new project for:
St. Charles County Ambulance District - SCCAD Headquarters
2000 slat river road
st. peters, missouri, 63376

procurement & contracting requirements
specifications
architectural structural

Spec. Book 1 of 2
Dec. 2, 2019
INVITATION TO BID
ST. CHARLES COUNTY AMBULANCE DISTRICT
SCCAD Headquarters

Notice is hereby given that the St. Charles County Ambulance District is accepting sealed bids for the construction of a new SCCAD Headquarters. Bids shall be clearly marked “Bid for SCCAD General Contractor” and shall be submitted on or before 2:00 P.M. CDT, Thursday January 9th, 2020.

Bids shall be submitted to:
St. Charles County Ambulance District
c/o Craig Meckfessel
4169 Old Mill Parkway, St. Peters MO 63376

Bids will be opened and read publicly at 2:30 PM the same day, at:
Community Council of St. Charles
427 Spencer Rd, Suite 255, St Peters, MO 63376
Upper level of the St. Charles County Library; park and enter from the back side / upper level of the building.

The overall scope of the project is the site development of approximately 31 acres and construction of a new 142,000 SF building. There will be one General Construction bid package for the entire project.

Prospective general contractors and subcontractors are highly encouraged to attend the pre-bid meeting that will be held on Wednesday December 11th, 2019 at 3:00 PM.
Prebid will be held at:
Community Council of St. Charles
427 Spencer Rd, Suite 255, St Peters, MO 63376
Upper level of the St. Charles County Library; park and enter from the back side / upper level of the building.

Bid documents and specifications may be obtained beginning December 2nd, 2019 and thereafter by contacting:
- Nicole Luedloff, Archimages, Inc., at nluedloff@archimages-stl.com or 314-965-7445.

Questions regarding this project should be directed to the following persons:
- Joe Carey, Archimages, Inc., at jcarey@archimages-stl.com or 314-965-7445.

Clarifications requested by bidders must be received by Archimages, Inc. in writing not less than 5 days prior to the receipt of bids. The reply will be in the form of an addendum, a copy of which will be forwarded to known bidders.

Each Bid Proposal must be accompanied by Bid Security in the form of cash, certified check of the Bidder or a Bid Bond, duly executed by the Bidder as principal and having
as surety thereon, a company authorized to execute such in the State of Missouri, in the amount of 5% of the bid. Bid Security will be returned to the Successful Bidder after the Contract, Performance and Labor and Material Payment Bonds are executed and filed with the Owner, and to each unsuccessful Bidder after the award is made. An attorney-in-fact who signs a Bid Bond must file with the Bond a certified and effectively dated copy of his power of attorney. The Bid Security shall be made in the favor of the Owner, St. Charles County Ambulance District, and shall become the Owner’s property in the event that the Successful Bidder fails, within ten (10) days after receipt of the Contract for the amount of the Bid Proposal, to both execute said Agreement and deliver the Performance and Labor and Material Payment Bonds.

Not less than the prevailing hourly rates of wages, as set forth by the State of Missouri Department of Labor, or determined by court on appeal, shall be paid to all workmen performing work under this Contract, and the Contractor will indemnify and hold the District harmless therefore.

The project will be tax exempt.

Contract terms will include Liquidated Damages.

In accordance with the Domestic Product Procurement Act (hereinafter referred to as the Buy American Act) RSMO 34.350-34.359, the bidder is advised that any goods purchased or leased by any public agency where the purchase, lease or contract involves the expenditure to $25,000 or more, shall be manufactured or produced in the United States.

In order to achieve successful construction project delivery, including the need to ensure a reliable supply of well trained, skilled craft workers and the need to ensure that the highest-quality of workmanship will be performed on the Project in the safest manner possible and in a timely manner, the St. Charles County Ambulance District requires the following:

a) All contractors and subcontractors performing work must participate in an apprenticeship and training program registered with the US Department of Labor Employment and Training Administration (ETA) Office of Apprenticeship (OA), formerly known as the Bureau of Apprenticeship and Training (BAT) or applicable state apprenticeship agency (hereinafter referred to as “Approved Program”) covering the type of work to be performed pursuant to the applicable contract. An Approved Program shall be one that has graduated at least one apprentice per year for three of the five calendar years (January 1st to December 31st) immediately preceding the date of the bid.

b) All General Contractors bidding on the Project must certify in their bid(s) that one hundred percent (100%) of the workers of all contractors and subcontractors performing work on the Project who are classified as apprentices are currently enrolled in an Approved Program for the type of work they will be performing.

c) All subcontractors shall certify prior to beginning their scope of work that one hundred percent (100%) of their workers performing work on the Project who are classified as apprentices are enrolled in an Approved Program for the type of work they will be performing.
Failure to comply with the above requirements will result in the bid being rejected. These terms do not apply to contractors or subcontractors that solely perform supplying and/or hauling work.

The St. Charles County Ambulance District reserves the right to reject any and all bids, or to advertise for new bids if deemed necessary. By submitting a bid, a bidder agrees that their bid will not be withdrawn for a period of sixty (60) days except as provided herein, subsequent to the specified time for receipt of bids and further agrees to the terms and conditions of this invitation and the Specifications regarding the bidding process. No low bidder shall have a business expectancy merely because their bid is the lowest one received; until the contract is awarded, no business expectancy exists. Bids may be withdrawn solely for demonstrated and verifiable clerical or typographical mistake, but not mistake of judgement.
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SEALS PAGE

DISCLAIMER OF RESPONSIBILITY

I HEREBY STATE THAT ALL DOCUMENTS INTENDED TO BE AUTHENTICATED BY MY SEAL ARE LIMITED TO SPECIFICATION SECTIONS:

015713 Temporary Erosion and Sediment Control
310000 Earthwork
311000 Site Clearing
312316 Excavation
312316.13 Trenching
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321123 Aggregate Base Courses
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C1.0 TITLE SHEET
C2.0 SPECIFICATION SHEET
C3.0 OVERALL PLAN SHEET
C4.0 EXISTING CONDITIONS & FACILITIES REMOVAL PLAN
C5.0-C5.1 SITE AND GRADING PLAN
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C10.1 BEST MANAGEMENT PRACTICES PROFILES & DETAILS
C11.0 DRAINAGE AREA PLAN
C12.0 STORMWATER POLLUTION PREVENTION PLAN
C12.1 STORMWATER POLLUTION PREVENTION PLAN DETAILS
AND HEREBY DISCLAIM ANY RESPONSIBILITY FOR ALL OTHER SPECIFICATIONS, ESTIMATES, REPORTS OR OTHER DOCUMENTS OR INSTRUMENTS RELATED TO OR INTENDED TO BE USED FOR ANY PART OR PARTS OF THE ARCHITECTURAL OR ENGINEERING PROJECT.

SEAL:

NAME: BRANDON A. HARP
REGISTRATION NUMBER: MISSOURI E-28650
DISCIPLINE: CIVIL ENGINEER
TITLE: PRINCIPAL / PROFESSIONAL ENGINEER
COMPANY NAME: CIVIL ENGINEERING DESIGN CONSULTANTS, INC.

END OF SECTION
DISCLAIMER OF RESPONSIBILITY

I HEREBY STATE THAT ALL DOCUMENTS INTENDED TO BE AUTHENTICATED BY MY SEAL ARE LIMITED TO SPECIFICATION SECTIONS:

DIVISION 00 - PROCUREMENT AND CONTRACTING DOCUMENTS
DIVISION 01 - GENERAL REQUIREMENTS
SECTION 02 41 00 – DEMOLITION
THROUGH
SECTION 14 24 00 - HYDRAULIC ELEVATORS

AND DRAWINGS:
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A001 - SHEET INDEX
A002 - LIFE SAFETY PLAN
A011 - TYP. NOTES SYMB. & RULES
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A110 - OVERALL BUILDING PLAN - LEVEL 1
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SEAL:

NAME: GREGORY GARNER
REGISTRATION NUMBER: MISSOURI-LICENSE #005443
EXPIRES: 12-31-2020
DISCIPLINE: ARCHITECT
TITLE: PRINCIPAL / ARCHITECT
COMPANY NAME: ARCHIMAGES, INC.

END OF SECTION
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SEALS PAGE

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LIMITED TO SPECIFICATION SECTIONS:

SECTION 03 20 00 – CONCRETE REINFORCING
SECTION 03 30 00 – CAST-IN-PLACE REINFORCING
SECTION 03 47 13 – TILT-UP CONCRETE
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AND HEREBY DISCLAIM ANY RESPONSIBILITY FOR ALL OTHER SPECIFICATIONS, ESTIMATES, REPORTS OR OTHER DOCUMENTS OR INSTRUMENTS RELATED TO OR INTENDED TO BE USED FOR ANY PART OR PARTS OF THE ARCHITECTURAL OR ENGINEERING PROJECT.

NAME: JASON N. RICHARDS
REGISTRATION NUMBER: MISSOURI LICENSE PE 2000162164
EXPIRES: 12-31-2020
DISCIPLINE: PROFESSIONAL ENGINEER
TITLE: PRINCIPAL
COMPANY NAME: KPFF CONSULTING ENGINEERS

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26 27 26 - Wiring Devices
26 28 26 - Enclosed Switches and Circuit Breakers
26 32 13 - Engine Generators
26 33 53 - Static Uninterruptible Power Supply
26 36 00 - Transfer Switches
26 41 13 - Lightning Protection
26 43 13 - Transient-Voltage Suppression for Low-Voltage Electrical Power Circuits
26 51 00 - Interior Lighting
26 56 00 - Exterior Lighting
26 90 00 - Electrical Commissioning

DIVISION 27 -- COMMUNICATIONS
27 05 28 - Pathways for Communications Systems
27 15 00 - Communications Horizontal Cabling
27 15 33 - Communications Coaxial Horizontal Cabling
27 51 00 - Audio Visual Systems

DIVISION 28 -- ELECTRONIC SAFETY AND SECURITY
28 05 13 - Conductors and Cables for Electronic Safety and Security
28 13 00 - Access Control
28 23 00 - Video Surveillance
28 31 11 – Digital Addressable Voice Fire Alarm System

DIVISION 31 -- EARTHWORK
31 00 00 - Earthwork
31 10 00 - Site Clearing
31 23 16 - Excavation
31 23 16.13 - Trenching
31 23 23 - Fill

DIVISION 32 -- EXTERIOR IMPROVEMENTS
32 11 23 - Aggregate Base Courses
32 12 16 - Asphalt Paving
32 13 13 - Concrete Paving
32 17 23.13 - Painted Pavement Markings
32 31 13 - Chain Link Fences and Gates
32 84 00 - Underground Irrigation System
32 93 00 - Landscape Work

DIVISION 33 -- UTILITIES
33 11 16 - Site Water Utility Distribution Piping
33 13 00 - Disinfecting of Water Utility Distribution
33 31 00 - Site Sanitary Utility Sewerage Piping
33 41 00 - Site Storm Utility Drainage Piping
33 46 00 - Subdrainage

END OF SECTION
SECTION 00 21 13
INSTRUCTIONS TO BIDDERS

SUMMARY

1.01 SEE AIA A701, INSTRUCTIONS TO BIDDERS BOUND IN THE PROJECT MANUAL.

1.02 DOCUMENT INCLUDES

A. Invitation
   1. See "Invitation to Bid" section

B. Bid Documents and Contract Documents
   1. Definitions
   2. Contract Documents Identification
   3. Availability
   4. Examination
   5. Inquiries/Addenda
   6. Product/Assembly/System Substitutions

C. Site Assessment
   1. Site Examination
   2. Prebid Conference

D. Qualifications
   1. Qualifications
   2. Prequalification
   3. Subcontractors/Suppliers/Others

E. Bid Submission
   1. Submission Procedure
   2. Bid Ineligibility

F. Bid Enclosures/Requirements
   1. Security Deposit
   2. Performance Assurance
   3. Bid Form Requirements
   4. Fees for Changes in the Work
   5. Bid Form Signature
   6. Additional Bid Information
   7. Selection and Award of Alternates

G. Offer Acceptance/Rejection
   1. Duration of Offer
   2. Acceptance of Offer

1.03 RELATED DOCUMENTS

A. Document 00 41 00 - Bid Proposal Form.
B. Document 00 73 00 - Supplementary Conditions:

INVITATION

2.01 BID SUBMISSION

A. See "Invitation to Bid" section.

BID DOCUMENTS AND CONTRACT DOCUMENTS

3.01 DEFINITIONS

A. Bid Documents: Contract Documents supplemented with Invitation To Bid, Instructions to Bidders, Bid Proposal Form, Supplemental Bid Information, General Contractor Scope of Work, and Appendices identified.

B. Contract Documents: Defined in AIA A201 Article 1 including issued Addenda.
C. Bid, Offer, or Bidding: Act of submitting an offer under seal.
D. Bid Amount: Monetary sum identified by the Bidder in the Bid Form.

3.02 CONTRACT DOCUMENTS IDENTIFICATION
A. Contract Documents are identified as Project Number 18007, as prepared by Architect who is located at 143 West Clinton Place, St. Louis, Missouri 63122, and with contents as identified in the Table of Contents.

3.03 AVAILABILITY
A. Bid documents may be purchased from:
   1. Indox Services
      8505 Valcourt Avenue
      St. Louis, Missouri 63123
      (314) 633-4800
   B. Digital copies of the contract documents can also be downloaded for free from the Architects FTP site, by contacting our office administrator Nicole Luedloff nluedloff@archimages-stl.com (314) 965-7445.
   C. Bid Documents are made available only for the purpose of obtaining offerings for this project. Their use does not grant a license for other purposes.

3.04 EXAMINATION
A. Bid Documents may be viewed at the office of Architect which is located at 143 West Clinton Place, St. Louis, Missouri 63122.
B. Upon receipt of Bid Documents verify that documents are complete. Notify Architect should the documents be incomplete.
C. Immediately notify Architect upon finding discrepancies or omissions in the Bid Documents.

3.05 INQUIRIES/ADDITIONA
A. Direct questions to Joe Carey, email: jcarey@archimages-stl.com or Ph. (314) 965-7477.
   Questions asked via phone or voicemail will not be answered. Answers will be provided via Addendum.
B. Addenda may be issued during the bidding period. All Addenda become part of Contract Documents. Include resultant costs in the Bid Amount.
C. Verbal answers are not binding on any party.
D. Clarifications requested by bidders must be in writing not less than 5 days before date set for receipt of bids. The reply will be in the form of an Addendum, a copy of which will be forwarded to known recipients.

3.06 PRODUCT/ASSEMBLY/SYSTEM SUBSTITUTIONS
A. Where the Bid Documents stipulate a particular product, substitutions will be considered up to 10 days before receipt of bids.
B. When a request to substitute a product is made, Architect may approve the substitution and will issue an Addendum to known bidders.
C. The submission shall provide sufficient information to determine acceptability of such products.
D. Provide complete information on required revisions to other work to accommodate each proposed substitution.
E. Provide products as specified unless substitutions are submitted in this manner and accepted.
F. See Section 01 60 00 - Product Requirements for additional requirements.

SITE ASSESSMENT
4.01 SITE EXAMINATION
A. Examine the project site before submitting a bid.
4.02 PREBID CONFERENCE
A. See "Invitation to Bid" section for date of Prebid Conference.
B. All general contract bidders and suppliers are invited.
C. Representatives of Architect will be in attendance.
D. Summarized minutes of this meeting will be circulated to attendees. These minutes will not form part of Contract Documents.
E. Information relevant to the Bid Documents will be recorded in an Addendum, issued to Bid Document recipients.

QUALIFICATIONS
5.01 EVIDENCE OF QUALIFICATIONS
A. To demonstrate qualification for performing the Work of this Contract, bidders may be requested to submit written evidence of financial position, license to perform work in the State.

