush-mounted boxes such that the required fire resistance will not be reduced.
 - a. Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches separation where wall is constructed with individual noncommunicating stud cavities or protect both boxes with listed putty pads.

- b. Do not install flush-mounted boxes with area larger than 16 square inches or such that the total aggregate area of openings exceeds 100 square inches for any 100 square feet of wall area.
 - 10. Locate junction and pull boxes as indicated, as required to facilitate installation of conductors, and to limit conduit length and/or number of bends between pulling points in accordance with Section 26 0533.13.
 - 11. Locate junction and pull boxes in the following areas, unless otherwise indicated or approved by the Architect:
 - a. Concealed above accessible suspended ceilings.
 - b. Within joists in areas with no ceiling.
 - c. Electrical rooms.
 - d. Mechanical equipment rooms.
- J. Box Mounting Heights:
 - 1. HVAC:
 - a. Temperature Control Junction Boxes: As indicated on Drawings.
 - b. Thermostats not mounted in occupied space: As indicated on Drawings.
 - c. Remote Temperature Sensors and thermostats mounted in occupied space:
 - 1) Wall-Mounted: 50 inches to top.
 - 2) Column-Mounted: As indicated on Drawings.
 - 2. Electrical:
 - a. Receptacles: 18 inches.
 - b. Wall Switches: 42 inches.
 - c. Wall-Mounted Exit Lights: 90 inches.
 - d. Emergency Lighting Units: 60 inches.
 - e. TV Distribution System Components: As indicated on Drawings.
 - f. Computer and TV: 18 inches.
 - g. Telephones (wall type): 60 inches.
 - h. Telephones (desk type): 18 inches.
 - i. Telephone / Data (desk type): 18 inches.
 - j. Data (desk type): 18 inches.
 - k. Signal Chimes: 84 inches.
 - l. Refer to other sections for mounting heights of electrical equipment not listed above.
- K. Box Supports:
 - 1. Secure and support boxes in accordance with NFPA 70 and Section 26 0529 using suitable supports and methods approved by the authority having jurisdiction.
 - 2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.
 - 3. Installation Above Suspended Ceilings: Do not provide support from ceiling grid or ceiling support system.
- L. Install boxes plumb and level.
- M. Flush-Mounted Boxes:
 - 1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch or does not project beyond finished surface.
 - 2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.
 - 3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch at the edge of the box.
- N. Install boxes as required to preserve insulation integrity.

- O. Metallic Floor Boxes: Install box level at the proper elevation to be flush with finished floor.
 - 1. Furnish and install inset material to match the floor finish.
- P. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- Q. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.
- R. Close unused box openings.
- S. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.
- T. Provide grounding and bonding in accordance with Section 26 0526.
- U. Identify boxes in accordance with Section 26 0553.

3.03 CLEANING

- A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

3.04 PROTECTION

- A. Immediately after installation, protect boxes from entry of moisture and foreign material until ready for installation of conductors.

END OF SECTION

SECTION 26 0553
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical identification requirements.
- B. Identification nameplates and labels.

1.02 REFERENCE STANDARDS

- A. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- B. NFPA 70E - Standard for Electrical Safety in the Workplace 2021.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Verify final designations for equipment, systems, and components to be identified prior to fabrication of identification products.
- B. Sequencing:
 - 1. Do not conceal items to be identified in locations such as above suspended ceilings, until identification products have been installed.
 - 2. Do not install identification products until final surface finishes and painting are complete.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittals procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

1.06 FIELD CONDITIONS

- A. Do not install adhesive products when ambient temperature is lower than recommended by manufacturer.

PART 2 PRODUCTS

2.01 IDENTIFICATION REQUIREMENTS

- A. Identification for Equipment:
 - 1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
 - a. Panelboards:
 - 1) Identify ampere rating.
 - 2) Identify voltage and phase.
 - 3) Identify power source and circuit number. Include location when not within sight of equipment.
 - 4) Use typewritten circuit directory to identify load(s) served for panelboards with a door. Identify spares and spaces using pencil.
 - 5) For power panelboards without a door, use identification nameplate to identify load(s) served for each branch device. Do not identify spares and spaces.
 - b. Time Switches:
 - 1) Identify load(s) served and associated circuits controlled. Include location.
 - 2. Service Equipment:
 - a. Use identification nameplate to identify each service disconnecting means.
 - b. Use identification nameplate to identify load served by each breaker. Do not identify spares or space.

3. Use identification label to identify overcurrent protective devices for branch circuits serving fire alarm circuits. Identify with text "FIRE ALARM CIRCUIT".
4. Available Fault Current Documentation: Use identification label to identify the available fault current and date calculations were performed at locations requiring documentation by NFPA 70 including but not limited to the following.
 - a. Service equipment.
 - b. Motor control centers.
 - c. Elevator control panels.
 - d. Panelboards.
 - e. Switchboards
5. Arc Flash Hazard Warning Labels: Use warning labels to identify arc flash hazards for panelboards.
 - a. Minimum Size: 3.5 by 5 inches.
 - b. Service Equipment: Include the following information in accordance with NFPA 70 and NFPA 70E.
 - 1) Nominal system voltage.
 - 2) Arc flash boundary.
 - 3) Available incident energy.
 - 4) Working distance.
 - 5) Minimum arc rating of clothing.
 - 6) Required PPE.
 - 7) Date label applied.
- B. Identification for Devices:
 1. Grouped dimmer switches: Provide nameplate for each dimmer identifying load controlled.

2.02 IDENTIFICATION NAMEPLATES AND LABELS

- A. Identification Nameplates:
 1. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch; 1/4 inch engraved text.
 2. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch high; Four, located at corners for larger sizes.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
 1. Surface-Mounted Equipment: Enclosure front.
 2. Flush-Mounted Equipment: Inside of equipment door.
 3. Free-Standing Equipment: Enclosure front; also, enclosure rear for equipment with rear access.
 4. Elevated Equipment: Legible from the floor or working platform.
 5. Branch Devices: Adjacent to device.
 6. Interior Components: Legible from the point of access.
 7. Conductors and Cables: Legible from the point of access.
 8. Devices: Outside face of cover.
- C. Install identification products centered, level, and parallel with lines of item being identified.
- D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.
- E. Mark all handwritten text, where permitted, to be neat and legible.

END OF SECTION

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**SECTION 26 0583
WIRING CONNECTIONS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical connections to equipment.

1.02 RELATED REQUIREMENTS

- A. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables.
- B. Section 26 0533.13 - Conduit for Electrical Systems.
- C. Section 26 0533.16 - Boxes for Electrical Systems.
- D. Section 26 2726 - Wiring Devices.

1.03 REFERENCE STANDARDS

- A. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.
 - 2. Determine connection locations and requirements.
- B. Sequencing:
 - 1. Install rough-in of electrical connections before installation of equipment is required.
 - 2. Make electrical connections before required start-up of equipment.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide wiring device manufacturer's catalog information showing dimensions, configurations, and construction.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Products: Listed, classified, and labeled as suitable for the purpose intended.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Cords and Caps: NEMA WD 6; match receptacle configuration at outlet provided for equipment.
 - 1. Colors: Comply with NEMA WD 1.
 - 2. Cord Construction: NFPA 70, Type SO, multiconductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations.
 - 3. Size: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.

2.02 EQUIPMENT CONNECTIONS

- A. Electric ranges:
 - 1. Electrical Connection: Cord (4-wire, grounding) and plug (NEMA 14-50P). 48-inch minimum cord length.

PART 3 EXECUTION

Helena Distribution Store – Project # 89018312501	26 0583 - 1	Wiring Connections
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3.01 EXAMINATION

- A. Verify that equipment is ready for electrical connection, wiring, and energization.

3.02 ELECTRICAL CONNECTIONS

- A. Make electrical connections in accordance with equipment manufacturer's instructions.
- B. Make conduit connections to equipment using flexible conduit. Use liquid tight flexible conduit with watertight connectors in damp or wet locations.
- C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.
- D. Provide receptacle outlet to accommodate connection with attachment plug.
- E. Provide cord and cap where field-supplied attachment plug is required.
- F. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.
- G. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.
- H. Install terminal block jumpers to complete equipment wiring requirements.
- I. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.

END OF SECTION

**SECTION 26 0923
LIGHTING CONTROL DEVICES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Occupancy sensors.
- B. Time switches.

1.02 RELATED REQUIREMENTS

- A. Section 26 0500 - Common Work Results for Electrical
- B. Section 26 0523 - Control-Voltage Electrical Cables
- C. Section 26 5100 - Interior Lighting.

1.03 DEFINITIONS

- A. Class A: Equipment has been tested and found to comply with limits for Class A digital device, pursuant to part 15 of FCC Rules. These limits provide reasonable protection against harmful interference when equipment is operated in commercial environment.

1.04 REFERENCE STANDARDS

- A. 47 CFR 15 - Radio Frequency Devices; current edition.
- B. ANSI C136.10 - American National Standard for Roadway and Area Lighting Equipment - Locking-Type Photocontrol Devices and Mating Receptacles - Physical and Electrical Interchangeability and Testing; 2017.
- C. ANSI C136.24 - American National Standard for Roadway and Area Lighting Equipment - Nonlocking (Button) Type Photocontrols; 2020.
- D. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- E. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2016.
- F. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2020.
- G. NEMA 410 - Performance Testing for Lighting Controls and Switching Devices with Electronic Drivers and Discharge Ballasts; 2020.
- H. NEMA ICS 5 - Industrial Control and Systems: Control Circuit and Pilot Devices; 2017.
- I. NEMA ICS 6 - Industrial Control and Systems: Enclosures; 1993 (Reaffirmed 2016).
- J. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- K. UL 773 - Plug-in, Locking Type Photocontrols for Use with Area Lighting; Current Edition, Including All Revisions.
- L. UL 773A - Nonindustrial Photoelectric Switches for Lighting Control; Current Edition, Including All Revisions.
- M. UL 916 - Energy Management Equipment; Current Edition, Including All Revisions.
- N. UL 917 - Clock-Operated Switches; Current Edition, Including All Revisions.
- O. UL 1472 - Solid-State Dimming Controls; Current Edition, Including All Revisions.
- P. UL 60947-1 - Low-Voltage Switchgear and Controlgear - Part 1: General Rules; Current Edition, Including All Revisions.
- Q. UL 60947-4-1 - Low-Voltage Switchgear and Controlgear - Part 4-1: Contactors and Motor-starters - Electromechanical Contactors and Motor-starters; Current Edition, Including All Revisions.
- R. Federal Communications Commission (FCC):
 - 1. Emission requirements for Class A applications.

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1.05 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the placement of lighting control devices with millwork, furniture, equipment, etc. installed under other sections or by others.
 - 2. Coordinate the placement of wall switch occupancy sensors with actual installed door swings.
 - 3. Coordinate the placement of occupancy sensors with millwork, furniture, equipment or other potential obstructions to motion detection coverage installed under other sections or by others.
 - 4. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.
- B. Sequencing:
 - 1. Do not install lighting control devices until final surface finishes and painting are complete.

1.06 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Include ratings, configurations, standard wiring diagrams, dimensions, colors, service condition requirements, and installed features.
- C. Shop Drawings:
 - 1. Occupancy Sensors: Provide lighting plan indicating location, model number, and orientation of each occupancy sensor and associated system component.
- D. Field Quality Control Reports.
- E. Manufacturer's Installation Instructions: Include application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- F. Informational Submittals:
 - 1. Certifications:
 - a. Technician Certification that equipment has been installed, adjusted and tested in accordance with Manufacturer's recommendations.
- G. Operation and Maintenance Data: Include detailed information on device programming and setup.
- H. Closeout Submittals:
 - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
 - a. Operations and Maintenance Data:
 - 1) Equipment operation and maintenance manual(s).
- I. Project Record Documents: Record actual installed locations and settings for lighting control devices.

1.07 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Regulatory Agency Sustainability Approvals:
 - 1. All control equipment shall be in compliance with FCC emissions' standards in Part 15 Subpart J for Class A application.
 - 2. Programmable panelboards shall be UL listed under UL 916 Energy Management Equipment.
- C. Qualifications:
 - 1. Manufacturer Qualifications:
 - a. Manufacturer of assembly shall be manufacturer of major components with assembly.
 - b. Manufacturer of this equipment shall have minimum of five (5) years manufacturing experience.
 - 2. Technician Qualifications:

- a. Authorized by Manufacturer and trained.
 - b. Have thorough knowledge of software, hardware and system programming.
- D. Certifications:
 - 1. Provide Technician Certification that equipment has been installed, adjusted and tested in accordance with Manufacturer's recommendations.
- E. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- F. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- G. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.08 DELIVERY, STORAGE, AND PROTECTION

- A. Delivery And Acceptance Requirements.
 - 1. Equipment shall be delivered, handled and stored in accordance with manufacturer's instructions.

1.09 FIELD CONDITIONS

- A. Maintain field conditions within manufacturer's required service conditions during and after installation.

PART 2 PRODUCTS

2.01 LIGHTING CONTROL DEVICES - GENERAL REQUIREMENTS

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.
- B. Unless specifically indicated to be excluded, provide all required conduit, wiring, connectors, hardware, components, accessories, etc. as required for a complete operating system.

2.02 OCCUPANCY SENSORS

- A. Manufacturers:
 - 1. Lutron Electronics Company, Inc: www.lutron.com/#sle.
 - 2. Sensor Switch Inc: www.sensorswitch.com/sle.
 - 3. WattStopper: www.wattstopper.com/sle.
 - 4. Cooper controls; [www. https://www.cooperlighting.com](http://www.cooperlighting.com)
 - 5. Source Limitations: Furnish products produced by a single manufacturer and obtained from a single supplier.
- B. All Occupancy Sensors:
 - 1. Description: Factory-assembled commercial specification grade devices for indoor use capable of sensing both major motion, such as walking, and minor motion, such as small desktop level movements, according to published coverage areas, for automatic control of load indicated.
 - 2. Sensor Technology:
 - a. Passive Infrared (PIR) Occupancy Sensors: Designed to detect occupancy by sensing movement of thermal energy between zones.
 - b. Ultrasonic Occupancy Sensors: Designed to detect occupancy by sensing frequency shifts in emitted and reflected inaudible sound waves.
 - c. Passive Infrared/Ultrasonic Dual Technology Occupancy Sensors: Designed to detect occupancy using a combination of both passive infrared and ultrasonic technologies.
 - 3. Provide LED to visually indicate motion detection with separate color LEDs for each sensor type in dual technology units.
 - 4. Operation: Unless otherwise indicated, occupancy sensor to turn load on with occupant manual operation and to turn load off when no occupant presence is detected during an adjustable turn-off delay time interval.

5. Dual Technology Occupancy Sensors: Field configurable turn-on and hold-on activation with settings for activation by either or both sensing technologies.
 6. Passive Infrared Lens Field of View: Field customizable by addition of factory masking material, adjustment of integral blinders, or similar means to block motion detection in selected areas.
 7. Turn-Off Delay: Field adjustable, with time delay settings up to 30 minutes.
 8. Compatibility (Non-Dimming Sensors): Suitable for controlling incandescent lighting, low-voltage lighting with electronic and magnetic transformers, fluorescent lighting with electronic and magnetic ballasts, and fractional motor loads, with no minimum load requirements.
 9. Load Rating for Line Voltage Occupancy Sensors: As required to control the load indicated on drawings.
- C. Wall Switch Occupancy Sensors:
1. All Wall Switch Dimming Occupancy Sensors:
 - a. Description: Occupancy sensors designed for installation in standard wall box at standard wall switch mounting height with a field of view of 180 degrees, integrated manual control capability, and no leakage current to load in off mode.
 - b. Unless otherwise indicated or required to control the load indicated on drawings, provide line voltage units with self-contained relay.
 - c. Operation: Field selectable to operate either as occupancy sensor (automatic on/off) or as vacancy sensor (manual-on/automatic off).
 - d. Manual-Off Override Control: When used to turn off load while in automatic-on mode, unit to revert back to automatic mode after no occupant presence is detected during the delayed-off time interval.
 - e. Finish: Match finishes specified for wiring devices in Section 26 2726, unless otherwise indicated.
 2. Products:
 - a. Cooper: OSW-D-010-W
 - b. Leviton: ODD10-IDW
 - c. Watt Stopper: DW-311
 - d. Lutron: MS-Z101-W
- D. Ceiling Mounted Occupancy Sensors:
1. All Ceiling Mounted Occupancy Sensors:
 - a. Description: Low profile occupancy sensors designed for ceiling installation.
 - b. Unless otherwise indicated or required to control the load indicated on drawings, provide low voltage units, for use with separate compatible accessory power packs.
 - c. Finish: White unless otherwise indicated.
 - d. Provide manual ON and OFF momentary override switches. Refer to Contract Drawings for
 2. Products - Ultrasonic:
 - a. Cooper:
 - 1) Sensor: OAC-U-0501-R.
 - 2) Relay / Transformer: SP20-MV.
 - b. IR-TEC America:
 - 1) Sensor: OS-361DT.
 - 2) Relay / Transformer: PPU-300.
 - c. Leviton:
 - 1) Sensor: OSC05-RUW.
 - 2) Relay / Transformer: OPP20-D2.
 - d. Sensorswitch:
 - 1) Sensor: CMPDT9.
 - 2) Relay / Transformer: MP-20-SP0DM.
 - e. Watt Stopper:

- 1) Sensor: W-500A.
 - 2) Relay / Transformer: BZ-150.
3. Products - Passive Infrared (PIR):
 - a. Cooper:
 - 1) Sensor: OAC-P-1500-R.
 - 2) Relay / Transformer: SP20-MV.
 - b. IR-TEC America:
 - 1) Sensor: OS-361.
 - 2) Relay / Transformer: PPU-300.
 - c. Leviton:
 - 1) Sensor: OSC15-RIW.
 - 2) Relay / Transformer: OPP20-D2.
 - d. Sensorswitch:
 - 1) Sensor: CM10.
 - 2) Relay / Transformer: MP-20-SP0DM.
 - e. Watt Stopper:
 - 1) Sensor: CI-205.
 - 2) Relay / Transformer: BZ-150.
4. Products - Dual Technology:
 - a. Cooper:
 - 1) Sensor: OAC-DT-0501-R.
 - 2) Relay / Transformer: SP20-MV.
 - b. IR-TEC America:
 - 1) Sensor: OS-361DT.
 - 2) Relay / Transformer: PPU-300.
 - c. Leviton:
 - 1) Sensor: OSC05-RMW.
 - 2) Relay / Transformer: OPP20-D2.
 - d. Sensorswitch:
 - 1) Sensor: CMPDT9.
 - 2) Relay / Transformer: MP-20-SP0DM.
 - e. Watt Stopper:
 - 1) Sensor: DT-305.
 - 2) Relay / Transformer: BZ-150.
- E. Power Packs for Low Voltage Occupancy Sensors:
 1. Description: Plenum rated, self-contained low voltage class 2 transformer and relay compatible with specified low voltage occupancy sensors for switching of line voltage loads.
 2. Provide quantity and configuration of power and slave packs with all associated wiring and accessories as required to control the load indicated on drawings.
 3. Input Supply Voltage: Dual rated for 120/277 V ac.
 4. Load Rating: As required to control the load indicated on drawings.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.
- C. Verify that openings for outlet boxes are neatly cut and will be completely covered by devices or wall plates.
- D. Verify that final surface finishes are complete, including painting.

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- E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to lighting control devices.
- F. Verify that the service voltage and ratings of lighting control devices are appropriate for the service voltage and load requirements at the location to be installed.
- G. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

- A. Install lighting control devices in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.
- B. Coordinate locations of outlet boxes provided under Section 26 0533.16 as required for installation of lighting control devices provided under this section.
- C. Install lighting control devices in accordance with manufacturer's instructions.
- D. Unless otherwise indicated, connect lighting control device grounding terminal or conductor to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
- E. Install lighting control devices plumb and level, and held securely in place.
- F. Where required and not furnished with lighting control device, provide wall plate in accordance with Section 26 2726.
- G. Provide required supports in accordance with Section 26 0529.
- H. Where applicable, install lighting control devices and associated wall plates to fit completely flush to mounting surface with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Inspect each lighting control device for damage and defects.
- C. Test occupancy sensors to verify proper operation, including time delays and ambient light thresholds where applicable. Verify optimal coverage for entire room or area. Record test results in written report to be included with submittals.
- D. Test time switches to verify proper operation.
- E. Correct wiring deficiencies and replace damaged or defective lighting control devices.

3.05 ADJUSTING

- A. Adjust devices and wall plates to be flush and level.
- B. Adjust occupancy sensor settings to minimize undesired activations while optimizing energy savings, and to achieve desired function as indicated or as directed by Architect.
- C. Adjust time switch settings to achieve desired operation schedule as indicated or as directed by Architect. Record settings in written report to be included with submittals.

3.06 CLOSEOUT ACTIVITIES

- A. See Section 01 7800 - Closeout Submittals, for closeout submittals.
- B. Prior to Substantial Completion, meet with personnel designated by Owner to:
 1. Identify location of control system components.
 2. Explain operation of each component.
 3. Demonstrate adjustment capabilities of time clocks, including turning systems OFF at times other than sunrise and keeping systems OFF on days facility is closed.

- 4. Set time clocks as directed.
- C. Demonstration: Demonstrate proper operation of lighting control devices to Architect, and correct deficiencies or make adjustments as directed.
- D. Training: Train Owner's personnel on operation, adjustment, programming, and maintenance of lighting control devices.
 - 1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
 - 2. Provide minimum of two hours of training.
 - 3. Instructor: Qualified contractor familiar with the project and with sufficient knowledge of the installed lighting control devices.
 - 4. Location: At project site.

END OF SECTION 26 0923

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SECTION 26 2726 WIRING DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wall switches.
- B. Wall dimmers.
- C. Receptacles.
- D. Wall plates.
- E. Floor box service fittings.

1.02 RELATED REQUIREMENTS

- A. Section 11 6623 - Gymnasium Equipment for motorized basketball backstop.
- B. Section 26 0500 - Common Work Results for Electrical.
- C. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables: Manufactured wiring systems for use with access floor boxes with compatible pre-wired connectors.
- D. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- E. Section 26 0533.16 - Boxes for Electrical Systems.
- F. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- G. Section 26 0923 - Lighting Control Devices: Devices for automatic control of lighting, including occupancy sensors, in-wall time switches, and in-wall interval timers.