5.02 SUBCONTRACTORS/SUPPLIERS/OTHERS
A. Owner reserves the right to reject a proposed subcontractor for reasonable cause.
B. Refer to General Conditions.

BID SUBMISSION
6.01 SUBMISSION PROCEDURE
A. Bidders shall be solely responsible for the delivery of their bids in the manner and time prescribed.
B. Refer to "Invitation to Bid" section for additional instructions for submission.
C. Improperly completed information, irregularities in bid bond, may be cause not to open the Bid Form envelope and declare the bid invalid or informal.
D. An abstract summary of submitted bids will be made available to all bidders following bid opening.

6.02 BID INELIGIBILITY
A. Bids that are unsigned, improperly signed or sealed, conditional, illegible, obscure, contain arithmetical errors, erasures, alterations, or irregularities of any kind, may at the discretion of the Owner, be declared unacceptable.
B. Bid Forms, Appendices, and enclosures that are improperly prepared may, at the discretion of Owner, be declared unacceptable.
C. Failure to provide security deposit, bonding or insurance requirements may, at the discretion of Owner, be waived.

BID ENCLOSURES/REQUIREMENTS
7.01 SECURITY DEPOSIT
A. Bids shall be accompanied by a security deposit as follows:
   1. Bid Bond of a sum no less than 5 percent of the Bid Amount on AIA A310 Bid Bond Form.
   B. Endorse the Bid Bond in the name of the Owner as obligee, signed and sealed by the principal (Contractor) and surety.
   C. The security deposit will be returned after delivery to the Owner of the required Performance and Payment Bond(s) by the accepted bidder.
   D. Include the cost of bid security in the Bid Amount.
   E. After a bid has been accepted, all securities will be returned to the respective bidders.
   F. If no contract is awarded, all security deposits will be returned.
7.02 PERFORMANCE ASSURANCE
A. Accepted Bidder: Provide a Performance bond as described in 00 73 00 - Supplementary Conditions.
B. Provide the cost of Payment and Performance Bond on Bid Proposal Form.

7.03 BID FORM REQUIREMENTS
A. Complete all requested information in the Bid Form and Appendices.
B. Refer to A201 for tax exempt status.

7.04 FEES FOR CHANGES IN THE WORK
A. Refer to "Change Order Calculations" section.

7.05 BID FORM SIGNATURE
A. The Bid Form shall be signed by the bidder, as follows:
   1. Corporation: Signature of a duly authorized signing officer(s) in their normal signatures. Insert the officer's capacity in which the signing officer acts, under each signature. Affix the corporate seal. If the bid is signed by officials other than the president and secretary of the company, or the president/secretary/treasurer of the company, a copy of the by-law resolution of their board of directors authorizing them to do so, must also be submitted with the Bid Form in the bid envelope.
   2. Partnership: Signature of all partners in the presence of a witness who will also sign. Insert the word "Partner" under each signature. Affix seal to each signature.
   3. Sole Proprietorship: Signature of sole proprietor in the presence of a witness who will also sign. Insert the words "Sole Proprietor" under the signature. Affix seal.
   4. Joint Venture: Each party of the joint venture shall execute the Bid Form under their respective seals in a manner appropriate to such party as described above, similar to the requirements of a Partnership.

7.06 ADDITIONAL BID INFORMATION
A. Submit the following Supplements 24 hours after bid submission:
   1. See "Supplemental Bid Information Form"
B. If bidding as a Partnership or Joint Venture, attach to the Bid Form a copy of the Partnership or Joint Venture agreement. Indicate on the Bid Form signature lines which party will be designated as the official Lead.
C. Joint ventures must provide information about the nature of the joint venture including the approximate percentage participation by each joint venture partner and the division of responsibility among the joint venture partners. Joint ventures must identify the company that employs each individual listed. If the respondent firm is a partnership, respondent must provide the requested information for each general and limited partner. If the respondent firm is a corporation or limited liability company, respondent must provide the requested information for each officer, director and/or member.
D. If bidding as a Partnership or Joint Venture, submit bid bond which covers the joint venture’s or partnership’s bonding, or submit separate bid bonds for each individual joint venture or partnership partner.

7.07 SELECTION AND AWARD OF ALTERNATES
A. Indicate variation of bid price for Alternates listed on the Bid Form. Unless otherwise indicated, indicate Alternates as a difference in bid price by adding to or deducting from the base bid price.

OFFER ACCEPTANCE/REJECTION
8.01 DURATION OF OFFER
A. Bids shall remain open to acceptance and shall be irrevocable for a period of sixty (60) days after the bid closing date.
8.02 ACCEPTANCE OF OFFER

A. Owner reserves the right to accept or reject any or all offers.

B. After acceptance by Owner, Architect on behalf of Owner, will issue to the successful bidder, a written letter of Contract Award.

END OF SECTION
SECTION 00 31 00
AVAILABLE PROJECT INFORMATION

PART 1 GENERAL

1.01 EXISTING CONDITIONS

A. Certain information relating to existing surface and subsurface conditions and structures is available to bidders but will not be part of Contract Documents, as follows:

   1. Copy is attached at the end of this spec. section.
   2. This report identifies properties of below grade conditions and offers recommendations for the design of foundations, prepared primarily for the use of Architect.
   3. The recommendations described shall not be construed as a requirement of this Contract, unless specifically referenced in Contract Documents.
   4. This report, by its nature, cannot reveal all conditions that exist on the site. Should subsurface conditions be found to vary substantially from this report, changes in the design and construction of foundations will be made, with resulting credits or expenditures to the Contract Sum accruing to Owner.

C. Prevailing Wage Determination and Report Forms:
   1. The Prevailing Wage Determination issued by the State of Missouri, County of St. Charles, effective at the time of the performance of the work will be made part of the Contract Documents. Annual Wage Order Number 26 (in effect as of March 8, 2019) is attached for reference only.
   2. It is the responsibility of all General Contract bidders and all subcontractors to comply with the minimum wage rates as set forth in the Prevailing Wage Determination, including any subsequent Prevailing Wage Determinations that are issued when the current Prevailing Wage that are issued when the current Prevailing Wage Determination expires. Refer to A101 for further information.
   3. The Contractor and each of his subcontractors shall keep an accurate record showing the names and occupation of all laborers, workers, and mechanics employed by them, in connection with the Construction of the PROJECT, and showing also the actual hourly wages paid to each person. This record shall be open at all reasonable hours to inspection by the OWNER, its officers and agents, and to the Director of Labor and his deputies and agents. These records of Employees and Wages Paid are required by the Prevailing Wage Determination. The Architect will require that an affidavit be submitted stating compliance with the Prevailing Wage with each application for payment. In addition, weekly Certified Payroll submittal is required. Payment will not be made unless all certified payrolls are provided for the time covered in the pay application.
   4. All Contractor’s bonds will include such provisions as will guarantee the faithful performance of the prevailing hourly wage clause as provided by Contract.
   5. Additional information and forms can be found on the Missouri Department of Labor website, http://www.labor.mo.gov/DLS/.

END OF SECTION
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Exploration of Subsurface Conditions
and
Foundation Recommendations

SAINT CHARLES COUNTY AMBULANCE DISTRICT
SALT RIVER ROAD
SAINT PETERS, MISSOURI

April 2019

Saint Charles County Ambulance District
Owner

Navigate Building Solutions
Project Manager

Archimages, Inc.
Architect

KPFF Consulting Engineers
Structural Engineer

Civil Engineering Design Consultants
Civil Engineer/Surveyor

JGE No. 19001.1

JACOBI GEOTECHNICAL ENGINEERING, INC.
798 Hoff Road, O’Fallon, Missouri 63366
636-978-7112
110 West Main Street, Suite B, Belleville, Illinois 62220
618-538-6666
April 29, 2019

Mr. Craig Meckfessel  
Saint Charles County Ambulance  
4169 Old Mill Pkwy  
Saint Peters MO 63376-6551

RE: Geotechnical Report  
Saint Charles County Ambulance District  
Salt River Road  
Saint Peters, Missouri  
JGE No. 19001.1

Dear Mr. Meckfessel:


We appreciate the opportunity to be of service to you on this project. If you have any questions or comments concerning this report, please call.

Sincerely,

Jacobi Geotechnical Engineering, Inc.

Christine E. Dayton, E.I.  
Staff Engineer

Jared V. Holland, P.E.  
Senior Engineer

CED/JVH/cm

Distribution: Craig Meckfessel, Saint Charles County Ambulance District, via email: cmeckfessel@sccad.com  
Collette Hermann Koscielski, Navigate Building Solutions, via email: collette@navigatebuildingsolutions.com
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Exploration of Subsurface Conditions and Foundation Recommendations

SAINT CHARLES COUNTY AMBULANCE DISTRICT
SALT RIVER ROAD
SAINT PETERS, MISSOURI

1.0 INTRODUCTION

At the request of Mr. Craig Meckfessel with the Saint Charles County Ambulance District, Jacobi Geotechnical Engineering, Inc. (JGE) conducted a subsurface exploration for a new headquarters in Saint Peters, Missouri. The purpose of our exploration was to characterize and observe the subsurface conditions, provide recommendations for foundations, and to address other geotechnical aspects. Our services were provided in general accordance with our proposal dated January 15, 2019, which was authorized by Mr. Craig Meckfessel on January 23, 2019.

2.0 PROJECT AND SITE DESCRIPTION

A new Saint Charles County Ambulance District facility is planned for a 31.2-acre parcel generally located south of Salt River Road about 900 feet east of Mid Rivers Mall Drive in Saint Peters, Missouri. The Location Plan, Figure 1, shows the site relative to the surrounding roads and topography.

The facility will include an approximately 115,000 square foot building consisting of a two-story office and conference area as well as a single-story vehicle maintenance space. The building is proposed within the western portion of the parcel with parking provided to the north and west of the building. The building is anticipated to be supported on shallow foundations with a slab-on-grade and a finished floor elevation (El.) at El. 436.5 feet. Water quality basins are planned within the parking areas and along the western and southern borders of the site.

About 1.5 to 3 feet of fill is anticipated within the building footprint with about 1 to 3 feet of cut or fill in parking areas and up to about 5 feet of cut within basins. The eastern side of the project is anticipated to be used as a borrow area for the improvement area. The proposed site improvements are shown on the Site Plan, Figure 2.

The provided structural loads indicate wall loads will be less than 10 kips per linear foot and column loads less than 175 kips. JGE assumes an interior floor load less than 200 pounds per square foot (psf).

The site currently consists of undeveloped agricultural fields. Surface topography is relatively flat, ranging from El. 431 feet to El. 437 feet. Within the proposed building footprint and paving areas, surface topography varies from El. 433 feet to El. 434 feet.

3.0 FIELD EXPLORATION

The field exploration consisted of drilling 20 borings, designated as B-1 through B-20, at the approximate locations shown on the Site Plan. A representative of Civil Engineering Design Consultants (CEDC) staked the boring locations in the field and provided elevations. The stake for B-12 was not observed at the time of drilling; therefore, the location and elevation were estimated from the Site Plan.
Continuous flight augers powered by a CME-550X drill rig were used to advance the borings to predetermined depths of 10 feet in the parking areas and eastern side of the property and 15 to 20 feet within the building footprint. Standard penetration tests (SPTs) were performed at 2.5- and 5-foot intervals throughout the boring depth. The SPT provides a correlation to soil strength and a disturbed sample for laboratory testing. Thin-walled Shelby tube samples were obtained in lieu of SPTs at select locations. The boreholes were backfilled with auger cuttings at the conclusion of drilling.

### 4.0 LABORATORY TESTING

In our laboratory, the samples were characterized using manual-visual methods. Moisture contents were determined for each sample. Two Atterberg limits tests were performed on select samples. Dry densities and unconfined compressive strength tests were performed on the Shelby tube samples.

The nature and thickness of the soils encountered, and the results of the field sampling and laboratory testing are shown on the Boring Logs in the Appendix. Our Boring Log Legend and Nomenclature sheet, included at the front of the Appendix, can be used to interpret the logs.

### 5.0 SUBSURFACE CONDITIONS

Presented herein is the general description of the soils encountered. Detailed information regarding the soil types and interpretive soil stratigraphy is presented in the Boring Logs.

Approximately 6 to 12 inches of topsoil was observed at the ground surface across the site.

The natural soil profile is generally comprised of medium stiff, medium plastic, silty clay (CL) and high plastic clay (CH) to a depth of about 15 feet. Soft soils were observed between 15 and 20 feet below the ground surface in 9 of the 20 borings. Moisture contents of the soils were typically between 23 and 30 percent but were as high as 52 percent in some areas.

Groundwater was encountered at the time of drilling at depths between 7 and 18.5 feet below the ground surface and as shallow as 1.5 feet 3 days after completion of drilling. Groundwater levels may not stabilize in a drilled boring even after several days. Groundwater is subject to seasonal and climatic variations and may be present at different depths at a future date.

A summary of the observed groundwater depths, boring depth, and staked boring elevation is presented in Table 1.
Table 1. Boring Data Summary

<table>
<thead>
<tr>
<th>Boring</th>
<th>Elevation (feet)</th>
<th>Boring Termination Depth (feet)</th>
<th>Observed Groundwater Depth At Time of Drilling (feet)</th>
<th>Observed Groundwater Depth At End of Drilling (feet)</th>
<th>Observed Groundwater Depth After Drilling 03.04.2019 (feet)</th>
</tr>
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<tr>
<td>B-1</td>
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<td>15</td>
<td>8</td>
<td>8</td>
<td>1.5</td>
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<td>B-2</td>
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<td>7</td>
<td>7.5</td>
<td>1.7</td>
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<td>B-3</td>
<td>434.0</td>
<td>15</td>
<td>13</td>
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<tr>
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<td>13</td>
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</table>

Note 1: Borehole filled prior to additional groundwater reading.

5.1 Data Review

A review of the Missouri Department of Natural Resources (MDNR) GeoSTRAT data did not indicate the presence of documented mines, wells, sinkholes, or other geologic structures (faults, folds, and other tectonic structures) within the site. The project area is noted as being within an area with earthquake liquefaction potential.

6.0 GEOTECHNICAL CONCERNS AND RECOMMENDATIONS

Geotechnical concerns were encountered during our exploration. These issues are not unusual or insurmountable but will add to the construction cost of the project. Geotechnical concerns encountered include:

- Expansive soil
- Groundwater
- Onsite borrow area moisture content
- Soft soils
- Disturbed soil due to agricultural activity

6.1 Expansive Soil Remediation

Potentially expansive soil (medium plastic, silty clay and high plastic clay) was encountered in each of the borings at depths which will impact the proposed development. High plastic clay soils have the potential for volume change with changes in the soil moisture content.
The volume change can lead to slab-on-grade movement and cracking, and in severe cases, movement and cracking of foundations and walls.

To reduce heave or settlement related problems associated with expansive soils, we recommend high plastic clay be removed and replaced 3 feet below the floor slab subgrade and 2 feet below the foundation subgrades. The overexcavation should extend 2 feet beyond the edges of foundations and floor slabs if non-expansive soil is used as the replacement material. The base of the excavations must not be allowed to desiccate during the remediation and construction process.

The overexcavation should be backfilled with properly compacted, non-expansive fill materials such as low plastic soil, lime stabilized clay, or 1-inch minus gradation crushed limestone. Figure 3 illustrates the potentially expansive soil remediation options.

Soil additives, such as Code-L or quicklime, may be used to stabilize clay for use as structural fill below the proposed building. A rotary tiller should be used to thoroughly mix the additive and soil. Lime stabilization should only be performed when the air temperature is 40 degrees (Fahrenheit) or greater. Additive quantities may include about 5 to 7 percent Code-L or about 3 percent quicklime relative to the soil dry unit weight. Laboratory testing will be required to determine if these quantities are sufficient for stabilization of the onsite potentially expansive soil.

The suggested method of treatment for potentially expansive soil is based on generally accepted standards in the local engineering community. Swell pressures and volume change potential greater than can be remediated by the suggested method may exist. Consequently, the owner should recognize that there is an inherent risk that floor slab and foundation damage may occur, even after remedial treatment of the subgrade soil.

### 6.2 Groundwater

Groundwater was observed in 11 of the 20 borings at depths ranging from 7 to 18.5 feet below the ground surface at the time of drilling and as shallow as 1.5 feet three days after drilling. Based on the observed groundwater depths, groundwater infiltration/seepage should be expected in excavations. Groundwater may be encountered at different depths at the time of construction and may impact construction of the proposed improvements, including fill placement and foundation excavations. The contractor should be prepared to handle dewatering of excavations and stabilization of deteriorated subgrades.

Consideration should be given to the time of year site develop will occur. A higher groundwater table may be present during wetter times of year.

### 6.3 Onsite Borrow Area

Presently, some of the onsite soils may be too wet to achieve proper compaction. Aeration or a drying agent, such as Code-L, may be necessary to lower the soil moisture to allow for proper compaction. General grading may be difficult during the winter months as drying agents and aeration may not be as effective in cold weather.

### 6.4 Soft Soils

Soft soils were encountered within 9 of the borings, generally at depths between 15 and 20 feet. Relatively soft soils may be encountered closer to the surface and possibly near the foundation bearing elevation. Remediation of these soils may be necessary to achieve the net allowable bearing capacity stated in Section 7.1.
The depth of the overexcavation will likely extend to a depth of 2 feet and be performed concurrently with the expansive soil remediation. The overexcavation should extend laterally beyond the perimeter of the foundation such that the removal extends downward at an inclination of 1 horizontal to 1 vertical (1H:1V) below the bearing elevation of the foundation. The actual depth of remediation will depend on the observed conditions. The excavation can be backfilled with a well-graded crushed limestone (1-inch minus) or lime stabilized clay, placed and compacted in general accordance with the recommendations provided in this report. JGE can revise this recommendation if a higher allowable bearing capacity is necessary.

6.5 Disturbed Soil Due to Agricultural Activity

Disturbed surficial soils were encountered within the upper 6 to 12 inches due to agricultural activities. The depth of disturbed soil likely varies between and away from the borings. Remediation of expansive soil is anticipated within the building footprint; however, remediation of disturbed soils should be considered in parking and drive areas. There is a risk for settlement and pavement cracking if the parking lot subgrades are supported on the disturbed soil in the in-situ state. In order to eliminate the risk, the disturbed material would have to be removed in its entirety from the designated improvement areas for the parking lot to be supported by undisturbed natural soils or newly placed fill.

Alternatively, if the disturbed soils contain less than 4 percent organics and are 12 inches or less in thickness, the soils can be moisture conditioned and recompressed. Moisture conditioning would likely include aerating the soil with a disk to allow the soil to air dry. Where deeper layers of disturbed soils are encountered, excavation and spreading of the soils may be necessary to properly dry and compact the soils.

The soil subgrade should be proofrolled prior to additional fill placement. Proofrolling is accomplished by passing over the subgrade with heavily loaded construction equipment and observing the subgrade for zones of soft, disturbed, pumping, rutting, excessive deflecting, or otherwise unsuitable soils. Proofrolling should be conducted utilizing a tandem axle dump truck with a load of at least 25 tons, a loaded scraper/pan, or other heavily loaded construction equipment and observed by a JGE representative. Unacceptable materials thus found should be excavated and either recompressed or replaced with new structural fill.

7.0 DESIGN RECOMMENDATIONS

The following sections detail recommendations for the building and site design. These recommendations assume the grading has been performed in general accordance with the recommendations provided above and in the "Construction Considerations" section that follows.

7.1 Shallow Foundations

Shallow foundations bearing in firm, low plastic, natural soil or compacted, non-expansive structural fill are appropriate for support of the proposed structure. The expansive soil should be remediated as previously described. Shallow foundations can be designed for net allowable bearing pressure of 2,000 psf, assuming the bearing materials will be improved as stated in previous sections. Continuous footings should have a minimum width of 18 inches. Isolated column footings should have a minimum dimension of 30 inches. Exterior footings and foundations in unheated portions of the building should be provided with at least 30 inches of soil cover for frost protection. Interior footings in heated parts of the building can be located at nominal depths below the finish floor.
**Foundation Settlement**

At the time of this report, foundation plans have not been developed. As such, the following assumptions and provided information were made to assist in development of foundation recommendations:

- Wall loads will be less than 10 kips per linear foot
- Column loads will be less than 175 kips
- Floor loads will be less than 200 psf
- Potentially expansive soils will be removed from the building footprint and replaced with non-expansive materials as specified in Section 6.1
- Approximately 1.5 to 2.5 feet of fill will be required to achieve the proposed finished floor elevation
- Foundations will be sized for net allowable bearing pressure of 2,000 psf

Following the recommendations given in this report as well as the assumptions and provided information listed above, settlement should be less than 1 inch and differential settlement should be less than ¾ inch. Foundation plans and up-to-date site plans should be provided for review once available.

### 7.2 Seismic Design Considerations

In our professional opinion, based on the field data, laboratory data, and assumed depth to rock, the site fits the International Building Code (IBC) for Site Class D. The proposed building can be designed for this or more stringent soil types. We recommend the structural engineer determine the Seismic Design Category.

Seismic design parameters for the site are summarized in Table 2, which are based on design values on 2012/2015 IBC Tables and the computer application published by the Applied Technology Council (ATC).

<table>
<thead>
<tr>
<th>Parameters</th>
<th>2012/2015 IBC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site Class</td>
<td>D</td>
</tr>
<tr>
<td>$S_s$, Short-Period Spectral Response Acceleration</td>
<td>0.328</td>
</tr>
<tr>
<td>$S_1$, 1-Second Period Spectral Response Acceleration</td>
<td>0.14</td>
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<tr>
<td>$F_a$, Site Amplification Coefficient at $S_s$</td>
<td>1.537</td>
</tr>
<tr>
<td>$F_v$, Site Amplification Coefficient at $S_1$</td>
<td>2.239</td>
</tr>
</tbody>
</table>

Note: Based on design values on 2012/2015 IBC Tables and the computer application published by the ATC.

### Liquefaction Potential Discussion

A review of the MDNR GeoSTRAT data shows that the site is within an area which has the potential to experience liquefaction of underlying soils in the event of an earthquake. Liquefaction is the loss of shear strength that occurs within a saturated soil mass when a cyclic load is applied, such as that induced by a seismic event. Liquefaction occurs when the porewater pressure in the soil mass increases to a value equaling the overburden pressure, resulting in zero effective stress. Under this condition, the ability of the soil to support an imposed load is greatly reduced. Loss of foundation support caused by liquefaction can result in a potential for displacement or failure of footings, piles, piers, retaining structures, and slopes that are supported within or above the liquefied soils.
The potential for liquefaction exists when the following conditions are present: low density sand, saturated sand, sand with relatively uniform grain size distributions, high groundwater levels, and a high magnitude of ground shaking during the design earthquake event.

Although MDNR GeoSTRAT data indicates the project site is within the general area delineated as potentially liquefiable during an earthquake, the subsurface exploration encountered cohesive soils consisting of silty clay and clay which are not considered susceptible to liquefaction. In our professional opinion, the potential for a liquefaction to occur at the project site is estimated to be low.

7.3 Floor Slabs

The floor slabs may be designed using a modulus of subgrade reaction of 125 pounds per cubic inch (pci) for a properly compacted subgrade. The following recommendations are not intended to supersede the structural engineer's design for the floor slabs.

The floor slabs should be supported on a layer of crushed stone. This will help distribute concentrated loads and equalize moisture conditions beneath the slabs. If a polyethylene moisture barrier is placed atop the crushed stone and beneath the floor, careful attention to curing of the concrete slab should be followed or excessive shrinkage cracking and "curling" can occur. We suggest the applicable recommendations provided in the American Concrete Institute (ACI) Standards be followed for curing the concrete floor slabs.

The floor slabs should not be structurally connected to the foundation walls and column pads. Isolation joints should be used where the slabs meet a wall or column. We also suggest that joints be placed in the floor slabs on no more than 15-foot intervals for 4-inch thick floors. The joints should be located in such a manner that each floor slab section is rectangular. Such joints permit slight movements of the independent elements and help prevent random cracking that might otherwise be caused by restraint of shrinkage, slight rotations, heave, or settlement.

7.4 General Pavement Subgrade Preparation Recommendations

The soil subgrade should be compacted as specified in the Structural Fill Considerations section of this report. The subgrade and adjacent area should be contoured to allow surface water drainage during the construction phase, to prevent ponding, and prevent entrapment of water during the life of the pavement. Water ponding can cause subgrade softening and deterioration even after a short time period.

Before placing the base rock, the entire subgrade should be proofrolled and observed for localized soft or yielding areas. Proofrolling is particularly important if a lapse of time occurred between general grading, trimming, and paving, or if the subgrade is disturbed by construction activities. Unstable materials thus found should be excavated and either recompacted or replaced with new structural fill.

7.5 Pavement Considerations

The flexible pavement recommendations provided herein are based on the Asphalt Institute guideline for parking lots, not based on a site specific pavement analysis. Asphaltic concrete wearing courses less than 3 inches thick do not perform well on these subgrade soils. Parking areas that can be restricted to automobiles and light trucks should consist of an 8-inch thick crushed stone base with a minimum 3-inch thick asphaltic concrete wearing surface. Entrance drives and other areas that will receive heavy traffic volumes or heavy truck traffic should have a minimum of 8-inch aggregate base with a 6-inch thick asphaltic
concrete surface. Trash dumpster pads and truck approaches should be a Portland cement concrete section due to the concentrated wheel loads experienced during loading.

A rigid pavement section, such as a Portland cement concrete, could also be utilized and may provide less long-term maintenance. Parking areas for automobile and light truck traffic could consist of a minimum 6-inch thick, non-reinforced concrete pavement, underlain by 2 inches of crushed aggregate base. Areas subjected to increased traffic loading should consist of an 8-inch thick, non-reinforced concrete pavement, over 4 inches of crushed aggregate base. This would be applicable to areas where medium to heavy traffic loading would occur, such as trash dumpster pads, approaches, or primary drive areas.

To provide resistance against salt and freeze-thaw cycles, we recommend the concrete have a minimum 28-day compressive strength of 4,000 pounds per square inch (psi) and air entrainment of 5 to 7 percent by volume. We also recommend that the joint spacing be no greater than 15 feet.

As previously stated, the pavement discussion provided above is typically satisfactory for most applications. It should be noted that the pavement thicknesses discussed in this section have not been evaluated for site specific use. JGE can assess if the above pavement sections are applicable if a desired pavement design life and estimated/assumed equivalent single axle loads (ESALs) or traffic counts are available.

### 7.6 Retaining and Below Grade Walls

Building walls retaining soil should be designed to withstand lateral earth pressures caused by the weight of the backfill and surcharge loads. The equivalent fluid unit weights tabulated below are recommended for design of the walls. Values for granular material should only be used if the granular backfill extends from the wall a lateral distance of at least one-half the wall height. The walls should be designed to resist an additional uniform lateral load of one-half of surface loads above the walls. This table assumes that positive foundation and backfill drainage is provided to prevent buildup of hydrostatic pressure.

<table>
<thead>
<tr>
<th>Backfill Type</th>
<th>Equivalent Fluid Unit Weights</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fixed-Headed Walls (pcf)</td>
<td>Free-Headed Walls (pcf)</td>
</tr>
<tr>
<td>Cohesive Soil</td>
<td>60</td>
<td>50</td>
</tr>
<tr>
<td>Granular Material (1-inch minus)</td>
<td>48</td>
<td>30</td>
</tr>
</tbody>
</table>

A fixed-headed wall is a wall connected to floor joists or beams that prevent deflection of the top after backfilling. A free-headed wall is designed to deflect at the top and remain fixed at the base, such as a retaining wall. A wing wall attached to a fixed headed wall should be considered fixed headed unless the structural design permits independent rotation.

The walls can be designed with a coefficient of friction between the base of the concrete footing and the subgrade soil of 0.3. A passive soil resistance modeled by an equivalent fluid unit weight of 200 pounds per cubic foot may be used for soil against the face of the exterior base or a key below the base of the walls. The upper 30 inches of soil should not be included in passive pressure calculations in frost susceptible areas.
To prevent the building of hydrostatic pressures behind the wall, a drainage system should be installed. Drains should consist of 4-inch diameter, perforated plastic pipe laid with the holes down and surrounded with a select filter material consisting of 0.5- to 1-inch clean crushed stone. This stone should be isolated from the surrounding soil with a layer of synthetic filter material such as Mirafi 140N or similar. Where practical, drains should drain by gravity to daylight or storm sewers (if allowed by the utility company).

7.7 Site Drainage and Final Grading

Adequate site drainage should be provided to reduce infiltration of surface water around the perimeter of the structures and beneath the slabs. All grades should be sloped away from the structures, and roof and surface drainage should be collected and discharged such that water is not permitted to infiltrate the foundation backfill.

8.0 CONSTRUCTION CONSIDERATIONS

The following sections present recommendations for the construction phase of the project.

8.1 Siltation Control

Some of the soils at this site are susceptible to erosion. Appropriate erosion control measures, such as proper site contouring during general grading and the installation of siltation fences or the placement of staked straw bales, should be used during construction to keep eroded materials on site.

8.2 Site Preparation

Cut and fill areas must be stripped of surface vegetation and topsoil prior to fill placement. Topsoil and soft surface materials could be stockpiled for later use in green areas or common ground or be removed from the site. The subgrade in all areas to receive fill should then be scarified, proofrolled and compacted as specified later in this report, and under the observation of JGE. Soft spots and areas where the recommended compaction cannot be achieved should be undercut and replaced with compacted, non-expansive cohesive soil fill or crushed stone.

8.3 Structural Fill Considerations

Low plastic, silty clay soil with a liquid limit less than 45 and a plastic index less than 20 is suitable for structural fill. Crushed limestone or limestone screenings may also be used as structural fill at the site. The onsite high plastic soils are not suitable for use as structural fill within 2 feet of foundations and 3 feet of floor slabs in an untreated state.

Cohesive fill and aggregate should be placed in 8-inch loose lifts. Cohesive fill should be compacted to a minimum dry density of 90 percent of the modified Proctor maximum dry density for the material (ASTM D 1557). Well-graded granular fill should be compacted to a minimum dry density of 95 percent of the maximum dry density as determined by the modified Proctor test. Field density tests should be performed on each lift of fill to check that proper compaction is being achieved.

8.4 Foundation Excavations

A JGE representative should observe the foundation excavations to check that the foundations will bear on competent materials. The base of all excavations should be clean, relatively dry, and free of loose soil, uncompacted fill, or potentially expansive soil. The excavations should be protected from extreme temperatures, precipitation, and construction
disturbances. To reduce the possibility of desiccation or saturation of the foundation soils, we recommend the concrete be placed as soon as possible after the excavation is made.

Disturbance of the soils in footing and floor slab excavations should be avoided. The potential for such disturbance will increase during wetter portions of the year. Footing subgrade materials that have been excessively disturbed should be overdeepened to firm, undisturbed soil and replaced with properly compacted, non-expansive fill. Excessively disturbed soils beneath the floor slabs should be removed and replaced with additional granular material.