1.03 REFERENCE STANDARDS

- A. FS W-C-596 - Connector, Electrical, Power, General Specification for 2014h, with Amendments (2017).
- B. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush Mounted (General Specification) 2014g, with Amendment (2017).
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- D. NECA 130 - Standard for Installing and Maintaining Wiring Devices 2016.
- E. NEMA WD 1 - General Color Requirements for Wiring Devices 1999 (Reaffirmed 2020).
- F. NEMA WD 6 - Wiring Devices - Dimensional Specifications 2021.
- G. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. UL 20 - General-Use Snap Switches Current Edition, Including All Revisions.
- I. UL 498 - Attachment Plugs and Receptacles Current Edition, Including All Revisions.
- J. UL 514D - Cover Plates for Flush-Mounted Wiring Devices Current Edition, Including All Revisions.
- K. UL 943 - Ground-Fault Circuit-Interrupters Current Edition, Including All Revisions.
- L. UL 1472 - Solid-State Dimming Controls Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the placement of outlet boxes with millwork, furniture, equipment, etc. installed under other sections or by others.
 - 2. Coordinate wiring device ratings and configurations with the electrical requirements of actual equipment to be installed.

3. Coordinate the placement of outlet boxes for wall switches with actual installed door swings.
4. Coordinate the installation and preparation of uneven surfaces, such as split face block, to provide suitable surface for installation of wiring devices.
5. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

B. Sequencing:

1. Do not install wiring devices until final surface finishes and painting is complete.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.
- C. Field Quality Control Test Reports.
- D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- E. Operation and Maintenance Data:
 1. GFCI Receptacles: Include information on status indicators.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Products: Listed, classified, and labeled as suitable for the purpose intended.

1.07 DELIVERY, STORAGE, AND PROTECTION

- A. Store in a clean, dry space in original manufacturer's packaging until ready for installation.

PART 2 PRODUCTS

2.01 WIRING DEVICE APPLICATIONS

- A. Provide wiring devices suitable for intended use and with ratings adequate for load served.
- B. For single receptacles installed on an individual branch circuit, provide receptacle with ampere rating not less than that of the branch circuit.
- C. Provide weather resistant GFCI receptacles with specified weatherproof covers for receptacles installed outdoors or in damp or wet locations.
- D. Provide GFCI protection for receptacles installed within 6 feet of sinks.
- E. Provide GFCI protection for receptacles serving electric drinking fountains.

2.02 WIRING DEVICE FINISHES

- A. Provide wiring device finishes as described below unless otherwise indicated.
- B. Wiring Devices Installed on light colored walls: White with white nylon wall plate.
- C. Wiring Devices Installed on dark colored walls: Brown with brown nylon wall plate.
- D. Wiring Devices Installed on black walls: Black with black nylon wall plate.
- E. Wiring Devices Installed in Unfinished Spaces: Gray with galvanized steel wall plate.
- F. Wiring Devices Installed in Wet or Damp Locations: Gray with specified weatherproof cover.

2.03 WALL SWITCHES

- A. Wall Switches - General Requirements: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20 and where applicable, FS W-S-896; types as indicated on the drawings.
 1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.

- B. Standard Wall Switches: Industrial specification grade, 20 A, 120/277 V with standard toggle type switch actuator and maintained contacts; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.

1. Products:

- a. Pass & Seymour (Legrand): PS20AC.
- b. Leviton: 1221-2.
- c. Cooper: AH1221.
- d. Hubbell HBL: 1221.
- e. Substitutions: See Section 01 6000 - Product Requirements.

2.04 WALL DIMMERS

- A. Wall Dimmers - General Requirements: Provide dimmer switches of the same brand as lighting control system. Solid-state with continuous full-range even control following square law dimming curve, integral radio frequency interference filtering, power failure preset memory, air gap switch accessible without removing wall plate, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 1472; types and ratings suitable for load controlled as indicated on the drawings.

2.05 RECEPTACLES

- A. Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498, and where applicable, FS W-C-596; types as indicated on the drawings.

1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.
2. NEMA configurations specified are according to NEMA WD 6.

B. Convenience Receptacles:

1. Standard Convenience Receptacles: Industrial specification grade, 15A, 125V, NEMA 5-15R; single or duplex as indicated on the drawings.

a. Products - Decora (Rectangular) Style:

- 1) Cooper: 6262W.
- 2) Hubbell: HBL2152WA.
- 3) Leviton: 16252-W.
- 4) Pass & Seymour: 26252-W.

b. Products - Standard Style:

- 1) Cooper: TR5262.
- 2) Hubbell: BR20.
- 3) Leviton: TBR20.
- 4) Pass & Seymour: TR20.

- C. Weather Resistant Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as weather resistant type complying with UL 498 Supplement SD suitable for installation in damp or wet locations; single or duplex as indicated on the drawings.

- D. Tamper Resistant Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as tamper resistant type; single or duplex as indicated on the drawings.

1. All outlets for meetinghouse application shall be tamper resistant

E. GFCI Receptacles:

1. GFCI Receptacles - General Requirements: Self-testing, with feed-through protection and light to indicate ground fault tripped condition and loss of protection; listed as complying with UL 943, class A.

2. Standard GFCI Receptacles: Industrial specification grade, duplex, 15A, 125V, NEMA 5-15R, rectangular decorator style.

a. Products:

- 1) Cooper: GF15W.

- 2) Hubbell: GF5252WA.
- 3) Leviton: 8599-W.
- 4) Pass & Seymour: 1594-W.
3. Weather Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as weather resistant type complying with UL 498 Supplement SD suitable for installation in damp or wet locations.
4. Tamper Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as tamper resistant type.

2.06 WALL PLATES

- A. Wall Plates: Comply with UL 514D.
 1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
 2. Size: Standard.
 3. Screws: Metal with slotted heads finished to match wall plate finish.
- B. Weatherproof Covers for Wet Locations: Gasketed, cast aluminum, with hinged lockable cover and corrosion-resistant screws; listed as suitable for use in wet locations while in use with attachment plugs connected and identified as extra-duty type.
 1. Products:
 - a. Hubbell: WP26MH, horizontal; WP26M, vertical.
 - b. Intermatic: WP1010HMC, horizontal; WP1010MC, vertical.
 - c. Red Dot: CKMG, horizontal; CKMGV, vertical.

2.07 FLOOR BOX SERVICE FITTINGS

- A. Manufacturers:
 1. Hubbell Incorporated: www.hubbell.com/sle.
 2. Thomas & Betts Corporation: www.tnb.com/#sle.
 3. Wiremold, a brand of Legrand North America, Inc: www.legrand.us/#sle.
- B. Description: Service fittings compatible with floor boxes provided under Section 26 0533.16 with components, adapters, and trims required for complete installation.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.
- C. Verify that wall openings are neatly cut and will be completely covered by wall plates.
- D. Verify that final surface finishes are complete, including painting.
- E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.
- F. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.
- B. Coordinate locations of outlet boxes provided under Section 26 0533.16 as required for installation of wiring devices provided under this section.

1. Mounting heights: Refer to section 26 0533.16 - Boxes for Electrical Systems for device mounting heights.
 2. Orient outlet boxes for vertical installation of wiring devices unless otherwise indicated.
 3. Where multiple receptacles, wall switches, or wall dimmers are installed at the same location and at the same mounting height, gang devices together under a common wall plate.
- C. Install wiring devices in accordance with manufacturer's instructions.
 - D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
 - E. Where required, connect wiring devices using pigtails not less than 6 inches long. Do not connect more than one conductor to wiring device terminals.
 - F. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.
 - G. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
 - H. Provide GFCI receptacles with integral GFCI protection at each location indicated. Do not use feed-through wiring to protect downstream devices.
 - I. Install wiring devices plumb and level with mounting yoke held rigidly in place.
 - J. Install wall switches with OFF position down.
 - K. Install wall dimmers to achieve full rating specified and indicated after derating for ganging as instructed by manufacturer.
 - L. Do not share neutral conductor on branch circuits utilizing wall dimmers.
 - M. Install vertically mounted receptacles with grounding pole on bottom and horizontally mounted receptacles with grounding pole on left.
 - N. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.
 - O. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Inspect each wiring device for damage and defects.
- C. Operate each wall switch, wall dimmer, and fan speed controller with circuit energized to verify proper operation.
- D. Test each receptacle to verify operation and proper polarity.
- E. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.
- F. Correct wiring deficiencies and replace damaged or defective wiring devices.

3.05 ADJUSTING

- A. Adjust devices and wall plates to be flush and level.
- B. Adjust presets for wall dimmers according to manufacturer's instructions as directed by Architect.

3.06 CLEANING

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

END OF SECTION

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**SECTION 26 5100
INTERIOR LIGHTING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Interior luminaires.
- B. Emergency lighting units.
- C. Exit signs.
- D. Ballasts and drivers.
- E. Lamps.
- F. LED replacement lamps.
- G. LED retrofit luminaire conversion kits.

1.02 RELATED REQUIREMENTS

- A. Section 09 5100 - Acoustical Ceilings.
- B. Section 26 0500 - Common Work Results for Electrical.

1.03 REFERENCE STANDARDS

- A. 47 CFR 15 - Radio Frequency Devices; current edition.
- B. ANSI C78.377-2015 - American National Standard for Electric Lamps: Specification for the Chromaticity of Solid-State Lighting Products.
- C. ANSI C82.11 - American National Standard for Lamp Ballasts - High Frequency Fluorescent Lamp Ballasts; 2017.
- D. ANSI/IES RP-16-10 - Nomenclature and Definitions for Illuminating Engineering.
- E. Federal Communications Commission (FCC): Code of Federal Regulations (CFR): FCC 47 CFR Part 18, 'Industrial, Scientific, and Medical Equipment'.
- F. IEC 60529 - Degrees of Protection Provided by Enclosures (IP Code); 2013 (Corrigendum 2019).
- G. IEC 60929 - AC and/or DC-Supplied Electronic Control Gear for Tubular Fluorescent Lamps - Performance Requirements; 2011, with Amendment (2015).
- H. IEC 61000-3-2:2005 - Electromagnetic Compatibility (EMC) - Part 3-2: Limits for Harmonic Current Emissions (Equipment Input Current \leq 16 A per phase).
- I. IEC 61347-1 ED. 2.2 B:2012 - Lamp Controlgear - Part 1: General and Safety Requirements.
- J. IEC 61347-2-13 - Controlgear for Electric Light Sources - Safety - Part 2-13: Particular Requirements - Electronic Controlgear for LED Light Sources; 2024.
- K. IEC 61547 ED. 2.0 B:2009 - Equipment for General Lighting Purposes - EMC Immunity Requirements.
- L. IEC 62384:2006 - D.C. or A.C. Supplied Electronic Control Gear for LED Modules - Performance Requirements.
- M. IEC 62386-101 ED.1.0 B:2009 - Digital Addressable Lighting Interface - Part 101: General Requirements - System.
- N. IEEE C62.41.1 - IEEE Standard Guide on the Surge Environment in Low-Voltage (1000 V and Less) AC Power Circuits; 2002 (Reaffirmed 2008).
- O. IEEE C62.41.2 - IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and less) AC Power Circuits; 2002 (Corrigendum 2012).
- P. IES LM-63 - Approved Method: IES Standard File Format for the Electronic Transfer of Photometric Data and Related Information; 2019.

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- Q. IES LM-79 - Approved Method: Optical and Electrical Measurements of Solid-State Lighting Products; 2019.
- R. IES LM-80 - Approved Method: Measuring Maintenance of Light Output Characteristics of Solid-State Light Sources; 2021.
- S. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- T. NECA/IESNA 500 - Standard for Installing Indoor Commercial Lighting Systems; 2006.
- U. NECA/IESNA 502 - Standard for Installing Industrial Lighting Systems; 2006.
- V. NEMA 410 - Performance Testing for Lighting Controls and Switching Devices with Electronic Drivers and Discharge Ballasts; 2020.
- W. NEMA LE 4 - Recessed Luminaires, Ceiling Compatibility; 2012 (Reaffirmed 2018).
- X. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- Y. NFPA 101 - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- Z. UL 1310 - Class 2 Power Units; Current Edition, Including All Revisions.
- AA. UL 924 - Emergency Lighting and Power Equipment; Current Edition, Including All Revisions.
- BB. UL 935 - Fluorescent-Lamp Ballasts; Current Edition, Including All Revisions.
- CC. UL 1598 - Luminaires; Current Edition, Including All Revisions.
- DD. UL 1598C - Light-Emitting Diode (LED) Retrofit Luminaire Conversion Kits; Current Edition, Including All Revisions.
- EE. UL 1993 - Self-Ballasted Lamps and Lamp Adapters; Current Edition, Including All Revisions.
- FF. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the installation of luminaires with mounting surfaces installed under other sections or by others. Coordinate the work with placement of supports, anchors, etc. required for mounting. Coordinate compatibility of luminaires and associated trims with mounting surfaces at installed locations.
 - 2. Coordinate the placement of luminaires with structural members, ductwork, piping, equipment, diffusers, fire suppression system components, and other potential conflicts installed under other sections or by others.
 - 3. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings:
 - 1. Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
- C. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, installed accessories, and ceiling compatibility; include model number nomenclature clearly marked with all proposed features.
 - 1. LED Luminaires:
 - a. Include estimated useful life, calculated based on IES LM-80 test data.
 - 2. Ballasts and Drivers:

- a. Manufacturer's published product data on dimensions, ratings, catalog numbers and identification of products and accessories for products included for project. Include performance data.
- b. Provide fixture type(s) list for each specific ballast/driver.
- c. Provide wiring diagrams as needed for special operation or interaction with other system(s).
- d. Qualification Statements: Provide experience compliance documentation and compliance documentation with UL / ULC requirements.
- 3. Lamps: Include rated life, color temperature, color rendering index (CRI), and initial and mean lumen output.
- 4. Fluorescent Emergency Power Supply Unit: Include a list of compatible lamp configurations and associated lumen output.
- D. Certificates for Dimming Drivers: Manufacturer's documentation of compatibility with dimming controls to be installed.
- E. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- F. Operation and Maintenance Data: Instructions for each product including information on replacement parts.
- G. Final, executed copy of Warranty on drivers.
- H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Regulatory Agency Sustainability Approvals: Meet UL / ULC requirements.
- C. Qualifications. Requirements of Section 01 4000 apply but not limited to following:
 - 1. Manufacturer with five (5) years experience in manufacture of dimmable electronic lighting drivers.
 - 2. Provide experience documentation.
- D. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- E. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with a minimum of three years documented experience.
- F. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND PROTECTION

- A. Receive, handle, and store products according to NECA/IESNA 500 (commercial lighting), NECA/IESNA 502 (industrial lighting), and manufacturer's written instructions.
- B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

1.08 FIELD CONDITIONS

- A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.09 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year manufacturer warranty for LED luminaires, including drivers.

PART 2 PRODUCTS

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2.01 LUMINAIRE TYPES

- A. Furnish products as indicated in luminaire schedule included on the drawings.
- B. Substitutions: See Section 01 6000 - Product Requirements.

2.02 LUMINAIRES

- A. Provide products that comply with the requirements of NFPA 70.
- B. Provide products that are listed and labeled as complying with UL 1598, where applicable.
- C. Provide products listed, classified, and labeled as suitable for the purpose intended.
- D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
- E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.
- F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.
- G. Product Options: When several lighting fixtures are specified by name for one use on Drawings, select any one of those specified. Do not mix fixtures from different manufacturers specified for one use.
- H. Recessed Luminaires:
 - 1. Ceiling Compatibility: Comply with NEMA LE 4.
 - 2. Luminaires Recessed in Insulated Ceilings: Listed and labeled as IC-rated, suitable for direct contact with insulation and combustible materials.
 - 3. Luminaires Recessed in Sloped Ceilings: Provide suitable sloped ceiling adapters.
- I. LED Luminaires:
 - 1. Components: UL 8750 recognized or listed as applicable.
 - 2. Tested in accordance with IES LM-79 and IES LM-80.
 - 3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.
 - 4. Provide fixtures with 0-10 V Dimming drivers.
- J. Luminaires Mounted in Continuous Rows: Provide quantity of units required for length indicated, with all accessories required for joining and aligning.
- K. Fixtures shall be fully assembled complete with necessary wiring, sockets, lamps, reflectors, ballasts, auxiliaries, plaster frames, recessing boxes, hangers, supports, lenses, diffusers, and other accessories essential for complete working installation.

2.03 EMERGENCY LIGHTING UNITS

- A. Description: Emergency lighting units complying with NFPA 101 and all applicable state and local codes and listed and labeled as complying with UL 924.
- B. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination and automatically recharges battery upon restoration of normal power source.
- C. Battery:
 - 1. Sealed maintenance-free lead calcium unless otherwise indicated.
 - 2. Size battery to supply all connected lamps, including emergency remote heads where indicated.
- D. Housing: Painted steel.
- E. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.

- F. Lamps: Designed for wet locations and with full vertical and horizontal adjustment.
- G. Provide low voltage disconnect to prevent battery damage from deep discharge.
- H. Accessories:
 - 1. Provide compatible accessory mounting brackets where indicated or required to complete installation.
 - 2. Provide compatible accessory high impact polycarbonate vandal shields where indicated.
 - 3. Provide compatible accessory wire guards where indicated.
 - 4. Where indicated, provide emergency remote heads that are compatible with the emergency lighting unit they are connected to and suitable for the installed location.
- I. Manufacturers:
 - 1. Refer to light fixture schedule provided by Owner's Representative.
 - 2. Substitutions: See Section 01 6000 - Product Requirements.

2.04 DRIVERS

- A. Manufacturers:
 - 1. General Electric Company/GE Lighting; www.gelighting.com/#sle.
 - 2. Lutron Electronics Company, Inc; www.lutron.com/#sle.
 - 3. OSRAM Sylvania, Inc; www.osram.us/ds/#sle.
 - 4. Philips Lighting North America Corporation; www.usa.lighting.philips.com/#sle.
- B. Drivers - General Requirements:
 - 1. Provide drivers containing no polychlorinated biphenyls (PCBs).
 - 2. Minimum Efficiency/Efficacy: Provide drivers complying with all current applicable federal and state ballast efficiency/efficacy standards.
 - 3. Electronic /Drivers: Inrush currents not exceeding peak currents specified in NEMA 410.
- C. Dimmable LED Drivers:
 - 1. Dimming Range: Continuous dimming from 100 percent to ten percent relative light output unless dimming capability to lower level is indicated, without flicker.
 - 2. Control Compatibility: Fully compatible with the dimming controls to be installed.
 - 3. 4-wire (010V DC Voltage Controlled) Dimming Drivers.
 - 4. Design Criteria:
 - a. Driver must be able to operate for ± 10 percent supply voltage of 120V through 277VAC at 60Hz.
 - b. Driver to be UL / ULC recognized under component program and shall be modular for simple field replacement. Drivers that are not UL / ULC recognized or not suited for field replacement will not be used.
 - c. Driver shall have ability to provide no light output when analog control signal drops below 0.5 V, o. Control deadband between 0.5V and 0.65V shall be included to allow for voltage variation of incoming signal without causing noticeable variation in fixture-to-fixture output.
 - d. Range and Quality: LED dimming to be equal in range and quality to commercial grade incandescent dimmer:
 - 1) Quality of dimming to be defined by dimming range, freedom from perceived flicker or visible stroboscopic flicker, smooth and continuous change in level (no visible steps in transitions), natural square law response to control input, and stable when input voltage conditions fluctuate over what is typically experience in commercial environment.
 - e. Inrush Current: Driver must limit inrush current as follows:
 - 1) Minimum Requirement: Meet or exceed NEMA 410 driver inrush standard of 430 amps per 10 amps load with maximum of 370 amps² per second.
 - 2) Preferred Requirement: Meet or exceed 30mA²s at 277VAC for up to 50 watts of load and 75A at 240 μ s at 277VAC for 100 watts of load.
 - f. Withstand up to 1,000-volt surge without impairment of performance as defined by IEEE C62.41.1 Category A.

- g. Light Output: No visible change in light output with variation of ± 10 percent line voltage input.
 - h. Harmonic Distortion:
 - 1) Total Harmonic Distortion less than 20 percent and meet ANSI C82.11 maximum allowable THD requirements at full output.
 - 2) THD shall at no point in dimming curve allow imbalance current to exceed full output THD.
 - i. Automatic Adaptation:
 - 1) Driver must support automatic adaptation, allowing for future luminaire upgrades and enhancements and deliver improved performance.
 - (a) Adjustment of forward LED voltage, supporting 3V through 55V.
 - (b) Adjustment of LED current from 200mA to 1.05A at the 100 percent control input point in increments of 1 mA.
 - (c) Adjustment for operating hours to maintain constant lumens (within 5 percent) over 50,000-hour design life of system and deliver up to 20 percent energy savings early in life cycle.
 - j. Light Quality:
 - 1) Over entire range of available drive currents, driver shall provide step-free, continuous dimming to black from 100 - 1 percent light output and step to 0 percent where indicated. Driver shall respond similarly when raising from 0 percent to 100 percent.
 - 2) Drivers to track evenly across multiple fixtures at all light levels and shall have input signal to output light level that allows smooth adjustment over entire dimming range.
 - 3) Driver and luminaire electronics shall deliver illumination that is free from objectionable flicker as measured by flicker index (ANSI/IES RP-16-10). At all points within dimming range from 100-0.1 percent luminaire shall have:
 - (a) LED dimming driver shall provide continuous step-free, flicker free dimming similar to incandescent source.
 - (b) Minimum Requirement: Flicker index shall less than 5 percent at all frequencies below 1000 Hz.
 - (c) Preferred specification: Flicker index shall be equal to incandescent, less than 1 percent at all frequencies below 1000 Hz.
 - k. Control Input:
 - 1) 4-Wire (0-10V DC Voltage Controlled) Dimming Drivers:
 - (a) Must meet IEC 60929 ED. 4.0 B Annex E for General White Lighting LED drivers.
 - (b) Connect to devices compatible with 0 to 1 0V Analog Control Protocol, Class 2, capable of sinking 0.6 ma per driver at low end of 0.3V. Limit number of drivers on each 0-1 0V control output based on voltage drop and control capacity.
 - (c) Control relays or contactors and transformers for up to six circuits.
 - (d) Sensor controller with HIGH, LOW, and DEADBAND adjustments.
 - 2) Digital (DALI Low Voltage Controlled) Dimming Drivers:
 - (a) Must meet requirements of IEC 62386-101 ED.1.0 B.
 - 3) Integral Dimmer Driver for replacement lamps:
 - (a) LED Driver shall not cause shadows.
 - (b) LED Driver shall be line voltage controlled and shall be compatible with any universal dimmer.
5. Manufacturers:
- a. eldoLED America, San Jose, CA www.eldoled.com.
 - b. OSRAM Sylvania, Danvers, MA or OSRAM Sylvania LTD, Mississauga, Ontario Canada www.Sylvania.com.