8.5 Excavation Bracing Requirements

The United States Department of Labor, Occupational Safety and Health Administration (OSHA) issued "Construction Standards for Excavations, 29 CFR, Part 1926, Subpart P" to provide for the safety of workers entering trenches or excavations. This document should be consulted for safe and legal excavations.

9.0 CONSTRUCTION MONITORING PROGRAM

The following are highlights of a construction monitoring program. These services are intended to assess our design assumptions and to provide construction quality assurance by comparing and documenting procedures and test results with plans, specifications, and good engineering practice. In this endeavor, JGE should:

- Review project plans and construction specifications to assess the interpretation of this report
- Observe site preparation
- Observe remediation of potentially expansive soil and relatively soft soils
- Verify the suitability of potential fill materials
- Monitor placement and proper density of structural fill and backfill
- Observe footing and floor slab excavations and verify that suitable bearing materials are present
- Test concrete during building construction

10.0 LIMITATIONS

The recommendations provided herein are based on the information obtained at 20 specific boring locations within the project area and regionally accepted practice. JGE should be contacted if conditions encountered are not consistent with those described.

In addition, we should be provided with a set of final development plans, as soon as they are available for review, to determine the applicability of our recommendations. Construction specifications also merit our review to assess the interpretation of this report. Failure to provide these documents for review may nullify some or all of the recommendations provided herein.
Location Plan based on USGS O'FALLON and SAINT CHARLES, MISSOURI QUADRANGLES 7.5-MINUTE SERIES, dated 2017
Contour Interval: 10 feet

Figure 1

JACOBI GEOTECHNICAL ENGINEERING, INC.

LOCATION PLAN
Saint Charles County Ambulance District
Salt River Road
Saint Peters, Missouri

19001.1
April 2019

Figure 1
Site Plan based on unmarked drawing provided by CEDC, received 1/30/2019

Boring Location
Expansive Soil Remediation: Removal and Replacement Below Foundations and Floor Slabs

Removal & Replacement: See the geotechnical report for recommended replacement materials and compaction criteria.

Excavations should, at minimum, follow Occupational Safety and Health Administration (OSHA) Standards. JGE is not responsible for site safety.

JACOBI GEOTECHNICAL ENGINEERING, INC.
EXPANSIVE SOIL REMEDIATION
Saint Charles County Ambulance District
Salt River Road
Saint Peters, Missouri
19001.1 April 2019
Figure 3
**Depth** - Depth below ground surface, in feet.

**Elevation** - Referenced to msl, city, or site datum, in feet.

**Type No.** - Sample type and number designated by the following:

- **SS** - Split spoon; disturbed sample from standard penetration test. Obtained by driving 2-inch O. D. split-spoon sampler. Blow counts for three 6-inch increments reported (ASTM D 1586). N-value is the sum of the second and third blow counts.

- **ST** - Shelby tube sampler; undisturbed, obtained by pushing 3-inch-diameter, thin walled tube sampler (ASTM D 1587).

- **CS** - Continuous sampler; undisturbed, obtained by split barrel sampler during auger advancement.

- **AS** - Auger samples; disturbed, obtained from auger cuttings or wash water return.

- **NX** - Nx rock core sample; nominal 2-inch-diameter, obtained by diamond core bit sampler, percent recovery and RQD reported (ASTM D 2113). **Note:** RQD indicates the ratio of the total length of segments greater than 4 inches to the total length drilled.

- **SV** - Shear vane test; obtained by pushing a 2-inch-diameter vane then torquing, shear strength in existing and remolded states reported (ASTM D 2573).

**Recovery** - Reported in inches as a ratio of the length of sample recovered to the total length pushed, driven, or cored.

**Blows per 6 inches** - The number of blows per 6 inches of sampler penetration when driven by a 140-pound hammer 30 inches (ASTM D 1586). **Note:** To avoid damaging the equipment driving is limited to 50 blows per 6-inch increment.

**USCS** - Unified Soil Classification System; designates letter symbols for soil types (ASTM D 2487 & D 2488).

**Soil Description** - Describes soil according to the Unified Soil Classification System (ASTM D 2488 & D 2488), indicates constituents and characteristics. Solid lines between descriptions indicate approximate change between soil types and the transition may be gradual.

**Water level** – Ground water detected by drillers at the time of drilling.

**Laboratory Test Results**

- **Moisture %** - Moisture content expressed as a percentage of the dry unit weight (ASTM D 2216).

- **Liquid Limit and Plastic Limit** - Index tests performed for classifying fine-grained components of soils (ASTM D 4318).

- **Dry Density** - Obtained from Shelby tube or continuous samplers, reported in pounds per cubic foot (pcf).

- **Shear Strength** - Results reported in kips per square foot (ksf) determined by Unconfined Compression Test unless preceded by PP or TV.

  - **Unconfined Compression Test** - Shear strength obtained from Shelby tube or continuous samplers (ASTM D 2166).

  - **PP** - Penetrometer - Approximates shear strength of unconfined compressive test.

  - **TV** - Torvane – Miniature vane used in determining approximate shear strength.
SAINT CHARLES COUNTY AMBULANCE DISTRICT - SALT RIVER ROAD  
SAINT PETERS, MISSOURI  
JGE No. 19001.1

<table>
<thead>
<tr>
<th>FIELD TESTING</th>
<th>LABORATORY TESTING</th>
</tr>
</thead>
<tbody>
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<td>MATERIAL DESCRIPTION</td>
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<td>Gray, fat, CLAY</td>
</tr>
<tr>
<td>5</td>
<td>Gray, fat, CLAY</td>
</tr>
<tr>
<td>10</td>
<td>Brown and gray, lean, SILTY CLAY</td>
</tr>
<tr>
<td>15</td>
<td>Brown and gray, lean, SILTY CLAY</td>
</tr>
</tbody>
</table>

Boring terminated at 15.0 feet.

NOTES:
SAINT CHARLES COUNTY AMBULANCE DISTRICT - SALT RIVER ROAD  
SAINT PETERS, MISSOURI  
JGE No. 19001.1

<table>
<thead>
<tr>
<th>FIELD TESTING</th>
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<td>USCS</td>
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<td>SAMPLE</td>
<td>RECOVERY, in/in (ROD, %)</td>
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<td>PENETRATION (ft)</td>
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<td>SPT 1</td>
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<tr>
<td>SPT 6</td>
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</tbody>
</table>

Gray, fat, CLAY
becomes brown and gray
Brown and gray, medium plastic, SILTY CLAY
trace sand and organics

Boring terminated at 20.0 feet.

NOTES:
# Saint Charles County Ambulance District - Salt River Road

**Saint Peters, Missouri**

**JGE No. 19001.1**

**Start Date:** 3/1/2019  
**Completion Date:** 3/1/2019  
**Logged By:** J. Holland  
**Checked By:** P. Dodd  
**Elevation:** 434.0 ft  
**Total Depth:** 15.0 ft  
**Contractor:** Midwest Drilling

**Ground Water Levels:**
- **At Time of Drilling:** 13.0 ft / El. 421.0 ft
- **At End of Drilling:** 13.0 ft / El. 421.0 ft

**Equipment:** CME-550X / 4-inch CFA

**Sampling:** 2-inch SS / Automatic Hammer

**Backfill:** Auger Cuttings

**After Drilling:** ---

---

## Field Testing

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Sample Number</th>
<th>Recovery, in/in (RQD, %)</th>
<th>Blow Counts (N Value)</th>
<th>Penetrometer (ft/s)</th>
<th>Material Description</th>
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</thead>
<tbody>
<tr>
<td>0</td>
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<td>15/18</td>
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<td>becomes brown and gray</td>
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Boring terminated at 15.0 feet.

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**Laboratory Testing**

- **Sample Type:** USCS
- **Sample Moisture Content (%):**
  - 25
- **Dry Unit Weight (pcf):**
  - 24
- **Shear Strength (ksf):**
  - 24
- **Atterberg Limits:**
  - **Liquid Limit:**
    - 25
  - **Plastic Limit:**
    - 36
  - **Plasticity Index:**
    - 15

---

**Notes:**

...
Boring terminated at 20.0 feet.
## SAINT CHARLES COUNTY AMBULANCE DISTRICT - SALT RIVER ROAD

**SAINT PETERS, MISSOURI**

**JGE No. 19001.1**

### BORING NUMBER B-5

<table>
<thead>
<tr>
<th>FIELD TESTING</th>
<th>MATERIAL DESCRIPTION</th>
<th>WATER LEVEL GRAPHIC LOG</th>
<th>LABORATORY TESTING</th>
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</thead>
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<td><strong>ELEVATION (ft)</strong></td>
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<td><strong>SAMPLE TYPE</strong></td>
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<td><strong>USCS</strong></td>
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Boring terminated at 20.0 feet.

**NOTES:**

- Gray, fat, CLAY
- Gray and brown, medium plastic, SILTY CLAY
- Gray and brown, fat, CLAY
- Becomes gray, brown, and reddish-brown

**GROUND WATER LEVELS:**

- **AT TIME OF DRILLING**: 18.5 ft / EL. 415.5 ft
- **72hrs AFTER DRILLING**: 11.3 ft / EL. 422.7 ft

**EQUIPMENT**: CME-550X / 4-inch CFA

**SAMPLE**: 2-inch SS / 3-inch ST / Automatic Hammer

**BACKFILL**: Auger Cuttings
SAINT CHARLES COUNTY AMBULANCE DISTRICT - SALT RIVER ROAD
SAINT PETERS, MISSOURI
JGE No. 19001.1

START DATE 2/28/2019
COMPLETION DATE 2/28/2019
ELEVATION (ft) 434.4
LOGGED BY J. Holland
CHECKED BY P. Dodd
TOTAL DEPTH (ft) 20.0

EQUIPMENT CME-550X / 4-inch CFA
GROUNDS WATER LEVELS:

SAMPLING 2-inch SS / 3-inch ST / Automatic Hammer

BACKFILL Auger Cuttings

FIELD TESTING

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<thead>
<tr>
<th>DEPTH (ft)</th>
<th>SAMPLE NUMBER</th>
<th>BLOW COUNTS (N VALUE)</th>
<th>PENETROMETER (ksf)</th>
<th>MATERIAL DESCRIPTION</th>
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<tbody>
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<td>3</td>
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</tr>
<tr>
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<td>SPT 2 20/24</td>
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<td>Gray brown, medium plastic, SILTY CLAY</td>
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<td>5</td>
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<tr>
<td>10</td>
<td>SPT 3 16/18</td>
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<td>20.0</td>
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</tr>
<tr>
<td>20</td>
<td>SPT 5 22/18</td>
<td>3-3-3 (6)</td>
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<td>becomes gray and reddish-brown</td>
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<td>20.0</td>
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<tr>
<td>20</td>
<td>SPT 6 21/18</td>
<td>2-2-3 (5)</td>
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LABORATORY TESTING

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<th>DEPTH (ft)</th>
<th>SPT NUMBER</th>
<th>RECOVERY, in/in (ROD, %)</th>
<th>BLOW COUNTS (N VALUE)</th>
<th>PENETROMETER (ksf)</th>
<th>MATERIAL DESCRIPTION</th>
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<tbody>
<tr>
<td>0</td>
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<tr>
<td>3</td>
<td>SPT 2 20/24</td>
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</tr>
<tr>
<td>10</td>
<td>SPT 3 16/18</td>
<td>4-4-5 (9)</td>
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<tr>
<td>12.0</td>
<td>SPT 4 18/18</td>
<td>3-4-5 (9)</td>
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<td>Brown, gray, and reddish-brown, fat, CLAY</td>
</tr>
<tr>
<td>20.0</td>
<td>SPT 5 22/18</td>
<td>3-3-3 (6)</td>
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</tr>
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</table>

Boring terminated at 20.0 feet.

NOTES:
**SAINT CHARLES COUNTY AMBULANCE DISTRICT - SALT RIVER ROAD**  
SAINT PETERS, MISSOURI  
JGE No. 19001.1

<table>
<thead>
<tr>
<th>DEPTH (ft)</th>
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<tr>
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<td>Gray and brown, lean, SILTY CLAY</td>
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<tr>
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<td>Gray and brown, fat, CLAY</td>
</tr>
<tr>
<td>15</td>
<td>becomes brown, gray, and reddish-brown</td>
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</table>

**Boring terminated at 15.0 feet.**

**FIELD TESTING**

<table>
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<th>BLOW COUNTS (N VALUE)</th>
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<tbody>
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<td>3-4-4 (8)</td>
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<tr>
<td>15</td>
<td>2-3-4 (7)</td>
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</tbody>
</table>

**GROUND WATER LEVELS:**

- **AT TIME OF DRILLING**: 14.0 ft / EL. 420.2 ft
- **AT END OF DRILLING**: 14.0 ft / EL. 420.2 ft
- **72hrs AFTER DRILLING**: 6.5 ft / EL. 427.7 ft

**EQUIPMENT**

- CME-550X / 4-inch CFA

**SAMPLING**

- 2-inch SS / Automatic Hammer

**BACKFILL**

- Auger Cuttings

**COMPLETION DATE**

- 3/1/2019

**CHECKED BY**

- P. Dodd

**LOGGED BY**

- J. Holland

**ELEVATION (ft)**

- 434.2

**TOTAL DEPTH (ft)**

- 15.0

**GROUND WATER LEVELS:**

- **AT TIME OF DRILLING**: 14.0 ft / EL. 420.2 ft
- **AT END OF DRILLING**: 14.0 ft / EL. 420.2 ft
- **72hrs AFTER DRILLING**: 6.5 ft / EL. 427.7 ft

**MOISTURE CONTENT (%), DRY UNIT WT. (pcf)**

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<th>10</th>
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<tr>
<td>15</td>
<td>31</td>
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</table>

**USCS**

- **SAMPLE NUMBER**: 13/18, 17/18, 15/18, 18/18
- **RECOVERY, in/in (RQD, %)**
- **PENETROMETER (ksf)**

**WATER LEVEL GRAPHIC LOG**

- **CATEGORIES**: CH, CL, CH

**USCS**

- **SAMPLE TYPE**: CLAY

**LABORATORY TESTING**

- **LIQUID LIMIT**, **PLASTIC LIMIT**, **PLASTICITY INDEX**

- **BLOW COUNTS (N VALUE)**

- **SHEAR STRENGTH (ksf)**

**NOTES:**

**CHECKED BY**

- P. Dodd

**LOGGED BY**

- J. Holland
### FIELD TESTING

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<thead>
<tr>
<th>DEPTH (ft)</th>
<th>SAMPLE NUMBER</th>
<th>RECOVERY, in/in (%)</th>
<th>BLOW COUNTS (N VALUE)</th>
<th>PENETRATOR (ft/s)</th>
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<td>3-3-5 (8)</td>
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Boring terminated at 20.0 feet.

### LABORATORY TESTING

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### ATTERBERG LIMITS

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### WATER LEVEL GRAPHIC LOG

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### GROUND WATER LEVELS:

- **AT TIME OF DRILLING**: 18.0 ft / EL. 415.9 ft
- **AT END OF DRILLING**: 18.0 ft / EL. 415.9 ft
- **96hrs AFTER DRILLING**: 12.2 ft / EL. 421.7 ft

### ELEVATION (ft)

- **TOTAL DEPTH (ft)**: 20.0

### EQUIPMENT

- CME-550X / 4-inch CFA

### BACKFILL

- Auger Cuttings

### COMPLETION DATE

- 2/28/2019

### FIELD TESTING NOTES:

- Boring terminated at 20.0 feet.
### FIELD TESTING

<table>
<thead>
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<th>DEPTH (ft)</th>
<th>SAMPLE NUMBER</th>
<th>RECOVERY</th>
<th>BLOW COUNTS (N VALUE)</th>
<th>PENETROMETER (ksf)</th>
<th>MATERIAL DESCRIPTION</th>
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<td>4-5-5 (10)</td>
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<td></td>
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</tr>
<tr>
<td>5</td>
<td>SPT 2</td>
<td>17/18</td>
<td>3-4-5 (9)</td>
<td>4</td>
<td>becomes gray and brown</td>
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<td>SPT 3</td>
<td>16/18</td>
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<td>becomes brown, gray, and reddish-brown</td>
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Boring terminated at 20.0 feet.