- c. Philips Lighting Co, Somerset, NJ www.lighting.philips.com/nam or Philips Lighting Canada, Scarborough, ON (416) 292-3000.

2.05 EMERGENCY POWER SUPPLY UNITS

- A. Manufacturers:
 - 1. Beghelli, Miramar, FL www.beghelliusa.com.
 - 2. Dual-Lite, Cheshire, CT www.dual-lite.com.
 - 3. Iota Engineering, LLC: www.iotaengineering.com/#sle.
 - 4. Lithonia Lighting: www.lithonia.com/#sle.
 - 5. Signify Emergency Lighting/Bodine: www.bodine.com/#sle.
 - 6. Eaton-Cooper Industries/Sure-Lites; www.cooperlighting.com
 - 7. McPhilben / Day-Brite Lighting, Tupelo, MS www.mcphilben.com.
 - 8. Substitutions: See Section 01 6000 - Product Requirements.
 - 9. Manufacturer Limitations: Where possible, for each type of luminaire provide fluorescent emergency power supply units produced by a single manufacturer.
- B. Description: Self-contained emergency power supply units suitable for use with indicated luminaires, complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.
- C. Compatibility:
 - 1. Drivers: Compatible with electronic, standard magnetic, energy saving, and dimming AC drivers, including those with end of lamp life shutdown circuits.
- D. Operation: Upon interruption of normal power source, solid-state control automatically switches connected lamp(s) to the fluorescent emergency power supply for minimum of 90 minutes of rated emergency illumination and automatically recharges battery upon restoration of normal power source.
- E. Battery: Sealed maintenance-free high-temperature nickel cadmium unless otherwise indicated.
- F. Factory installed in lighting fixture, or field installed to same standards. Components shall be fully concealed and easily accessible for maintenance or replacement.
 - 1. Install in ballast channel of fixture with charging indicator light and test switch mounted on fixture end, or visible and accessible through lens.
- G. Linear Lighting Fixtures:
 - 1. Battery pack shall operate one (1) lamp at approximately 600 lumens initially and 60 percent minimum of initial lumens after ninety (90) minutes.
 - 2. Charger shall be capable of full recharge in twenty-four (24) hours.
- H. Diagnostics: Provide accessible and visible multi-chromatic combination test switch/indicator light to display charge, test, and diagnostic status and to manually activate emergency operation.
- I. Accessories:
 - 1. Provide compatible accessory remote combination test switch/indicator light where indicated.
- J. Battery Packs in Freezers/Coolers:
 - 1. Operating range shall be minus 20 deg C to 55 degrees C.
 - 2. Shall operate one lamp of Fluorescent lighting fixture at approximately 1000 lumens initially at 25 deg C and 60 percent minimum of initial lumens after ninety (90) minutes.
 - 3. Charger shall be capable of full recharge in twenty-four (24) hours.
 - 4. Manufacturers:
 - a. Bodine Co Inc: B50 Cold-Pak.
 - b. Iota Engineering Co: ICE-80.
 - c. Substitutions: See Section 01 6000 - Product Requirements

2.06 LAMPS

- A. Manufacturers:

1. Osram Sylvania: www.sylvania.com/sle.
 2. Philips Lighting North America Corporation: www.usa.lighting.philips.com/#sle.
- B. Lamps - General Requirements:
1. Unless explicitly excluded, provide new, compatible, operable lamps in each luminaire.
 2. Verify compatibility of specified lamps with luminaires to be installed. Where lamps are not specified, provide lamps per luminaire manufacturer's recommendations.
 3. Minimum Efficiency: Provide lamps complying with all current applicable federal and state lamp efficiency standards.
 4. Color Temperature Consistency: Unless otherwise indicated, for each type of lamp furnish products which are consistent in perceived color temperature. Replace lamps that are determined by the Architect to be inconsistent in perceived color temperature.
- C. Other Lamps:
1. Manufacturers:
 - a. General Electric.
 - b. North American Philips.
 - c. Osram/Sylvania.
- D. LED Lamps and Fixtures:
1. Replacement Lamps shall have minimum efficiency of 90 lm / W per LM 79.
 2. Integral LED Lamps shall have minimum efficiency of 100 lm / W per LM 79.
 3. Provide minimum rated life of 50,000 per LM 80 and LM 70 standards.
 4. Color Temperature: 4000 K.
 5. Fluorescent 4' T8 and T12 lamps shall be retrofitted with type A or C LED retrofit tubes.

2.07 LED REPLACEMENT LAMPS

- A. Description: Light-emitting diode (LED) self-ballasted lamps listed as complying with UL 1993; intended for replacement of existing lamps of other light source types, including but not limited to, incandescent, fluorescent, and high intensity discharge (HID); suitable for installation in luminaire to be retrofitted.
- B. LED Estimated Useful Life:
1. Calculated based on IES LM-80 test data.
 2. Fluorescent Lamp Replacements: Minimum of 50,000 hours at 70 percent lumen maintenance.
 3. High Intensity Discharge (HID) Lamp Replacements: Minimum of 50,000 hours at 70 percent lumen maintenance.
 4. Incandescent Lamp Replacements: Minimum of 15,000 hours at 70 percent lumen maintenance.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.
- C. Verify that suitable support frames are installed where required.
- D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Proceed with installation only when following ambient conditions can be maintained:
1. Install when the temperature is between minus 4 deg F (minus 20 deg C) minimum and 122 deg. F (50 deg. C) maximum and relative humidity is ninety (90) percent, non-condensing.

2. Protect from dust and excess moisture during installation.
- B. Coordinate locations of outlet boxes provided under Section 26 0533.16 as required for installation of luminaires provided under this section.
- C. Install products in accordance with manufacturer's instructions.
- D. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 500 (commercial lighting).
- E. Provide required support and attachment in accordance with Section 26 0529.
- F. Interface with Other Work:
 1. Coordinate with Sections under 09 5000 heading to obtain symmetrical arrangement of fixtures in acoustic tile ceiling as shown on Reflected Ceiling Plan in Contract.
 2. Coordinate with Sections under 09 9000 heading to ensure that light coves are properly painted before installation of light fixtures.
 3. In mechanical equipment rooms, coordinate locations of light fixtures with equipment locations to provide proper room illumination without obstruction. Suspend fixtures that must be mounted below pipes, ducts, etc, with chains or other Architect approved method.
- G. Securely mount fixtures. Support fixtures weighing 50 lbs (23 kg) or more from building framing or structural members.
- H. Where recessed fixtures are to be installed, provide openings, plaster rings, etc, of exact dimensions for such fixtures to be properly installed. Coordinate fixture installation with ceiling type and thickness. Terminate circuits for recessed fixtures in an extension outlet box near fixture and connect with specified flexible conduit.
- I. Verify operation of track lighting system in Cultural Center, then remove and store track lighting fixtures as directed.
- J. Dimmable LED Drivers:
 1. Installation of driver to meet Manufacturer's prescribed methods and instructions.
 2. Meet Ambient Conditions requirements for installation.
 3. Driver may be remote mounted up to 300 ft (90 m) depending on power level and wire gauge.
 4. 0-10V input shall be protected from line voltage wire, and immune and output unresponsive to induced AC voltage on control leads.
- K. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- L. Suspended Ceiling Mounted Luminaires:
 1. Do not use ceiling tiles to bear weight of luminaires.
 2. Do not use ceiling support system to bear weight of luminaires unless ceiling support system is certified as suitable to do so.
 3. Secure surface-mounted and recessed luminaires to ceiling support channels or framing members or to building structure.
 4. Secure pendant-mounted luminaires to building structure.
 5. Secure lay-in luminaires to ceiling support channels using listed safety clips at four corners.
 6. In addition to ceiling support wires, provide two galvanized steel safety wire(s), minimum 12 gauge, connected from opposing corners of each recessed luminaire to building structure.
 7. See appropriate Division 9 section where suspended grid ceiling is specified for additional requirements.
- M. Recessed Luminaires:
 1. Install trims tight to mounting surface with no visible light leakage.
 2. Non-IC Rated Luminaires: Maintain required separation from insulation and combustible materials according to listing.

- N. Suspended Luminaires:
 - 1. Unless otherwise indicated, specified mounting heights are to bottom of luminaire.
 - 2. Install using the suspension method indicated, with support lengths and accessories as required for specified mounting height.
 - 3. Unless otherwise indicated, support pendants from swivel hangers.
- O. Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to center of luminaire.
- P. Install accessories furnished with each luminaire.
- Q. Bond products and metal accessories to branch circuit equipment grounding conductor.
- R. Emergency Lighting Units:
 - 1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.
 - 2. Install lock-on device on branch circuit breaker serving units.
 - 3. Wire so unit can be tested with lights on.
 - 4. Wire so lamps are normally off and operate upon loss of normal building power.
- S. Emergency Power Supply Units:
 - 1. For field-installed units, install inside luminaire unless otherwise indicated. Where installation inside luminaire is not possible, install on top of luminaire.
 - 2. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal ballast(s) in luminaire. Bypass local switches, contactors, or other lighting controls.
 - 3. Install lock-on device on branch circuit breaker serving units.
 - 4. Wire so unit can be tested with lights on.
 - 5. Wire so lamps in normal mode are switched off with other lighting in area. Connect unit to unswitched conductor of normal lighting circuit.
- T. Install lamps in each luminaire.
- U. T8 LED Replacement Lamps
 - 1. Furnish and install new tombstones.
 - 2. Refurbish the wiring in the fixture to match the wiring specified by the lamp manufacturer.
 - 3. Self-driven lamps shall be furnished and wired to be fed from both ends of the lamp.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Inspect each product for damage and defects. Repair scratches or nicks on exposed surfaces of fixtures to match original undamaged conditions.
- C. Operate each luminaire after installation and connection to verify proper operation.
- D. Test self-powered exit signs and emergency lighting units to verify proper operation upon loss of normal power supply.
- E. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect.

3.04 ADJUSTING

- A. Aim and position adjustable emergency lighting unit lamps to maximize lighting of first 50 feet (15 meters) of egress path.
- B. Exit Signs with Field-Selectable Directional Arrows: Set as indicated or as required to properly designate egress path as directed by Architect or authority having jurisdiction.

3.05 CLEANING

- A. Clean surfaces according to NECA 500 (commercial lighting) and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

3.06 CLOSEOUT ACTIVITIES

- A. See Section 01 7800 - Closeout Submittals, for closeout submittals.
- B. See Section 01 7900 - Demonstration and Training, for additional requirements.
- C. Demonstration: Demonstrate proper operation of luminaires to Architect, and correct deficiencies or make adjustments as directed.
- D. Just prior to Substantial Completion, replace all lamps that have failed.

3.07 PROTECTION

- A. Protect installed luminaires from subsequent construction operations.