### LABORATORY TESTING

- **USCS**
- **SAMPLE TYPE**
- **MOISTURE CONTENT (%)**
- **DRY UNIT WT. (pcf)**
- **LIQUID LIMIT**
- **PLASTIC LIMIT**
- **PLASTICITY INDEX**
- **SHEAR STRENGTH (ksf)**
- **ATERBERG LIMITS**

### NOTES:

Gray, fat, CLAY becomes gray and brown becomes brown, gray, and reddish-brown becomes red becomes gray
### Field Testing

<table>
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<th>Sample Number</th>
<th>Recovery</th>
<th>Blown Counts (N Value)</th>
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<tr>
<td></td>
<td></td>
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<td></td>
<td>becomes gray and brown</td>
</tr>
<tr>
<td>SPT 2</td>
<td>18/18</td>
<td>3-4-5 (9)</td>
<td>4.5</td>
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</tr>
<tr>
<td>SPT 3</td>
<td>16/18</td>
<td>3-4-5 (9)</td>
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<td>SPT 4</td>
<td>18/18</td>
<td>3-3-4 (7)</td>
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</tr>
<tr>
<td>SPT 5</td>
<td>22/18</td>
<td>2-3-2 (5)</td>
<td>3</td>
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</tr>
</tbody>
</table>

15.0 feet. becomes brown, gray, and reddish-brown

**Boring terminated at 15.0 feet.**

### Laboratory Testing

- **USCS Sample Type:** CH
- **Moisture Content (%):**
  - 26
- **Dry Unit Weight (pcf):**
  - 24
- **Liquid Limit:**
  - 25
- **Plastic Limit:**
  - 24
- **Plasticity Index:**
  - 52
- **Shear Strength (ksf):**
  - 418.6

**TOTAL DEPTH (ft):** 15.0

**ELEVATION (ft):** 433.6
**SAINT CHARLES COUNTY AMBULANCE DISTRICT - SALT RIVER ROAD**  
**SAINT PETERS, MISSOURI**  
**JGE No. 19001.1**

<table>
<thead>
<tr>
<th>DEPTH (ft)</th>
<th>FIELD TESTING</th>
<th>LABORATORY TESTING</th>
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</thead>
<tbody>
<tr>
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<tr>
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<tr>
<td>15</td>
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</tr>
<tr>
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**FIELD TESTING**

<table>
<thead>
<tr>
<th>DEPTH (ft)</th>
<th>SAMPLE NUMBER</th>
<th>RECOVERY: in/in</th>
<th>BLOW COUNTS (N VALUE)</th>
<th>PENETROMETER (ft/s)</th>
<th>MATERIAL DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SPT 1</td>
<td>14/18</td>
<td>3-3-4</td>
<td>4.5</td>
<td>Gray, fat, CLAY</td>
</tr>
<tr>
<td></td>
<td>SPT 2</td>
<td>14/18</td>
<td>4-5-6</td>
<td>4.5</td>
<td>becomes gray and brown</td>
</tr>
<tr>
<td></td>
<td>SPT 3</td>
<td>18/18</td>
<td>3-4-5</td>
<td>3.5</td>
<td></td>
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<tr>
<td></td>
<td>SPT 4</td>
<td>20/18</td>
<td>3-3-5</td>
<td>4</td>
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<td></td>
<td>ST 5</td>
<td>24/24</td>
<td>1.5</td>
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<td>SPT 6</td>
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<td>2-1-2</td>
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**LORATORY TESTING**

<table>
<thead>
<tr>
<th>DEPTH (ft)</th>
<th>SAMPLE TYPE</th>
<th>MOISTURE CONTENT (%)</th>
<th>DRY UNIT WT. (pcf)</th>
<th>LIQUID LIMIT</th>
<th>PLASTIC LIMIT</th>
<th>PLASTICITY INDEX</th>
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<tr>
<td>20</td>
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</table>

**GROUND WATER LEVELS:**

- **AT TIME OF DRILLING:** 17.0 ft / EL. 416.6 ft
- **AT END OF DRILLING:** 17.0 ft / EL. 416.6 ft
- **72hrs AFTER DRILLING:** 4.2 ft / EL. 429.4 ft

**EQUIPMENT:** CME-550X / 4-inch CFA

**SAMPLING:** 2-inch SS / 3-inch ST / Automatic Hammer

**BACKFILL:** Auger Cuttings

**MATERIAL DESCRIPTION:**

- Gray, fat, CLAY
- Reddish-brown and gray, medium plastic, SILTY CLAY
- Gray, lean, SILTY CLAY, trace fine sand

Boring terminated at 20.0 feet.

**NOTES:**
**FIELD TESTING**

<table>
<thead>
<tr>
<th>DEPTH (ft)</th>
<th>SAMPLE NUMBER</th>
<th>RECOVERY, in/in (ROD, %)</th>
<th>BLOW COUNTS (N VALUE)</th>
<th>PENETROMETER (ksf)</th>
<th>MATERIAL DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>SPT 1</td>
<td>16/18</td>
<td>3-4-4 (8)</td>
<td>3.5</td>
<td>Gray, fat, CLAY</td>
</tr>
<tr>
<td></td>
<td>SPT 2</td>
<td>17/18</td>
<td>4-4-4 (8)</td>
<td>4</td>
<td>Gray and brown, lean, SILTY CLAY, trace fine sand</td>
</tr>
<tr>
<td></td>
<td>SPT 3</td>
<td>14/18</td>
<td>3-4-4 (8)</td>
<td>4.5</td>
<td>Gray and brown, fat, CLAY</td>
</tr>
<tr>
<td></td>
<td>SPT 4</td>
<td>11/18</td>
<td>4-4-5 (9)</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SPT 5</td>
<td>20/18</td>
<td>4-4-5 (9)</td>
<td>5</td>
<td>becomes brown, gray, and reddish-brown</td>
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Boring terminated at 15.0 feet.

**LABORATORY TESTING**

<table>
<thead>
<tr>
<th>DEPTH (ft)</th>
<th>WATER LEVEL GRAPHIC LOG</th>
<th>USCS</th>
<th>ATTERBERG LIMITS</th>
<th>MOISTURE CONTENT (%)</th>
<th>DRY UNIT WT. (pcf)</th>
<th>LIQUID LIMIT</th>
<th>PLASTIC LIMIT</th>
<th>PLASTICITY INDEX</th>
<th>PENETROMETER (ksf)</th>
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</thead>
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<td>---</td>
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</tr>
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<td>3.0</td>
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<td>24</td>
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<td>---</td>
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<td>---</td>
</tr>
<tr>
<td>5.5</td>
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<td>CH</td>
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**FIELD TESTING**

<table>
<thead>
<tr>
<th>DEPTH (ft)</th>
<th>SAMPLE NUMBER</th>
<th>RECOVERY, in/in (ROD, %)</th>
<th>BLOW COUNTS (N VALUE)</th>
<th>PENETROMETER (ksf)</th>
<th>MATERIAL DESCRIPTION</th>
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<tbody>
<tr>
<td>0</td>
<td>SPT 1</td>
<td>16/18</td>
<td>3-4-4 (8)</td>
<td>3.5</td>
<td>Gray, fat, CLAY</td>
</tr>
<tr>
<td></td>
<td>SPT 2</td>
<td>17/18</td>
<td>4-4-4 (8)</td>
<td>4</td>
<td>Gray and brown, lean, SILTY CLAY, trace fine sand</td>
</tr>
<tr>
<td></td>
<td>SPT 3</td>
<td>14/18</td>
<td>3-4-4 (8)</td>
<td>4.5</td>
<td>Gray and brown, fat, CLAY</td>
</tr>
<tr>
<td></td>
<td>SPT 4</td>
<td>11/18</td>
<td>4-4-5 (9)</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SPT 5</td>
<td>20/18</td>
<td>4-4-5 (9)</td>
<td>5</td>
<td>becomes brown, gray, and reddish-brown</td>
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</table>

Boring terminated at 15.0 feet.
### FIELD TESTING

<table>
<thead>
<tr>
<th>DEPTH (ft)</th>
<th>SAMPLE NUMBER</th>
<th>BLOW COUNTS (N VALUE)</th>
<th>PENETROMETER (ft)</th>
<th>MATERIAL DESCRIPTION</th>
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</thead>
<tbody>
<tr>
<td>0</td>
<td>SPT 1 15/18</td>
<td>3-3-4 (7)</td>
<td>4</td>
<td>Gray, fat, CLAY</td>
</tr>
<tr>
<td>3.0</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>SPT 2 17/18</td>
<td>3-4-5 (9)</td>
<td>4</td>
<td>Gray and brown, medium plastic, SILTY CLAY</td>
</tr>
<tr>
<td>5.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>SPT 3 15/18</td>
<td>3-3-5 (8)</td>
<td>4</td>
<td>Gray and brown, fat, CLAY</td>
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<tr>
<td>10.0</td>
<td>SPT 4 20/18</td>
<td>2-3-4 (7)</td>
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Boring terminated at 10.0 feet.

### LABORATORY TESTING

<table>
<thead>
<tr>
<th>DEPTH (ft)</th>
<th>USCS</th>
<th>SAMPLE TYPE</th>
<th>MOISTURE CONTENT (%)</th>
<th>DRY UNIT WT. (pcf)</th>
<th>LIQUID LIMIT</th>
<th>PLASTIC LIMIT</th>
<th>PLASTICITY INDEX</th>
<th>ATTERBERG LIMITS</th>
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<tr>
<td>3.0</td>
<td>CH</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.5</td>
<td>CL</td>
<td></td>
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<td></td>
</tr>
<tr>
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</table>

### NOTES:

- **SAINT CHARLES COUNTY AMBULANCE DISTRICT - SALT RIVER ROAD**
- **SAINT PETERS, MISSOURI**
- **JGE No. 19001.1**

- **START DATE**: 3/1/2019
- **COMPLETION DATE**: 3/1/2019
- **ELEVATION (ft)**: 434.2
- **TOTAL DEPTH (ft)**: 10.0
- **EQUIPMENT**: CME-550X / 4-inch CFA
- **GROUND WATER LEVELS**: AT TIME OF DRILLING ---
- **SAMPLING**: 2-inch SS / Automatic Hammer
- **AFTER DRILLING**: ---
- **BACKFILL**: Auger Cuttings

- **CHECKED BY**: P. Dodd
- **LOGGED BY**: J. Holland
- **COMPLETED BY**: Midwest Drilling
### Field Testing

<table>
<thead>
<tr>
<th>Sample Number</th>
<th>Recovery</th>
<th>Blow Counts</th>
<th>Penetrometer Count (ft)</th>
<th>Material Description</th>
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<tbody>
<tr>
<td>SPT 1</td>
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<td>3-3-4</td>
<td>4</td>
<td>Gray, fat, CLAY</td>
</tr>
<tr>
<td>SPT 2</td>
<td>16/18</td>
<td>3-4-4</td>
<td>4</td>
<td>Gray and brown, medium plastic, SILTY CLAY</td>
</tr>
<tr>
<td>SPT 3</td>
<td>15/18</td>
<td>3-4-6</td>
<td>4</td>
<td>Gray and brown, fat, CLAY</td>
</tr>
<tr>
<td>SPT 4</td>
<td>18/18</td>
<td>3-3-4</td>
<td>3.5</td>
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</table>

Boring terminated at 10.0 feet.

### Laboratory Testing

<table>
<thead>
<tr>
<th>Sample Type</th>
<th>Moisture Content (%)</th>
<th>Dry Unit Weight (pcf)</th>
<th>Plasticity Index</th>
<th>Liquid Limit</th>
<th>Plastic Limit</th>
<th>Shear Strength (ksf)</th>
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</thead>
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### Atterberg Limits

<table>
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<th>Depth (ft)</th>
<th>Sample Type</th>
<th>Moisture Content (%)</th>
<th>Liquid Limit</th>
<th>Plastic Limit</th>
<th>Shear Strength (ksf)</th>
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</thead>
<tbody>
<tr>
<td>0</td>
<td>CH</td>
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<tr>
<td>5</td>
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<td>CH</td>
<td>28</td>
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### General Information

- **Start Date**: 2/28/2019
- **Completion Date**: 2/28/2019
- **Contractor**: Midwest Drilling
- **Equipment**: CME-550X / 4-inch CFA
- ** Sampling**: 2-inch SS / Automatic Hammer
- **Backfill**: Auger Cuttings
- **Elevation**: 433.9 ft
- **Total Depth**: 10.0 ft
- **Equipment**: CME-550X / 4-inch CFA
- **Sampling**: 2-inch SS / Automatic Hammer
- **Backfill**: Auger Cuttings
- **Notes**: Blowing terminated at 10.0 feet.
<table>
<thead>
<tr>
<th>FIELD TESTING</th>
<th>WATER LEVEL GRAPHIC LOG</th>
<th>LABORATORY TESTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEPTH (ft)</td>
<td>MATERIAL DESCRIPTION</td>
<td>ATTERBERG LIMITS</td>
</tr>
<tr>
<td>0</td>
<td>Gray, fat, CLAY</td>
<td></td>
</tr>
<tr>
<td>2-3-4</td>
<td>(7)</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>becomes gray and brown</td>
<td></td>
</tr>
<tr>
<td>5.5</td>
<td>Gray and brown, medium plastic, SILTY CLAY</td>
<td></td>
</tr>
<tr>
<td>6.0</td>
<td></td>
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</tr>
<tr>
<td>10.0</td>
<td>Gray and brown, fat, CLAY</td>
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</tr>
</tbody>
</table>

Boring terminated at 10.0 feet.
## Boring Number B-16

**Saint Charles County Ambulance District - Salt River Road**

**Saint Peters, Missouri**

**JGE No. 19001.1**

| START DATE | 2/28/2019 |
| COMPETITION DATE | 2/28/2019 |
| CONTRACTOR | Midwest Drilling |
| EQUIPMENT | CME-550X / 4-inch CFA |
| SAMPLING | 2-inch SS / Automatic Hammer |
| BACKFILL | Auger Cuttings |

**Logging Details**

- **Logged By:** J. Holland
- **Checked By:** P. Dodd
- **Elevation:** 433.0 ft
- **Total Depth:** 10.0 ft

### Field Testing

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Sample Number</th>
<th>Recovery, % (RQD, %)</th>
<th>Blow Counts (N Value)</th>
<th>Penetrometer (ft/s)</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>SPT 1</td>
<td>12/18</td>
<td>2-3-4 (7)</td>
<td>3</td>
<td>Gray, fat, CLAY</td>
</tr>
<tr>
<td>5</td>
<td>SPT 2</td>
<td>15/18</td>
<td>4-5-5 (10)</td>
<td>4.5</td>
<td>becomes gray and brown</td>
</tr>
<tr>
<td>10</td>
<td>SPT 3</td>
<td>15/18</td>
<td>3-4-5 (9)</td>
<td>3.5</td>
<td>becomes gray</td>
</tr>
<tr>
<td>17/18</td>
<td>SPT 4</td>
<td>2</td>
<td>3-3-3 (6)</td>
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</table>

Boring terminated at 10.0 feet.