END OF SECTION 26 5100

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**SECTION 27 1501
COMMUNICATIONS HORIZONTAL CABLING**

PART 1 GENERAL

1.01 SUMMARY

- A. Includes But Not Limited To:
 - 1. Furnish, install, and test communications horizontal cabling as described in Contract Documents including following:
 - a. Cables and related terminations.
 - b. Patch cords and modular connectors.
 - c. Surface raceway and outlet poles.
 - d. Support and grounding hardware.
 - e. UTP Cable.
 - f. UTP Patch cords.
 - g. UTP Connector Modules.
 - h. Installation and testing of Owner Furnished Network Equipment.
- B. Related Requirements:
 - 1. Division 26: Raceways and surface boxes.
 - 2. Section 07 8400: 'Firestopping' for furnishing and installation of firestopping.
- C. Products Installed But Not Furnished Under This Section:
 - 1. Owner Furnished Network Equipment as specified on TT (Technology Telecommunication) and TA (Technology Audiovisual) Drawings as shown in Contract Documents including:
 - a. Internet Firewall.
 - b. ISP Modem.
 - c. Network Switch.
 - d. Wireless Access Port.
- D. Related Requirements:
 - 1. Section 01 6400: Owner will provide Network Equipment as specified on TT (Technology Telecommunication) and TA (Technology Audiovisual) Drawings as shown in Contract Documents. Contract Documents establishes quality of materials and installation for information of Contractor, Architect, and Owner's Representatives. Design Criteria in PART 2 of this Section identifies Contractor's responsibility for Owner Network Equipment.

1.02 REFERENCES

- A. Association Publications:
 - 1. Building Industry Consulting Service International (BISCI):
 - a. Information Technology Systems Installation Methods Manual (ITSIMM) (8th Edition).
 - b. Telecommunications Distribution Methods Manual (TDMM) (14th Edition).
 - 2. Institute of Electrical and Electronics Engineers:
 - a. IEEE 802.3, 'Standard for Ethernet'.
 - b. IEEE 1100-2005, 'Recommended Practice for Powering and Grounding Electric Equipment'.
 - 3. Telecommunications Industry Association:
 - a. TIA TSB-162, 'Telecommunication Cabling Guidelines for Wireless Access Points' (Revision A, 2013).
- B. Reference Standards:
 - 1. National Fire Protection Association:
 - a. NFPA 70, 'National Electrical Code (NEC)' (2020 or most recent edition adopted by AHJ).
 - 2. Canadian Standards Association:

- a. CSA C22.1-18, 'Canadian Electrical Code, part I (21st Edition), safety standard for electrical installations.
- 3. Telecommunications Industry Association:
 - a. TIA-568.1 'Commercial Building Telecommunications Infrastructure Standard' (Revision D, 2019)
 - b. TIA-568.2, 'Balanced Twisted-Pair Telecommunications Cabling and Components Standards' (Revision D, 2018).
 - c. TIA-568.4 'Broadband Coaxial Cabling and Components Standard (Revision D, 2017)
 - d. TIA-606, 'Administration Standard for Telecommunications Infrastructure' (Revision C, 2017).
 - e. TIA-607, 'Telecommunications Bonding and Grounding (Earthling) for Customer Premises' (Revision D, 2019).
 - f. TIA-758, 'Customer-Owned Outside Plant Telecommunication Infrastructure Standard' (Revision B, 2012).
 - g. TIA-1152, 'Requirements for Field Test Instruments and Measurements for Balanced Twisted-Pair Cabling' (Revision A 2016).
- 4. Underwriters Laboratories:
 - a. UL 94: Standard for Test for Flammability of Plastic Materials for Parts in Devices and Appliances (March 2013 6th Edition).
 - 1) 94HB, 'Horizontal Burn Test'.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate with Project Manager and/or Facility Manager well in advance of Substantial Completion for installation of all Owner Furnished Network Equipment.

1.04 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data:
 - a. Provide Manufacturer's documentation, installation instructions, and descriptive information on each piece of equipment to be used.
 - 2. Shop Drawings:
 - a. Provide sample of labeling system reflecting approved label scheme for cable installation for racks, cables, panels, and outlets.
- B. Informational Submittals:
 - 1. Certificates:
 - a. Provide Installer certificates of qualifications required.
 - 2. Design Data:
 - a. Identification and labeling:
 - 1) Provide labeling system for cable installation to be approved by Owner.
 - (a) Clearly identify all components of system: racks, cables, panels and outlets.
 - (b) Designate cables origin and destination and unique identifier for cable within facility by room number and port count.
 - (c) Racks and patch panels shall be labeled to identify location within cable system infrastructure.
 - b. After system installation, provide documentation set to Consulting Engineer/Architect for approval.
 - 3. Tests And Evaluation Reports:
 - a. Submit documentation within ten (10) working days of completion of each testing phase. This is inclusive of all test results and record drawings.
 - b. Draft drawings may include annotations done by hand. Final copies of all drawings shall be submitted within thirty (30) working days of completion of each testing phase.
 - c. At request of Consulting Engineer, provide copies of original test results.
 - 4. Field Quality Control Submittals:

- a. Architect will provide floor plans in paper and electronic formats on which record documentation information can be recorded.
- 5. Qualification Statements:
 - a. Letter from Manufacturer certifying level of training and experience of Installer.
- C. Closeout Submittals:
 - 1. Include following information in Operations And Maintenance Manual specified in Section 01 7800:
 - a. Operations and Maintenance Data:
 - 1) Provide operating and maintenance instructions for each item of equipment submitted under Product Data.
 - b. Warranty Documentation:
 - 1) Final, executed copy of Warranty.
 - c. Record Documentation:
 - 1) Manufacturers documentation:
 - (a) Manufacturer's literature or cut sheet.
 - 2) Tests and evaluation reports.
 - 3) As-built Documentation:
 - (a) Provide record document to include cable routes and outlet locations.
 - (b) Sequential number shall identify outlet locations.
 - (c) Numbering, icons, and drawing conventions used shall be consistent throughout all documentation.
 - (d) Provide labeling system information.

1.05 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
 - 1. System shall meet approval of authority having jurisdiction (AHJ). NEC and State and/or local ordinances and regulations shall govern unless more stringent requirements are specified.
 - 2. Meet all TIA/EIA commercial building wiring standards.
 - 3. Meet Telecommunications Distribution Methods Manual (TDMM) (14th Edition) requirements for installation and testing.
 - 4. All Networks shall be installed per applicable standards and manufacturer's guidelines.
 - 5. Cable assemblies shall be UL / CE Listed and CSA Certified. Cables shall be a distinctive green or green/yellow in color, and all jackets shall be UL, VW-1 flame rated.
 - 6. Grounding shall conform to all required Commercial Building Grounding and Bonding Requirements for Telecommunications, Electrical Codes, and Manufacturer's grounding requirements.
- B. Qualifications: Requirements of Section 01 4301 applies, but is not limited to following:
 - 1. Manufacturer Qualifications:
 - a. Provide single source for all products of system:
 - 1) KeyConnect by Belden.
 - 2) Netkey by Panduit.
 - 3) System 6 by Siemon.
 - 4) Uniprise Media 6 by CommScope.
 - 2. Installers Qualifications:
 - a. Approved and Certified by Manufacturer (installation and maintenance trained):
 - 1) Belden Certified System Vendor (CSV).
 - (a) Belden Certified LDS Partner.
 - 2) CommScope Certified Business Partner.
 - (a) CommScope Certified LDS Partner.
 - 3) Panduit Certified Installer (PCI).
 - 4) Siemon Certified Installers (CI).
 - b. Three (3) year experience with similar projects. Provide documentation.

1.06 WARRANTY

- A. Special Warranty:
 - 1. Cabling System:
 - a. Provide warranty for permanent link cabling system to meet Category 6 standard requirements for structured cabling system for twenty (20) years.
 - 2. Installer Warranty:
 - a. Installer guarantees that all work is in accordance with all express and implied requirements of Contract Documents, that all work is of good quality, and further warrants work and material for period of (1) year from date of substantial completion of project, unless longer period of time is specified in Contract. All work not conforming to these requirements, may be considered defective:
 - 1) If, within one (1) year after substantial completion of work, or within such longer period of time as may be prescribed by law or by terms of any warranty in Contract, any of work is found to be defective or not in accordance with Contract, Installer shall at Installer cost correct it promptly after receipt of written notice from Owner.
 - 2) Installer's obligation shall survive termination of Contract.
 - 3) Owner shall give such notice within reasonable time after discovery of condition.
 - b. Installer warrants to Owner that all materials and equipment furnished under this Contract shall be new unless otherwise specified, free from faults and defects and in conformance with Contract Documents:
 - 1) Contractor shall secure manufacturer's warranties and deliver copies thereof to Owner upon completion of work.
 - 2) All such warranties shall commence from date of substantial completion and will not in any way reduce Installer's responsibilities under this Contract.
 - 3) Whenever guarantees or warranties are required by specifications for longer period than one year, such longer period shall govern.
 - c. Installer will provide twenty (20) year minimum end to end manufacturer warranty.

PART 2 PRODUCTS

2.01 OWNER-FURNISHED PRODUCTS

- A. Products. See Section 01 6200:
 - 1. Owner Furnished Network Equipment as specified on TT (Technology Telecommunication) and TA (Technology Audiovisual) Drawings as shown in Contract Documents including:
 - a. Internet Firewall.
 - b. ISP Modem.
 - c. Network Switch(es).
 - d. Wireless Access Points.
 - 2. Coordination:
 - a. Coordinate installation of all Owner Furnished Network Equipment including but limited to:
 - 1) Installation and configure devices in accordance with Owner requirements.
 - 2) Proper set-up of network equipment.
 - 3) Owner Furnished internet service to building prior to final installation of AV and Voice Data Equipment.
 - 4) Testing of network equipment.

2.02 SYSTEMS

- A. Manufacturers:
 - 1. Approved Manufacturers and Products. See Section 01 6200:
 - a. Belden, St. Louis, MO www.belden.com.
 - b. Panduit Corporation, Tinley Park IL www.panduit.com.
 - c. Systimax Solutions, a CommScope Company, Hickory, NC www.systimax.com.