### Laboratory Testing

- **USCS Sample Number**
- **Recovery, in/in**
- **RQD, %**
- **PENETROMETER (ksf)**
- **SAMPLE TYPE**
- **MOISTURE CONTENT (%)**
- **DRY UNIT WT. (pcf)**
- **WATER LEVEL GRAPHIC LOG**
- **BORING NUMBER**
- **BORING LIMITS**
- **ATTERBERG LIMITS**

### Notes:

- **Midwest Drilling**
- **CME-550X / 4-inch CFA**
- **2-inch SS / Automatic Hammer**

---

**Equipment**

- **CME-550X / 4-inch CFA**
- **2-inch SS / Automatic Hammer**

**Backfill**

- **Auger Cuttings**

**Ground Water Levels**

- **At Time of Drilling:** ---
- **At End of Drilling:** ---

**Equipment**

- **CME-550X / 4-inch CFA**

**Sampling**

- **2-inch SS / Automatic Hammer**

**Backfill**

- **Auger Cuttings**

---

**Competition Date:** 2/28/2019

**Start Date:** 2/28/2019

**Elevation:** 433.0 ft

**Total Depth:** 10.0 ft

**Checked By:** P. Dodd

**Logged By:** J. Holland

---

**Notes:**

- Boring terminated at 10.0 feet.
<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Sample Number</th>
<th>Recovery, in/in (RQD, %)</th>
<th>Blow Counts (N Value)</th>
<th>Penetrometer (ft)</th>
<th>Material Description</th>
<th>Water Level Graphic Log</th>
<th>Laboratory Testing</th>
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<td>12/18</td>
<td>2-3-3 (6)</td>
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<td>Gray, fat, CLAY</td>
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<tr>
<td>5</td>
<td>SPT 2</td>
<td>16/18</td>
<td>4-4-4 (8)</td>
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<td></td>
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<tr>
<td>10</td>
<td>SPT 3</td>
<td>14/18</td>
<td>4-5-5 (10)</td>
<td>3.5</td>
<td>becomes gray and brown</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>SPT 4</td>
<td>17/18</td>
<td>3-3-5 (8)</td>
<td>4</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Boring terminated at 10.0 feet.

**Notes:**

Gray, fat, CLAY becomes gray and brown.

**Field Testing:**

- **Depth (ft):**
  - 0
  - 5
  - 10

- **Sample Number:**
  - SPT 1
  - SPT 2
  - SPT 3
  - SPT 4

- **Recovery, in/in (RQD, %):**
  - 12/18
  - 16/18
  - 14/18
  - 17/18

- **Blow Counts (N Value):**
  - 2-3-3 (6)
  - 4-4-4 (8)
  - 4-5-5 (10)
  - 3-3-5 (8)

- **Penetrometer (ft):**
  - 3
  - 3
  - 3.5
  - 4

**Material Description:**

- Gray, fat, CLAY
- Becomes gray and brown

**Laboratory Testing:**

- **USCS:**
  - Sample Type
  - Moisture Content (%)
  - Dry Unit Weight (pcf)
  - Liquid Limit
  - Plastic Limit
  - Plasticity Index
  - Shear Strength (ksf)

- **Atterberg Limits:**
  - Field Testing
  - Laboratory Testing

**Elevation (ft):**

- 433.0

**Notes:**

Boring terminated at 10.0 feet.
### FIELD TESTING

<table>
<thead>
<tr>
<th>DEPTH (ft)</th>
<th>SAMPLE NUMBER</th>
<th>PENETROMETER</th>
<th>MATERIAL DESCRIPTION</th>
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<tbody>
<tr>
<td>0</td>
<td>SPT 1</td>
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<td>Gray, fat, CLAY</td>
</tr>
<tr>
<td></td>
<td>SPT 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>SPT 3</td>
<td></td>
<td>becomes gray and brown</td>
</tr>
<tr>
<td>10</td>
<td>SPT 4</td>
<td></td>
<td>Gray and brown, medium plastic, SILTY CLAY</td>
</tr>
</tbody>
</table>

MATERIAL DESCRIPTION:
- Gray, fat, CLAY
- Becomes gray and brown
- Gray and brown, medium plastic, SILTY CLAY

**Boring terminated at 10.0 feet.**

### LABORATORY TESTING

<table>
<thead>
<tr>
<th>DEPTH (ft)</th>
<th>LIQUID LIMIT</th>
<th>PLASTIC LIMIT</th>
<th>PLASTICITY INDEX</th>
<th>BLOW COUNTS (N VALUE)</th>
<th>SHEAR STRENGTH (ksf)</th>
<th>DRY UNIT WT. (pcf)</th>
<th>SAMPLE MOISTURE CONTENT (%)</th>
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<tbody>
<tr>
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<td>4-4-4 (8)</td>
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<tr>
<td>10</td>
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<td>2-3-3 (6)</td>
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</tbody>
</table>

**ELEVATION (ft):**
- 0 ft
- 5 ft
- 10 ft

**Notes:**
- Gray, fat, CLAY
- Becomes gray and brown
- Gray and brown, medium plastic, SILTY CLAY

**LOGGED BY:** J. Holland
**ELEVATION (ft):** 433.3
**TOTAL DEPTH (ft):** 10.0
**CHECKED BY:** P. Dodd

**GROUND WATER LEVELS:**
- AT TIME OF DRILLING: 8.0 ft / EL. 425.3 ft
- AT END OF DRILLING: 8.0 ft / EL. 425.3 ft

**EQUIPMENT:** CME-550X / 4-inch CFA
**SAMPLING:** 2-inch SS / Automatic Hammer
**BACKFILL:** Auger Cuttings

**GROUND WATER LEVELS:**
- AT TIME OF DRILLING: 8.0 ft / EL. 425.3 ft
- AT END OF DRILLING: 8.0 ft / EL. 425.3 ft

**COMPLETED AT:** 10.0 ft

**ELEVATION (ft):** 433.3
**TOTAL DEPTH (ft):** 10.0

**CHECKED BY:** P. Dodd
**LOGGED BY:** J. Holland

**COMPLETED AT:** 10.0 ft

**ELEVATION (ft):** 433.3
**TOTAL DEPTH (ft):** 10.0

**CHECKED BY:** P. Dodd
**LOGGED BY:** J. Holland
**FACE OF BORING**

**SAINT CHARLES COUNTY AMBULANCE DISTRICT - SALT RIVER ROAD**

**SAINT PETERS, MISSOURI**

**JGE No. 19001.1**

**START DATE** 2/28/2019  
**COMPLETION DATE** 2/28/2019  
**ELEVATION (ft)** 433.5  
**TOTAL DEPTH (ft)** 10.0  
**EQUIPMENT** CME-550X / 4-inch CFA  
**GROUND WATER LEVELS**  
**AT TIME OF DRILLING** ---  
**AT END OF DRILLING** ---  
**SAMPLING** 2-inch SS / Automatic Hammer  
**BACKFILL** Auger Cuttings  
**CHECKED BY** P. Dodd  
**LOGGED BY** J. Holland

<table>
<thead>
<tr>
<th>DEPTH (ft)</th>
<th>SAMPLE NUMBER</th>
<th>RECOVERY, in/in (ROD, %)</th>
<th>PENETROMETER (ft/s)</th>
<th>BLOW COUNTS (N VALUE)</th>
<th>PENETROMETER (ft/s)</th>
<th>MATERIAL DESCRIPTION</th>
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<td>0</td>
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<td>15/18</td>
<td>2-3-3</td>
<td>2</td>
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<tr>
<td>5</td>
<td>SPT 2</td>
<td>18/18</td>
<td>3-3-4</td>
<td>2</td>
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<td>10</td>
<td>SPT 3</td>
<td>16/18</td>
<td>3-3-4</td>
<td>3.5</td>
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<td>becomes gray and brown</td>
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<tr>
<td>10.0</td>
<td>SPT 4</td>
<td>18/18</td>
<td>3-3-4</td>
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**FIELD TESTING**

Boring terminated at 10.0 feet.

**NOTES:**

**LATERAL TESTING**

<table>
<thead>
<tr>
<th>DEPTH (ft)</th>
<th>MOISTURE CONTENT (%)</th>
<th>DRY UNIT WT. (pcf)</th>
<th>LIQUID LIMIT</th>
<th>PLASTIC LIMIT</th>
<th>PLASTICITY INDEX</th>
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</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
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**LABORATORY TESTING**

<table>
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<tr>
<th>DEPTH (ft)</th>
<th>PENETROMETER (ksf)</th>
<th>SHEAR STRENGTH (ksf)</th>
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</thead>
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<td></td>
</tr>
<tr>
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</tr>
</tbody>
</table>

Boring terminated at 10.0 feet.
## FIELD TESTING

<table>
<thead>
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<th>DEPTH (ft)</th>
<th>SAMPLE NUMBER</th>
<th>RECOVERY, in/in (ROD, %)</th>
<th>BLOW COUNTS (N VALUE)</th>
<th>PENETROMETER (ksf)</th>
<th>MATERIAL DESCRIPTION</th>
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<td>9/18</td>
<td>3-3-3 (6)</td>
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<td>Brown, fat, CLAY</td>
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<td></td>
<td>becomes gray and brown</td>
</tr>
<tr>
<td>5</td>
<td>SPT 2</td>
<td>18/18</td>
<td>4-4-5 (9)</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>becomes gray</td>
</tr>
<tr>
<td>10</td>
<td>SPT 3</td>
<td>17/18</td>
<td>3-3-4 (7)</td>
<td>3.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>becomes gray and brown</td>
</tr>
<tr>
<td>10</td>
<td>SPT 4</td>
<td>18/18</td>
<td>3-3-4 (7)</td>
<td>3.5</td>
<td></td>
</tr>
</tbody>
</table>

Boring terminated at 10.0 feet.

## LABORATORY TESTING

<table>
<thead>
<tr>
<th>DEPTH (ft)</th>
<th>LIQUID LIMIT</th>
<th>PLASTIC LIMIT</th>
<th>PLASTICITY INDEX</th>
<th>BLOW COUNTS (N VALUE)</th>
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<tbody>
<tr>
<td>0</td>
<td>28</td>
<td>23</td>
<td>9</td>
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<td>4-4-5 (9)</td>
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<td>10</td>
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<td>3-3-4 (7)</td>
</tr>
</tbody>
</table>

Notes:

Brown, fat, CLAY becomes gray and brown.

Brown, fat, CLAY becomes gray.

Brown, fat, CLAY becomes gray and brown.
Missouri
Division of Labor Standards
WAGE AND HOUR SECTION

MICHAEL L. PARSON, Governor

Annual Wage Order No. 26
Section 092
ST. CHARLES COUNTY

In accordance with Section 290.262 RSMo 2000, within thirty (30) days after a certified copy of this Annual Wage Order has been filed with the Secretary of State as indicated below, any person who may be affected by this Annual Wage Order may object by filing an objection in triplicate with the Labor and Industrial Relations Commission, P.O. Box 599, Jefferson City, MO 65102-0599. Such objections must set forth in writing the specific grounds of objection. Each objection shall certify that a copy has been furnished to the Division of Labor Standards, P.O. Box 449, Jefferson City, MO 65102-0449 pursuant to 8 CSR 20-5.010(1). A certified copy of the Annual Wage Order has been filed with the Secretary of State of Missouri.

Original Signed by
Taylor Burks, Director
Division of Labor Standards

Filed With Secretary of State: ____________________________ March 8, 2019

Last Date Objections May Be Filed: April 8, 2019

Prepared by Missouri Department of Labor and Industrial Relations
<table>
<thead>
<tr>
<th>OCCUPATIONAL TITLE</th>
<th>** Date of Increase</th>
<th>Basic Hourly Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asbestos Worker</td>
<td></td>
<td>$58.41</td>
</tr>
<tr>
<td>Boilermaker</td>
<td></td>
<td>$26.34*</td>
</tr>
<tr>
<td>Bricklayer</td>
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<td>$57.67</td>
</tr>
<tr>
<td>Carpenter</td>
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<td>$55.56</td>
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<tr>
<td>Lather</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Linoleum Layer</td>
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<tr>
<td>Millwright</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pile Driver</td>
<td></td>
<td></td>
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<tr>
<td>Cement Mason</td>
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<td>$51.36</td>
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<tr>
<td>Plasterer</td>
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<tr>
<td>Communications Technician</td>
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<td>$55.57</td>
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<tr>
<td>Electrician (Inside Wireman)</td>
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<td>$64.59</td>
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<tr>
<td>Electrician Outside Lineman</td>
<td></td>
<td>$63.98</td>
</tr>
<tr>
<td>Lineman Operator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lineman - Tree Trimmer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Groundman</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Groundman - Tree Trimmer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elevator Constructor</td>
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<td>$26.34*</td>
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<tr>
<td>Glazier</td>
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<tr>
<td>Ironworker</td>
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<tr>
<td>First Semi-Skilled</td>
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<tr>
<td>Second Semi-Skilled</td>
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<tr>
<td>Mason</td>
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<td>$50.01</td>
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<tr>
<td>Marble Mason</td>
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<tr>
<td>Marble Finisher</td>
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<td>Terrazzo Worker</td>
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<tr>
<td>Tile Finisher</td>
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<tr>
<td>Operating Engineer</td>
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<tr>
<td>Group III</td>
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<tr>
<td>Group III-A</td>
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</tr>
<tr>
<td>Group IV</td>
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<tr>
<td>Group V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Painter</td>
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<tr>
<td>Plumber</td>
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<tr>
<td>Pipe Fitter</td>
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<tr>
<td>Roofer</td>
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<td>$50.81</td>
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<td>Sheet Metal Worker</td>
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<td>$66.11</td>
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<tr>
<td>Sprinkler Fitter</td>
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<td>$67.39</td>
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<tr>
<td>Truck Driver</td>
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<td>$26.34*</td>
</tr>
<tr>
<td>Truck Control Service Driver</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group I</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group II</td>
<td></td>
<td></td>
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<tr>
<td>Group III</td>
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<tr>
<td>Group IV</td>
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</tbody>
</table>

*The Division of Labor Standards received less than 1,000 reportable hours as required by RSMo 290.257.4(b).
Public works contracting minimum wage is established for this occupational title using data provided by Missouri Economic Research and Information Center, in accordance with RSMo 290.257.2.

**Annual Incremental Increase**

ANNUAL WAGE ORDER NO. 26

3/29/19
<table>
<thead>
<tr>
<th>OCCUPATIONAL TITLE</th>
<th>** Date of Increase</th>
<th>Basic Hourly Rates</th>
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<tbody>
<tr>
<td>Carpenter</td>
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<td>$56.31</td>
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<tr>
<td>Millwright</td>
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<td>Pile Driver</td>
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<td></td>
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<tr>
<td>Electrician (Outside Lineman)</td>
<td></td>
<td>$63.98</td>
</tr>
<tr>
<td>Lineman Operator</td>
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<td></td>
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<tr>
<td>Lineman - Tree Trimmer</td>
<td></td>
<td></td>
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<tr>
<td>Groundman</td>
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<td></td>
</tr>
<tr>
<td>Groundman - Tree Trimmer</td>
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<tr>
<td>Laborer</td>
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<td>$47.45</td>
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<tr>
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</tr>
<tr>
<td>Group IV</td>
<td></td>
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</tr>
</tbody>
</table>

Use Heavy Construction Rates on Highway and Heavy construction in accordance with the classifications of construction work established in 8 CSR 30-3.040(3).

Use Building Construction Rates on Building construction in accordance with the classifications of construction work established in 8 CSR 30-3.040(2).

If a worker is performing work on a heavy construction project within an occupational title that is not listed on the Heavy Construction Rate Sheet, use the rate for that occupational title as shown on the Building Construction Rate Sheet.