- d. The Siemon Company, Watertown, CT www.siemon.com.
- B. Design Criteria:
1. Must install single manufacture as complete permanent link.
 - a. Category 6 minimum compliance margin on all parameters beyond category 6 and Power Sum ACR out to 250 MHz.
 2. Entire Category 6 system to be provided by single approved Manufacturer throughout.
 3. Install structured cabling system that will be able to support interconnections to active telecommunications equipment for voice and data applications in multi-vendor, multi product environment. Structured cabling system should adhere to TIA-568, TIA-606; TIA-607, and TIA-942 standards with respect to pathways, distribution, administration, and grounding of the system.
 4. Each room drop will consist of two drops each consisting of two terminations can be interoperable to accommodate either voice or data applications. Provide convenience phone drops that will consist of single termination that will be installed in proper faceplate for each location's phone.
 5. Install, terminate, test, and guarantee each drop according to customer all applicable standards and customer preferences.
 6. Horizontal cables will be rated Category 6 (250 MHz) in performance and rated to comply with TIA-568 to connector outlets at Work Area. Horizontal cables will home run back to Technology Room (Entrance Facility / Main Cross Connect) and will terminate on individual Category 6 rated jacks to populate modular 48 port angled patch panel on open or flat patch panel inside enclosures. All cables will be patched at cutover as interconnection into floor serving active equipment using RJ45 modular equipment cables rated to Category 6.
 7. Match additions to horizontal raceway to complete system according to TIA-568 where suspension and protection gaps exist.
- C. Components – Work Area Subsystem:
1. Provide connectivity equipment used to connect horizontal cabling subsystem and equipment in work area. Both copper and fiber media shall be supported. Connectivity equipment shall include following options:
 - a. Patch (equipment) cords and modular connectors.
 - b. Outlets and surface mount boxes.
 - c. Surface raceway and outlet poles.
 - d. Consolidation point / MUIO.
 2. Patch Cords and Modular Connectors:
 - a. Match horizontal cabling medium and rating. Same Manufacturer shall provide modular connectors and patch cords. Total patch cord length at work area is not to exceed 10 feet (3.0 m).
 - b. Copper Connectivity:
 - 1) Network Cabling System:
 - (a) Provide for Work Area subsystem, including all modular connectors.
 - (b) Modular connectors shall support of high-speed networks and applications designed for implementation on copper cabling.
 - (c) Outlets shall utilize fully interchangeable and individual connector modules that mount side-by-side to facilitate quick and easy moves, adds and changes.
 - 2) Modular Connections:
 - (a) Data Modules shall be Category 6:
 - (b) Eight position modules required in all work areas and shall exceed connector requirements of TIA Category 6 standard.
 - (c) Prove termination cap with strain relief on cable jacket, ensure cable twists are maintained to within 1/8 inch (3 mm) and include wiring scheme label. Wiring scheme label shall be available with TIA-568 wiring schemes.
 - (d) Terminations shall use for TIA-568 wiring scheme.

- (e) Modules shall terminate 4 pair 23 100-ohm solid unshielded twisted pair cable.
 - (f) Modules shall meet ISO 11801 standard including complying with intermateability standard IEC 60603-7 for backward compatibility.
 - (g) Category 6 modules shall have UL and CSA approval.
 - (h) Modules shall have ETL verified Category 6 performance and ISO 11801 Class E performance in both basic and channel links.
 - (i) Modules shall be universal in design, accepting 2, 3, or 4 pair modular plugs without damage to outer jack contacts.
 - (j) Modules shall be able to be re-terminated minimum of 10 times and be available in 11 standard colors for color-coding purposes.
 - (k) Jack shall snap into all outlets and patch panels.
 - (l) Module shall include black base to signify Category 6 400 MHz performance.
- 3) Patch Cords:
- (a) Category 6 patch cords shall be factory terminated with modular plugs featuring one-piece, tangle-free latch design and strain-relief boots to support easy moves, adds, and changes.
 - (b) Constructed with Category 6 23-AWG stranded UTP cable.
 - (c) Each patch cord shall be one hundred (100) percent performance tested at factory in channel test to TIA Category 6 standard.
 - (d) Patch cords shall come in standard lengths of 3, 5, 7, 9, 14 and 20 feet (0.90, 1.50, 2.15, 2.75, 4.20 and 6.1 meters) and 6 standard colors of Blue or White.
 - (e) Provide one (1) each 8 feet (2.45 m) patch cord for 50 percent of terminated workstation ports.
3. Outlets and Surface Mount Boxes:
- a. Outlets and surface mount boxes shall support network system by providing high-density in-wall, surface mount cabling applications.
 - b. Provide faceplates for flush mount:
 - 1) Outlets faceplates shall be manufactured from high-impact thermoplastic material with UL 94 flammability rating of 94 HB or better.
4. Copper Cable:
- a. Design Criteria:
 - 1) Performance exceeds all TIA-568 Category 6 and ISO 11801 for Class E cable requirements.
 - 2) ETL tested and verified for Category 6 component performance.
 - 3) Conductors are twisted in pairs with four pairs contained in flame retardant PVC jacket separated by a spline.
 - 4) Performance tested to 650 MHz.
 - 5) Plenum (CMP) and non-plenum/riser (CMR) flame rated.
 - 6) Maximum installation tension of 25 lbs (110 N).
 - 7) Installation temperature range: 32 deg F (0 deg C) to 140 deg F (60 deg C).
 - 8) Operating temperature range: 14 deg F (minus 10 deg C) to 140 deg F (60 deg C).
 - 9) Cable diameter: Riser – 0.26 inch (6.604 mm) 0.260"; Plenum – 0.25 inch (6.35 mm).
 - 10) Easy payout, reel-in-a-box and descending length markings on cable speed installation.
 - 11) Supports following applications: Ethernet 10BASE-T, 100BASE-T (Fast Ethernet) and 1000BASE-T (Gigabit Ethernet); 1.2Gb/s ATM; Token Ring 4/16; digital video; and broadband/baseband analog video.
 - 12) Color shall be blue.

D. Horizontal Distribution Cabling:

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1. General:
 - a. Horizontal distribution cabling system is portion of telecommunications cabling system that extends from work area telecommunications outlet/connector to horizontal cross-connect in Technology Room (Entrance Facility / Main Cross Connect).
 - 1) Horizontal cabling in office should terminate in Technology Room (Entrance Facility / Main Cross Connect) located on same floor as Work Area being served.
 - 2) Horizontal cabling is installed in star topology (home run).
 - 3) Bridged taps and splices are not permitted as part of copper horizontal cabling.
- E. Components – Technology Room (Entrance Facility / Main Cross Connect):
 1. General:
 - a. Connect networking equipment to horizontal and backbone cabling subsystems:
 - 1) Termination hardware (connectors and patch cords), racks, cable management products and cable routing products.
 - 2) Cable termination hardware.
 - b. Terminate each horizontal or backbone cabling run using appropriate connectors or connecting blocks depending upon cable type:
 - 1) Matching patch cords will be used to perform cross-connect activities or to connect into the networking/voice hardware:
 - (a) Category 6 Enhanced Unshielded Twisted Pair (UTP).
 - c. Four-pair Category 6 UTP cabling shall be terminated onto four-pair Category 6 module:
 - 1) All modules shall be terminated using 568-B wiring scheme.
 - 2) Eight position module shall exceed connector requirements of TIA Category 6 standard.
 - 3) Jack termination to 4-pair, 100-ohm solid unshielded twisted pair cable shall be by use of forward motion termination cap and shall not require use of punchdown or insertion tool.
 2. Rack, Cabinet, and Cabling Management Enclosure:
 - a. Cable Management:
 - 1) Cable Management System shall be used to provide neat and efficient means for routing and protecting fiber and copper cables and patch cords on telecommunication racks and enclosures.
 - 2) Provide complete cable management system comprised of vertical and horizontal cable managers to manage cables on both front and rear of rack.
 - 3) System shall protect network investment by maintaining system performance, controlling cable bend radius and providing cable strain relief.
 - b. Vertical Cable Management:
 - 1) General:
 - (a) Vertical cable managers include components that aid in routing, managing and organizing cable to and from equipment.
 - (b) Panels shall protect network equipment by controlling cable bend radius and providing cable strain relief.
 - 2) Provide panels with universal design mounting to 19 inches (480 mm) rack and constructed of steel bases with PVC duct attached.
 - 3) Covers shall be able to hinge from either side yet still be easily removed to allow for quick moves, adds, and changes.
 - c. Horizontal Cable Management:
 - 1) General:
 - (a) Horizontal cable managers include components that aid in routing managing and organizing cable to and from equipment.
 - (b) Panels shall protect network equipment by controlling cable bend radius and providing cable strain relief.

- 2) Provide panels with universal design mounting to 19 inches (480 mm) rack and constructed of steel bases with PVC duct attached.
 - 3) Duct fingers shall include retaining tabs to retain cables in place during cover removal.
 - 4) Covers shall be able to hinge from either side yet still be easily removed to allow for quick moves, adds, and changes.
3. Patch Cords:
- a. Provide patch cords between modular patch panels configured as cross-connect or between patch panel and networking hardware when patch is used as interconnect. Provide one (1) each 3 feet (0.90 m) patch cord for each terminated patch panel port.
 - b. Provide patch cords as indicated on Drawings and Specifications as shown in Contract Documents. Ensure all devices are fully connected to network equipment.
 - c. Provide additional patch cords with appropriate length to connect all Owner provided internet enabled appliances (IEA) as specified on TT (Technology Telecommunication) and TA (Technology Audiovisual) Drawings as shown in Contract Documents.
 - d. Patch cords shall be factory terminated with modular plugs featuring one-piece, tangle-free latch design and black strain-relief boots to support easy moves, adds and changes.
 - e. Construct patch cords with Category 6 24-AWG stranded UTP cable.
 - f. Patch cords shall be one hundred (100) percent performance tested at factory in channel test to Category 6 standard.
4. Patch Panels:
- a. Four-pair Category 6 UTP cabling shall be terminated onto four-pair-punch-down style connecting hardware mounted to rear of integral patch panels and routed to Category 6 modules on front face of patch panel.
 - b. Patch panels shall be universal for TIA-568 wiring configurations.
 - c. Patch panels shall have removable 6-port design that allows 6-port module to be removed without disrupting other ports.
 - d. Integral cable tie mounts shall be included in panel for cable management on back of panel.
 - e. Port and panels shall be easy to identify with write-on areas and optional label holder for color-coded labels.
 - f. Rack mountable patch panels shall mount to standard 19 inches (480 mm) rack.
5. Grounding and Bonding:
- a. Provide Telecommunications Bonding Backbone:
 - 1) Ground all telecommunications cable shields, equipment, racks, cabinets, raceways, and other associated hardware that has potential to act as current carrying conductor.
 - 2) Install telecommunication Bonding Backbone independent of building's electrical and building ground.
 - 3) Designed in accordance with recommendations contained in TIA-607 Telecommunications Bonding and Grounding Standard.
 - b. All wires used for telecommunications grounding purposes shall be identified with green insulation:
 - 1) Non-insulated wires shall be identified at each termination point with wrap of green tape.
 - 2) All cables and bus bars shall be identified and labeled as required.
6. Firestopping: Furnish and install firestopping as per Section 07 8400.

PART 3 EXECUTION

3.01 INSTALLATION

A. General:

Helena Distribution Store – Project # 89018312501	27 1501 - 8	COMMUNICATIONS HORIZONTAL CABLING
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1. Install communications system in accordance with Manufacturer's written instructions and complying with applicable portions of NEC 'Standard of Installation'.
- B. Work Area Outlets:
1. Cables shall be coiled in in-wall or surface-mount boxes if adequate space is present to house cable coil without exceeding Manufacturers bend radius.
 - a. No more than 12 inches (300 mm) of UTP slack shall be stored in in-wall box, modular furniture raceway, or insulated walls.
 - b. Excess slack shall be loosely configured and stored in ceiling above each drop location when there is not enough space present in outlet box to store slack cable.
 2. Cables shall be dressed and terminated in accordance with TIA-568, Manufacturer's recommendations, and best industry practices.
 3. Cables shall be bundled using Velcro straps at least 0.25 inch (6.35 mm) wide. Use of plastic wire ties or zip ties is not allowed on project.
 4. Pair untwist at termination shall not exceed 0.125 inch (3.175 mm).
 5. Bend radius of cable in termination area shall not be less than 4 times outside diameter of cable.
 6. Cable jacket shall be maintained to within one inch (25 mm) of termination point.
 7. Data / voice jacks, unless otherwise noted in Contract Documents, shall be located on each faceplate.
 8. Horizontal Cabling:
 - a. Data jacks in horizontally oriented faceplates shall occupy rightmost position(s).
 - b. Voice jacks shall occupy the top position(s) on the faceplate. Voice jacks in horizontally oriented faceplates shall occupy the left-most position(s).
- C. Horizontal Cross Connect:
1. Cables shall be dressed and terminated in accordance with TIA-568, Manufacturer's recommendations, and best industry practices.
 2. Pair untwist at termination shall not exceed 0.125 inch (3.175 mm).
 - a. Bend radius of cable in termination area shall not be less than 4 times outside diameter of cable.
 3. Cables shall be neatly bundled and dressed to their respective panels or blocks.
 - a. Each panel or block shall be fed by individual bundle separated and dressed back to point of cable entrance into rack or frame.
 - b. Cables shall be bundled using Velcro straps at least 0.25 inch (6.35 mm) wide. Use of plastic wire ties or zip ties is not allowed on project.
 4. Cable jacket shall be maintained as close as possible to termination point.
 5. Each cable shall be clearly labeled on cable jacket behind patch panel at location that can be viewed without removing bundle support ties.
 - a. Cables labeled within bundle, where label is obscured from view shall not be acceptable.
 6. Horizontal Cabling:
 - a. A pull cord (nylon; 1/8-inch (3 mm) minimum) shall be co-installed with all cable installed in any conduit.
 - b. Cable raceways shall not be filled greater than required by TIA-569 maximum fill for particular raceway type.
 - c. Cables shall be installed in continuous lengths from origin to destination (no splices) except for transition points, or consolidation points.
 - d. Where transition points or consolidation points are allowed, they shall be located in accessible locations and housed in enclosure intended and suitable for purpose.
 - e. Cable's minimum bend radius and maximum pulling tension shall not be exceeded.
 - f. If J-hook or trapeze system is used to support cable bundles, all horizontal cables shall be supported at 48 inch (1 200 mm) to 60 inches (1 500 mm) maximum intervals. At no point shall cable(s) rest on acoustic ceiling grids or panels.

- g. Horizontal distribution cables shall be bundled in groups of no more than 25 cables. Cable bundle quantities in excess of 25 cables may cause deformation of bottom cables within bundle and degrade cable performance.
 - h. Cables shall be bundled using Velcro straps at least 0.25 inch (6.35 mm) wide. Use of plastic wire ties or zip ties is not allowed on project.
 - i. Cable shall be installed above fire-sprinkler systems and shall not be attached to system or any ancillary equipment or hardware. Cable system and support hardware shall be installed so that it does not obscure any valves, fire alarm conduit, boxes, or other control devices.
 - j. Cables shall not be attached to ceiling grid or lighting fixture wires. Where support for horizontal cable is required, install appropriate carriers to support cabling.
 - k. Cables shall be identified by self-adhesive label and meet requirements of TIA-606. Cable label shall be applied to cable behind faceplate on section of cable that can be accessed by removing cover plate.
 - l. Unshielded twisted pair cable shall be installed so that there are no bends smaller than four times the cable outside diameter at any point in run and at termination field.
 - m. Pulling tension on 4-pair UTP cables shall not exceed 25 lbf (111 N) for a four-pair UTP cable.
- D. Vertical Outlet Pole And Surface Raceway:
- 1. Horizontal Cabling:
 - a. General:
 - 1) Vertical outlet poles and Surface Raceway refers to surface raceway system used for branch circuit wiring and/or data network, voice, video and other low-voltage cabling. Surface raceway shall be used in solid wall applications or for applications where moves, additions and changes are very typical to workflow.
 - b. Raceway system shall consist of raceway, appropriate fittings and accessories to complete installation per electrical Contract Documents. Non-metallic surface raceway is to be utilized in dry interior locations only as covered in Article 352, part B of the NEC, as adopted by the NFPA and as approved by the ANSI.
- E. Copper Termination Hardware:
- 1. Cables shall be dressed and terminated in accordance with TIA-568, Manufacturer's recommendations, and best industry practices.
 - 2. Pair untwist at termination shall not exceed 0.125 inch (3.175 mm).
 - a. Bend radius of cable in termination area shall not be less than 4 times outside diameter of cable.
 - 3. Cables shall be neatly bundled and dressed to their respective panels or blocks.
 - a. Each panel or block shall be fed by individual bundle separated and dressed back to point of cable entrance into rack or frame.
 - b. Cables shall be bundled using Velcro straps at least 0.25 inch (6.35 mm) wide. Use of plastic wire ties or zip ties is not allowed on project.
 - 4. Cable jacket shall be maintained as close as possible to termination point.
 - 5. Each cable shall be clearly labeled on cable jacket behind patch panel at location that can be viewed without removing bundle Velcro support straps.
 - a. Cables labeled within bundle, where label is obscured from view shall not be acceptable.
- F. Grounding System:
- 1. Where required, Telecommunications Bonding Backbone shall be designed and/or approved by qualified Installer.
 - 2. Follow requirements of TIA-607.
- G. Seismic Bracing:
- 1. Comply with IBC and local seismic requirements for all equipment and conduit pathways.
- H. Identification and Labeling:
- 1. Apply machine generated approved labeling for racks, cables, panels and outlets:

- a. Designate cables origin and destination and unique identifier for cable by room name and/or number and port count.
- b. Racks and patch panels shall be labeled to identify location within cable system infrastructure.
- 2. Place labeling within view at termination point on each end.
- 3. Outlet, patch panel and wiring block labels shall be installed on, or in, space provided on device.
- 4. See Contract Drawings for labeling scheme.
- 5. Conform to IP addressing assignments as listed in Attachment 'FACILITIES ZONE IP ADDRESS ASSIGNMENT TABLE'.
 - a. See Attachment 'FACILITIES ZONE IP ADDRESS ASSIGNMENT TABLE' for 'IP Address Assignments'.

3.02 FIELD QUALITY CONTROL

- A. Field Tests:
 - 1. Provide testing upon completion of installation.
 - a. General:
 - 1) Testing to be in accordance with TIA standards and Manufacturer's system warranty guidelines and best industry practice.
 - (a) If any of these are in conflict, discrepancies shall be brought to attention of Architect/Consulting Engineer for clarification and resolution.
 - b. Cables and termination hardware:
 - 1) Test complete system for defects in installation.
 - 2) Verify cabling system performance under installed conditions according to requirements of TIA-568:
 - (a) All pairs of each installed cable shall be verified prior to system acceptance.
 - (b) Any defect in cabling system installation including but not limited to cable, connectors, feed through couplers, patch panels, and connector blocks shall be repaired or replaced in order to ensure one hundred (100) percent useable conductors in all cables installed.
 - c. Copper channel testing:
 - 1) All twisted-pair copper cable links shall be tested for compliance to requirements of TIA-568 for appropriate Category of cabling installed.
 - 2) Backbone multimode fiber cabling shall be tested at both 850 nm and 1300 nm.
 - d. UTP Cables and Links testing:
 - 1) UTP cabling channel must be tested at swept frequencies up to 250 MHz for internal channel performance parameters as defined in IEEE 802.3 and TIA-568. Certifications shall include following parameters for each pair of each cable installed:
 - (a) Wire map (pin to pin connectivity).
 - (b) Length (in feet or millimeters).
 - (c) Near End Crosstalk (NEXT).
 - (d) Far End Crosstalk (FEXT).
 - (e) ELFEXT.
 - (f) Attenuation/Crosstalk Ration (ACR).
 - (g) Return Loss.
 - (h) Propagation Delay.
 - (i) Delay Skew.
 - (j) Test equipment shall provide electronic and printed record of these tests.
 - 2) Test each pair of cable for opens, shorts, grounds, and pair reversal.
 - (a) Correct short or grounded and reversed pairs.
 - (b) Examine open and shorted pairs to determine if problem is caused by improper termination.

- (c) If termination is proper, tag bad pairs at both ends and note on termination sheets.
 - (d) If horizontal cable contains bad conductors, remove and replace cable.
- e. Testing Equipment:
 - 1) Comply with requirements of TIA-568.
 - (a) Appropriate level III tester shall be used to verify Category 6 cabling systems.
 - 2) UTP Cables and Links test equipment:
 - (a) Category Four Approved Testing Equipment. See Section 01 6200 for definitions of Categories:
 - (b) Fluke Networks DTX-1800 with firmware version 2.04 or later.
 - (c) Test lead to be P/N DTX-PLA001 or PLA002 universal permanent link interface adapter.
 - (d) Agilent Wireshope Pro N2640A with firmware version 2.1.9 or later.
 - (e) Test lead to be P/N N2644A-101 universal CAT6A link smart probes.
 - (f) Equipment shall be calibrated in accordance with manufacture requirements, TIA standards and warranty requirements.
- f. Re-Testing:
 - 1) Consulting Engineer may request ten (10) percent random field re-test to be conducted on cable system, at no additional cost to Owner, to verify documented findings.
 - (a) Tests shall be repeat of those defined above.
 - (b) If findings contradict documentation submitted, additional testing can be requested to extent determined necessary by Consulting Engineer, including one hundred (100) percent re-test at no additional cost to Owner.
- g. Tests And Evaluation Reports:
 - 1) Printouts generated for each cable by wire test instrument shall be submitted as part of documentation package. Installer may furnish this information in electronic form.
 - (a) Media shall contain electronic equivalent of test results as defined by the Section along with software necessary to view and evaluate test reports.
 - 2) Submit documentation within ten (10) working days of completion of each testing phase. This is inclusive of all test results and record drawings.
 - 3) Draft drawings may include annotations done by hand. Final copies of all drawings shall be submitted within thirty (30) working days of completion of each testing phase.
 - 4) If requested by Consulting Engineer, provide copies of original test results.
- h. Test Documentation:
 - 1) Provide electronic format documentation within three (3) weeks after completion of project.
 - 2) Documentation shall be clearly marked on outside front cover with following:
 - (a) "Project Test Documentation".
 - (b) Project name.
 - (c) Date of completion (month and year).
 - 3) Test results shall include following:
 - (a) Record of test frequencies.
 - (b) Cable type.
 - (c) Conductor pair and cable (or outlet) I.D.
 - (d) Measurement direction.
 - (e) Reference setup.
 - (f) Crew member name(s).
 - (g) Test equipment name, manufacturer, model number, serial number, software version.
 - (h) Last calibration date:

- (i) Unless Manufacturer specifies more frequent calibration cycle, annual calibration cycle is required on all test equipment used on project.
 - (j) Document shall detail test method used and specific settings of equipment during test as well as software version being used in field test equipment.
- B. Non-Conforming Work: Non-conforming work as covered in General Conditions applies, but is not limited to following:
 - 1. Any cable damaged or exceeding recommended installation parameters during installation shall be replaced at no additional cost to Owner.
 - 2. Any defect in cabling system installation including but not limited to cable, connectors, feed through couplers, patch panels, and connector blocks shall be repaired or replaced in order to ensure one hundred (100) percent useable conductors in all cables installed at no additional cost to Owner.
 - 3. Correct deviation and repeat applicable testing at no additional cost to Owner.
 - 4. Correct any work found defective or not complying with Association Publications and TDMM requirements at no additional cost to Owner.
 - a. Document all problems found and corrective action taken.
 - b. Include both failed and passed test data.

END OF SECTION

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