*The Division of Labor Standards received less than 1,000 reportable hours as required by RSMo 290.257.4(b). Public works contracting minimum wage is established for this occupational title using data provided by Missouri Economic Research and Information Center, in accordance with RSMo 290.257.2.
OVERTIME

For all work performed on a Sunday or a holiday, not less than twice (2x) the prevailing hourly rate of wages for work of a similar character in the locality in which the work is performed or the public works contracting minimum wage, whichever is applicable, shall be paid to all workers employed by or on behalf of any public body engaged in the construction of public works, exclusive of maintenance work.

For all overtime work performed, not less than one and one-half (1½) the prevailing hourly rate of wages for work of a similar character in the locality in which the work is performed or the public works contracting minimum wage, whichever is applicable, shall be paid to all workers employed by or on behalf of any public body engaged in the construction of public works, exclusive of maintenance work or contractual obligation. For purposes of this subdivision, "overtime work" shall include work that exceeds ten hours in one day and work in excess of forty hours in one calendar week; and

A thirty-minute lunch period on each calendar day shall be allowed for each worker on a public works project, provided that such time shall not be considered as time worked.

HOLIDAYS

January first;
The last Monday in May;
July fourth;
The first Monday in September;
November eleventh;
The fourth Thursday in November; and
December twenty-fifth;

If any holiday falls on a Sunday, the following Monday shall be considered a holiday.
The Division of Labor Standards (DLS) is providing this check-off list to assist contractors in being compliant with Missouri’s labor laws applicable to public construction projects. The Prevailing Wage Law requires that not less than the locally prevailing wages be paid to workers on every construction project in the state that is for the public use or benefit or that uses public funds. Failure to comply with the Prevailing Wage Law may constitute a misdemeanor for the employer and for the public official that does not fulfill the responsibilities it imposes. The Construction Safety Training Act mandates that all employees working on the site of public works construction projects must have received safety training.

I

Before Contract Is Let

☐ The annual wage order obtained from the DLS website (www.labor.mo.gov/DLS/PrevailingWage) must be made a part of the specifications for the work to be performed under the contract (Section 290.250 and 290.325, RSMo).

II

While Contract Is Being Performed

☐ All workers performing work under a public construction contract must be paid not less than the prevailing hourly rate of wages (as set out in the annual wage order attached to and made part of the specification for work under the contract). (Section 290.250, RSMo).

The contractor will forfeit a penalty to the contracting public body of $100 per day (or portion of a day) for each worker that is paid less than the prevailing rate for any work done under the contract by the contractor or any subcontractor (Section 290.250, RSMo). For detailed information on rules and occupational titles, see 8 CSR 30-3.010 through 3.060.

☐ The contractor and all subcontractors to the contract must require all on-site employees to complete the ten-hour construction safety training program required under Section 292.675, RSMo, if they have not previously completed the program and have documentation of having done so.

The contractor will forfeit a penalty to the contracting public body of $2500 plus an additional $100 for each employee employed by the contractor or subcontractor, for each calendar day, or portion thereof, such employee is employed without the required training. (Section 292.675, RSMo).

☐ A legible list of all prevailing wage rates must remain posted in a prominent and easily accessible place at the worksite by each contractor and subcontractor on the project. The notice must be posted during the full time that any worker is employed on the job (Section 290.265, RSMo).

☐ The payroll records required to be so kept shall be open to inspection by any authorized representative of the contracting public body or of DLS at any reasonable time and as often as may be necessary and such records shall not be destroyed or removed from the state for the period of one year following the completion of the public work in connection with which the records are made (Section 290.290, RSMo). DLS provides a Contractor Payroll Records form (LS-57) for contractors and subcontractors to use to assure provision of the payroll information required (8 CSR 30-3.010[7]).
III
Before Contract Is Fully Paid

☐ Before final payment can be made, the general contractor and all subcontractors must file an Affidavit of Compliance (PW-4) with the contracting public body. The affidavit must affirm under oath that the party has fully complied with Missouri Prevailing Wage Law, and the public body must verify that the correct wages were paid. No payment can be legally made by the public body to the contractor(s) until the affidavit is filed in proper form and order with the public body (Section 290.290 and 290.325, RSMo).

☐ It shall be lawful for any contractor to withhold from any subcontractor under him sufficient sums to cover any penalties withheld from him by the awarding body on account of any such subcontractor’s failure to comply with the terms of sections 290.210 to 290.340, and if payment has already been made to him, the contractor may recover from the subcontractor the amount of the penalty in a suit at law (Section 290.250.1, RSMo).

Failure to comply with the requirements of the Prevailing Wage Law can result in civil action, including an injunction stopping work on a project, and in criminal fines of up to $500 and up to six months imprisonment for each day there is a violation.

Missouri Department of Labor and Industrial Relations
Division of Labor Standards
Prevailing Wage Section
P.O. Box 449
Jefferson City, MO 65102-0449
Phone: 573-751-3403
Fax: 573-751-3721

Email: prevailingwage@labor.mo.gov
Website: www.labor.mo.gov/DLS/prevailingwage/

Missouri Department of Labor and Industrial Relations is an equal opportunity employer/program. TDD/TTY: 800-735-2966 Relay Missouri: 71
**DIVISION OF LABOR STANDARDS**

MISSOURI DEPARTMENT OF LABOR AND INDUSTRIAL RELATIONS

CONTRACTOR PAYROLL RECORDS
(See Sections 290.210 to 290.340, RSMo and 8 CSR 30-3.010 to 8 CSR 30-3.060)

<table>
<thead>
<tr>
<th>Name of</th>
<th>Contractor</th>
<th>Subcontractor</th>
<th>Address of Contractor or Subcontractor:</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>City:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name of Public Body</th>
<th>Address of Public Body:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>City:</td>
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</table>

<table>
<thead>
<tr>
<th>Payroll No.</th>
<th>For Week Ending</th>
<th>AWO</th>
<th>Project and Location</th>
<th>Project or Contract No.</th>
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</table>

<table>
<thead>
<tr>
<th>1. Name and Address of Employee</th>
<th>2. Occupational Title ***</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
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</thead>
<tbody>
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<td>Day</td>
<td>Date</td>
<td>Hours Worked Each Day</td>
<td>Project/Week</td>
<td>FICA and Medicare</td>
<td>Federal and State Withholding Tax</td>
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*** If a worker performs work in more than one occupational title, you must separately list the hours worked per occupational title and wage rates. ***
**FRINGE BENEFITS**

In addition to the basic rates paid to each laborer or mechanic on the payroll, payments have been or will be made to appropriate programs for the benefit of these employees as shown in the following chart below. If fringe benefit amounts paid are the same for all employees, you may list the amount of each such identical fringe payment only once in the appropriate column, if the fringe benefit amounts vary by employee, list each employee’s name and set out the amounts paid on behalf of each employee for each fringe benefit.

<table>
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<tr>
<th>Employee Name</th>
<th>Health and Welfare ($/hr)</th>
<th>Pension ($/hr)</th>
<th>Vacation ($/hr)</th>
<th>Holiday ($/hr)</th>
<th>Apprentice Training ($/hr)</th>
<th>Other C ($/hr)</th>
<th>Other D ($/hr)</th>
<th>Total ($/hr)</th>
<th>If “Other/Deduction” or Fringes, please explain. (Indicate Other A, B, C or D)</th>
<th>Identify by name, the plan, fund, or programs to which fringe benefits are paid. (Indicate H&amp;W, Pension, etc.)</th>
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Date: ________________

I, ____________________________________________ (Name of Signatory Party), ____________________________ (Title) do hereby state:

(1) That I pay or supervise the payment of the persons employed by ____________________________ (Contractor or Subcontractor) on the ____________________________ (Building or Work), that during the payroll period commencing seven (7) days prior to the week ending date of __________ all persons employed on said project have been paid the full weekly wages stated above, that no rebates have been or will be made either directly or indirectly to or on behalf of ____________________________________________ (Contractor or Subcontractor), from the full weekly wages earned by any person and that no deductions have been made either directly or indirectly from the full wages earned by any person, other than legally permissible deductions, that full and accurate records clearly indicating the names, occupations, and crafts of every worker employed by them in connection with the public work together with an accurate record of the number of hours worked by each worker and the actual wages paid for each class or type of work performed and deduction made for each worker have been prepared, that these payroll records are kept and have been provided for inspection to the authorized representative of the contracting public body and will be available as often as may be necessary and such records shall not be destroyed or removed from the state for the period of one year following the completion of the public work in connection with which the records are made.

(2) That any payrolls otherwise under this contract required to be submitted for the above period are correct and complete; that the wage rates for laborers or mechanics contained therein are not less than the applicable wage rates contained in any wage order incorporated into the contract; that the occupational title set forth herein for each laborer or mechanic conform with the work performed.

Name and Title | Signature
---|---
The falsification of any of the above statements may subject the contractor or subcontractor to criminal prosecution. See Sections 290.340, 570.090, 575.050, and 575.060, RSMo.
Contractor or Subcontractor: Fill in your firm's name and check appropriate box.

Address: Fill in your firm's address and noted information.

Name of Public Body: Name of public entity for which work is being performed or who issued contract.

Address: Address of public entity.

Payroll No.: Begin with payroll No. 1.
Payroll reports must be submitted each week. If work was not performed in specified week, note "No Work".

For Week Ending: List the workweek ending date.

AWO: Indicate Annual Wage Order Number.

Project and Location: Name of Project/Project Location.

Project or Contract No.: Indicate Project Number or Contract Number.

1. Name and Address of Employee: List workers that worked on project for the listed week. Enter each worker's full name and address on weekly payroll. Both the name and address must be listed.

2. Occupational Title: List the occupational title of each worker. A worker may perform work under different occupational titles. The employer must keep accurate records showing the breakdown of hours worked for each occupational title. For a list of occupational titles, visit http://www.sos.mo.gov/adrules/CSR/current/8CSR/8C30-3.pdf.

3. Day and Date: List day of week in the top row (Su – M – Tu – W – Th – F – Sa), begin with the first day of the pay period. List calendar date in the bottom row (1, 2, 3, 4, 5, 6, 7…).
   Hours worked: Record number of hours worked per day.
   Straight Time (ST), Overtime (OT), Double Time (DT), if applicable.

4. Total Hours: Total hours worked for the listed week on this project.

5. Hourly Rate of Pay: List the actual hourly rate paid for straight time worked. When overtime is worked, show the overtime hourly rate paid in the "Overtime" box for each worker.

6. Gross Amount Earned: TOP CORNER – Project gross amount earned this pay period, on this project for the listed week. LOWER CORNER – Week total gross amount earned during week for work on all projects. If part of a worker's weekly wage was earned on projects other than the project described on given payroll, then the gross amount earned is gross earned for the week on all projects (example:
"$163/$420" would reflect a worker who earned $163 on a public works construction project and a total of $420 from all work performed for the listed week, including the public works project.

7. **Deductions:** Complete all required deductions. List any additional deductions in the "Other" column. Add all deductions, and place total in the "Total Deductions" column. On page 2 of the form, describe the deduction(s) contained in the "Other" columns in the space provided. If an individual worked on other jobs in addition to this project, show actual deductions from the weekly gross wage.

8. **Net Wages Paid for Week:** Net wages paid for the listed week on all projects. This is the take-home amount for the week.

**Page Two (Back of Form)**

**Required Statement:** An authorized agent of the contractor or subcontractor must complete and sign the "statement of compliance." The entry of any false information in this form will result in the agent and the contractor or subcontractor being subject to criminal prosecution and penalties under §§ 290.340, 575.050, 575.060, and 575.080, RSMo.
MISSOURI DEPARTMENT OF LABOR AND INDUSTRIAL RELATIONS

AFFIDAVIT

COMPLIANCE WITH THE PREVAILING WAGE LAW

I, ___________________________, upon being duly sworn upon my oath state that: (1) I am the ______________________ of ______________________; (2) all requirements of §§ 290.210 to 290.340, RSMo, pertaining to the payment of wages to workers employed on public works projects have been fully satisfied with regard to this company's work on ______________________; (3) I have reviewed and am familiar with the prevailing wage rules in 8 CSR 30-3.010 to 8 CSR 30-3.060; (4) based upon my knowledge of these rules, including the occupational titles set out in 8 CSR 30-3.060, I have completed full and accurate records clearly indicating (a) the names, occupations, and crafts of every worker employed by this company in connection with this project together with an accurate record of the number of hours worked by each worker and the actual wages paid for each class or type of work performed, (b) the payroll deductions that have been made for each worker, and (c) the amounts paid to provide fringe benefits, if any, for each worker; (5) the amounts paid to provide fringe benefits, if any, were irrevocably made to a fund, plan, or program on behalf of the workers; (6) these payroll records are kept and have been provided for inspection to the authorized representative of the contracting public body and will be available, as often as may be necessary, to such body and the Missouri Department of Labor and Industrial Relations; (7) such records shall not be destroyed or removed from the state for one year following the completion of this company's work on this project; and (8) there has been no exception to the full and complete compliance with the provisions and requirements of Annual Wage Order No. _____ Section ____ issued by the Missouri Division of Labor Standards and applicable to this project located in __________ County, Missouri, and completed on the ____ day of _____________, _____.

The matters stated herein are true to the best of my information, knowledge, and belief. I acknowledge that the falsification of any information set out above may subject me to criminal prosecution pursuant to §§290.340, 570.090, 575.040, 575.050, or 575.060, RSMo.

__________________________________
Signature

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

My commission expires ______________________, _____.

Notary Public

Receipt by Authorized Public Representative

Missouri Department of Labor and Industrial Relations is an equal opportunity employer/program.

PW-4 (07-14) AI
St. Charles County Ambulance District  
New Headquarters Campus  
Scope of Work for General Contractor

The Construction Manager (CM) referred to below is Navigate Building Solutions, LLC. The Owner referred to below is the St. Charles County Ambulance District. The Contractor referred to below is the General Contractor. This bid package includes, but is not limited to, the following:

1. Scope shall include all work outlined by the project documents (plans and specifications) issued by Archimages Inc. dated December 2, 2019.

2. This contractor shall include in the base bid price an unknown site conditions allowance of $400,000. Allowance shall include all overhead, profit, and fees as is allowed for Change Orders in specification section 01 20 01, Change Order Calculations. Unit prices provided on the Bid Form shall be used where applicable to work paid from the Allowance. Any savings to this allowance shall be reconciled via a deduct Change Order which shall include the associated overhead, profit, and fees. This allowance may only be used at the sole discretion of the CM and Owner. This allowance may not be used to address the effects of weather conditions. Allowance amount to be entered on Bid Form.

3. Contractor is aware of the potential for Liquidated Damages. Contractor shall be responsible to maintain scheduled items for the Contractor's work as included in the Master Project Schedule below. Contractor shall reference 2017 AIA 101 and AIA 201 as well as the Supplementary Conditions included in the bid documents. Contractor agrees to pay the Owner, or to deduct from the Contract Sum, not as a penalty, but as liquidated damages, the amounts listed in the contract drafts provided.

4. The AIA 101 and AIA 201 contract forms will be modified from their original versions. See Supplementary Conditions for the modifications that will be made to the contracts prior to issuance. Contractor shall read and agree to these documents as part of the bid process.

5. Upon execution of this contract, this contractor must submit to the CM a detailed critical path baseline construction schedule outlining each construction activity and phase. This schedule must fall within the Master Project Schedule outlined below and be submitted no later than twenty-one (21) days following execution of the contract. Contractor is required to provide updated work schedules at a minimum on a monthly basis with each pay application. Contractor's detailed activity schedule/critical path schedule shall adhere to the Master Project Schedule and shall provide for expeditious and practicable execution of the Work. Should the Contractor fall behind schedule by more than 5 work days due to the fault of this Contractor, the Contractor shall provide a recovery schedule to the CM within 5 days of request by the CM.

**Master Project Schedule Milestone Dates:**

1. Request for Bids  
   December 2, 2019
2. Pre-Bid Meeting  
   December 11, 2019 at 3:00 PM
3. Bid RFIs Due  
   January 3, 2020 at 5:00 PM
4. Last Bid Addenda Issued (if necessary)  
   January 6, 2020 at 5:00 PM
5. Receipt of Bids  
   January 9, 2020 at 2:00 PM
6. Supplemental Bid Information Due January 10, 2020 at 2:00 PM
7. Final Board Approval February 13, 2020
8. Issue Contract February 18, 2020
9. Notice to Proceed / Mobilization (Day 1) March 2, 2020
10. Groundbreaking Date TBD by Owner
11. All Submittals Submitted for Review June 15, 2020
12. Place first course of paving on rear lot, for temporary parking use Spring 2020
13. Pave drive lanes and parking lots complete with curb and first course of paving, leaving out only as necessary around building for exterior wall construction access October 30, 2020
14. Topping Out Ceremony Date TBD by Owner
15. Building ‘Dry-In’:
   - Watertight roof
   - Exterior wall air barrier in place
   - All windows / storefront / curtainwall installed, or openings filled with temporary watertight construction October 30, 2020
16. General Contractor Internal Pre-Punch 5 weeks prior to Substantial Completion
17. Substantial Completion / Punchlist Populated (Day ___*) *Based on Bidder’s proposed duration
   All Life Safety Inspections & Occupancy Inspections to be completed on or before Substantial Completion date.
18. Final Completion / Completion of Punchlist 30 calendar days after Subst. Completion

6. The contractual project duration shall be proposed by bidders on the Bid Form. The proposed duration will be used as key criteria along with other information on the Bid Form to select and award a General Contractor. The project duration will be incorporated into the Contract between the Owner and the General Contractor.

7. Contractor accepts all risks associated with adverse weather. No time extensions will be granted related to claims of adverse weather. No claims for extra costs will be granted related to adverse weather and/or taking action to deal with adverse weather and/or the effects of adverse weather. All provisions in the A101 and A201 otherwise respecting weather are superseded by this provision, and are of no force and effect.

8. Any claims for delay to critical path activities shall be submitted to the Construction Manager within 24 hours of occurrence, identifying the event and the impacted critical path activity. The Construction Manager will review to determine if the claim will be considered a valid delay. Each day claimed shall be tracked on a log for review at the bi-weekly Owner meetings.

9. Contractor is required to provide detailed work schedule (short term schedule) on a weekly
basis. Contractor’s detailed work schedule shall adhere to the Master Project Schedule and the accepted contractual project duration. Contractor shall meet the requirements of the Master Project Schedule.

10. Provide all supervision, labor, tools, equipment and materials to complete the work.

11. Perform all unloading, loading, distribution and hoisting of materials for this scope of work.

12. Furnish, install, maintain and remove temporary on-site trailers and storage containers as required to perform the work. Trailer shall include a conference room with table and chairs for Owner and Architect meetings, and other meetings as needed.

13. Perform all work in accordance with OSHA standards (including OSHA 10-hour requirement). This Contractor is responsible for OSHA required safety railings (installation, maintenance and removal) including appropriate OSHA approved system for roof edge protection for all trades.

14. Provide ladders for all contractors to access the upper floor until the stairs are in place and available for use.

15. The Owner will provide the MO DNR Land Disturbance permit, City of St. Peters Building permit, City of St. Peters water and sewer tap fees and Central County Fire Protection Fire permit. This Contractor (or its subcontractors) is responsible for all other trade permits, if required and fees required by state, county, local, regional, and federal authorities and agencies associated with this scope of work. This Contractor is required to comply with all permit requirements and inspection requirements associated with such permits. This Contractor is also required to obtain a Business License from the City of St. Peters.

16. Contractor to obtain fire alarm permit and fire sprinkler permit. Coordinate with Fire District for inspection of fire lines and fire hydrants. Site fire line into the building shall be flushed prior to interior drywall partition construction.

17. Coordinate all work with the Construction Manager’s representative.

18. Bi-weekly meetings at the jobsite will be held with the Owner Representative. The work of this contractor must be performed in accordance with the decision and schedules formulated at these meetings so as not to delay the work. The Contractor’s Project Manager and Foreman/Superintendent must be present at these meetings. This contractor shall keep minutes of these meetings and forward to the CM for review within 4 working days after the meeting.

19. Weekly meetings at the jobsite MUST be held with this contractor and its subcontractor’s Foreman/Project Managers to coordinate installation of all systems. The Owner, Architect and the CM shall be invited to all of these meetings and will attend at their discretion. This contractor shall keep minutes of these meetings and forward to the CM for review weekly.

20. General Contractor and its HVAC, Plumbing, Fire Protection and Electrical subcontractors will be expected to coordinate above-ceiling work prior to installation, including the creation of drawing overlays to identify and address interferences prior to installation.

21. This Contractor shall provide all surveying and layout required to complete the work.

22. Review all drawings and specifications and accept responsibility for requirements, general notes, notes, specifications, and details as they relate to this scope of work.
23. General Contractor will install, maintain, and remove all SWPPP scope of work. Contractor will provide all SWPPP reports per MDNR standards. Provide SWPPP reports to the CM on a weekly basis and immediately following each rain event.

24. This Contractor is responsible for locating all public and private utilities.

25. Provide street cleaning to remove dirt, mud, and debris generated by the project site as needed to maintain a clean surface at existing drives, parking lots and public roads.

26. Take note of nearest water source and the schedule for water line installation; if no water is available on site, provide alternate means for tire wash down of trucks prior to leaving the site.

27. Provide barricades, signage, flagging and flagman for traffic control and public safety during the execution of the work. Coordination of all road closures (full or partial) with CM and city officials.

28. Protect adjacent properties and utilities as required during the execution of this work. Provide shoring or underpinning as required for safe excavations to meet OSHA requirements and to protect adjacent streets, sidewalks, utilities and existing structure(s). If this requires engineered shoring systems, this Contractor will provide as needed for this scope of work.

29. This Contractor to cleanup all rubbish and debris from site and building on a daily basis. This includes off-site disposal of all rubbish and debris along with excess spoils, unsuitable materials, excess materials such as concrete, sand and masonry materials. Trucks or dumpsters to haul off material by this Contractor.

30. This Contractor shall furnish all dumpsters for the entire project and shall include cost to haul offsite and legally dispose of all construction rubbish and debris.

31. This contractor to broom clean all floors at least once a week to ensure housekeeping stays up to par.

32. This Contractor shall provide a heavy construction cleaning prior to punch list creation so all surfaces can be observed by the design team. Clean exterior and interior surfaces exposed to view; remove temporary labels, stains, putty, soil, paint and foreign substances from all surfaces, including glass and painted surfaces; polish transparent and glossy surfaces; clean equipment and fixtures to a sanitary condition; replace air filters in mechanical equipment; clean roofs, gutters, and downspouts; remove obstructions and flush debris from drainage systems; clean site; sweep paved areas and rake clean other surfaces; remove trash and surplus materials from the site; clean and polish all floors; clean and polish all hardware; and repair all Work damaged during cleaning.

33. Provide final cleaning of all buildings and site prior to occupancy.

34. Contractor will provide temporary construction toilets for the project for all Contractors, visitors, etc.

35. Contractor will provide ice, cups and distribute drinking water as needed for workers performing this scope of work.

36. This Contractor and all subcontractors will be responsible to review all specifications and drawings.

37. Contractor must not burn in the concrete at the carpet tile, vinyl, or other resilient flooring locations. Contractor to ensure floors are kept dry and clean so that the concrete can dry in order to accept adhesive for flooring products. Include moisture mitigation as required by the specifications.
38. The Owner, Architect, and CM will be very stringent on the quality of exposed concrete floors during punch list. It is ultimately in this Contractor’s scope of work to protect all finish products through education, signage, and temporary protection. Proper concrete protection from staining must be observed and will be enforced. Steel must not be placed on slab to avoid staining. Diaper hydraulic powered equipment to avoid oil and gasoline staining. Pipe cutting machines shall not be used on the concrete slabs where the exposed concrete finishes are scheduled. Any rubber-tired traffic shall be kept at a minimum and shall be protected with drop cloths.

39. Plan concrete floor pours such that a single pour covers any continuous area of architecturally exposed concrete, stained concrete or polished concrete floors in the Administration area.

40. No lignite to be allowed in any interior flatwork concrete.

41. Contractor to furnish first aid and safety supplies as needed for this scope of work.

42. Contractor is solely responsible for site/project safety for this scope of work.

43. Contractor to maintain Site Specific Safety Plan which shall be completed and kept in their job trailer at all times.

44. Contractor to grout fill frames per architectural details and notes.

45. Provide code compliant seismic support and bracing as required for installation of acoustical ceiling systems per contract documents.

46. Provide fire stop systems as required for the installation of this scope of work.

47. Provide stenciling of rated walls according to AHJ requirements.

48. Include cost to furnish and install toilet accessories as indicated.

49. Include wall blocking as needed for ALL toilet accessories, TV’s, etc. regardless of OFCI, OFOI, or CFCI status.

50. Contractor to provide and maintain weather protection for material and work as required by the project schedule. Contractor to also provide any cold or hot weather measures for weather sensitive materials like concrete, masonry, roofing materials, air/vapor barrier, etc. This shall include but is not limited to tenting and heating for masonry installation. Delays will not be awarded for construction activities impacted by hot/cold temperatures. If wet site conditions are hindering the progress onsite and access for trades, this Contractor shall provide temporary rock access to those areas to maintain the project schedule.

51. Include water pumping and dewatering necessary to proceed with work being performed under this bid package. Refer to Geotechnical Report for anticipated groundwater.

52. This Contractor is responsible for securing the building once it is reasonably possible to do with temporary or permanent measures at the close of every day. Any temporary openings in walls are to be secured at the end of the work day.

53. This Contractor to supply, install, maintain, move and remove temporary site fence with gates. See Site Logistics Plan in bid documents.
54. Provide and remove temporary rock parking for visitors to the site, temporary construction parking, staging, and laydown areas. Location of all staging/trailer placement/access to be coordinated and approved by the Construction Manager. See Site Logistics Plan in bid documents.

55. A fire apparatus access road is required by the Fire District Fire Prevention Code. Access road must be a paved surface from the street all the way to the building slab. The Fire District must be able to access all parts of the building interior on foot from the point where this road meets the building. At a minimum this shall be 3” of asphalt over 8” of rock base, 20’ in width and capable of supporting a fire apparatus GVW 80,000 lbs. Road shall be in place before the vertical construction begins. Road must be kept clean, clear of debris and clear of all construction parking at all times, to maintain a path for emergency response vehicles to reach the building while it is under construction. Repairs may be necessary if the access road becomes damaged during the process of construction. Road to be blocked off from construction traffic as soon as it is constructed.

56. General Contractor shall place rock around the building perimeter to create an all-weather access path for crane access and exterior wall construction.

57. Contractor is responsible for any coordination of staging or relocation for materials for this scope of work after initial unloading.

58. Soil testing, concrete testing and the Special Inspections listed on structural plans shall be performed by Owner’s consultant and paid for by Owner. Contractor will assist and coordinate/schedule with the agency to perform onsite testing work as needed/required by the documents. If the agency must re-test or re-inspect for failed tests/inspections or if the Contractor fails to notify the testing agency of a cancelled test/inspection, this Contractor shall compensate the Owner for such tests.

59. The Owner may opt to utilize a third party exterior envelope testing agency. General Contractor to assist with such testing.

60. No smoking shall be allowed inside the building once interior construction begins.

61. Full-time onsite superintendent is required when any Work is taking place.

62. The contractor shall use Procore Project Management software program for coordination of project RFIs, submittals, change orders, etc. Contractor shall be the administrator and maintain all records in the program, and shall grant access to the Owner, CM and design team members. Include the cost associated with the use of such program.

63. This Contractor shall produce a submittal log at the beginning of the project that is populated with all of the required submittals for this scope of work and assign due dates for submission to the Architect and due dates for return from the Architect. This log must be submitted to the CM and Architect for review on a weekly basis.

64. The Project Milestone Dates identify when all submittals shall be submitted for review. This milestone does not relieve the Contractor of completing select submittals sooner, as needed to meet the overall project schedule for installation of the work.

65. This Contractor shall maintain an RFI log for this scope of work. This log must be submitted to the CM and Architect for review on a weekly basis. Log to include:
   a. RFI number
b. Topic of RFI
c. Date submitted
d. Date requested response by
e. Date returned
f. Status- Open or Closed

66. Immediately upon award, this Contractor shall submit any proposed revisions to Site Logistics Plan for review. The Owner, CM, Contractor, and Architect will meet to review and discuss site logistics and finalize an agreed upon plan of action for construction parking, office/storage containers, temporary toilets, temporary site fence, etc.

67. This Contractor must prepare and make available upon request, a procurement log for this scope of work for all long lead materials and equipment. Procurement log must include date of order, date of confirmation of order, expected delivery date, actual delivery date, and comments noting any changes to dates and reasons for change.

68. This Contractor shall organize and arrange for pre-installation meetings for this scope of work for all major scopes of work with the subcontractors and manufacturers prior to commencement of those activities and invite the Owner, Architect, and CM to all pre-installation meetings. This contractor shall keep minutes of those meetings and forward to the CM and Architect for review.

69. This Contractor will be responsible for submitting daily logs containing the number of workers, equipment, work accomplished, daily weather, deliveries, visitors to the site, any inspections passed or failed, problems encountered, and other relevant data as may be required. These reports must be emailed to the CM daily, within 24 hours of work performance, utilizing an Apple iPad app called Construction Superintendent.

70. Provide photographs of all below slab, in slab, and in-wall rough in. Organize photos electronically and label with location. Submit ‘rough in photograph’ package at the end of the project. CM may ask for progress photos during project as needed for reference or coordination.

71. This Contractor shall arrange, schedule, organize and video tape as it pertains to this scope of work all equipment start-ups and Owner Training sessions per contract documents.

72. This Contractor must populate a closeout log and submit to the CM and Architect for review to verify that all required items have been included. Once approved, this log will be used to track required closeout items prior to final payment. This contractor is highly encouraged to submit O&M requirements as soon as possible in advance of final acceptance to help eliminate delay in payment.

73. This Contractor is responsible for any temporary heating/cooling, humidifying/dehumidifying as needed to maintain the project schedule and as needed prior to starting the permanent HVAC equipment. Use of the new HVAC system will not be allowed during construction.

74. This Contractor shall be responsible for the cost of temporary utilities usage for all trades during the course of construction including but not limited to: gas, electric, sewer, water. Contractor is responsible for any backflow preventer costs/water usage costs for hydrant use.

75. Contractor shall coordinate, furnish and install temporary transformer according to Ameren requirements.

76. Furnish and install concrete transformer pad per Ameren UE Specifications.
77. Provide fuel for generator testing. At turnover of emergency generator, this Contractor is to completely fill generator fuel tank.

78. Clean all HVAC coils and replace all filters with new filters at the time of building turnover to the Owner.

79. All ductwork ends to be sealed before arriving at site and seals at end of runs to be maintained.

80. This Contractor will compile for the Owner a ‘record set’ of all documents and drawings, as it pertains to this scope of work, for the project at Substantial Completion. This shall be ‘red-lined’ copies of all project changes throughout the course of the project to identify all systems as they were actually installed on the project for the Owner’s records. These must be electronically recorded and submitted to the Owner in pdf format.

81. As-built Surveys will be required by this Contractor at the Completion of the Project, including for Site Utilities, rain gardens, detention basins, etc. to submit to Utility company/department or City/County for final approval. A portion of retainage will be held until all surveyed as-builts have been submitted and accepted by the utility company and authorities having jurisdiction.

82. Contractor is required to hold their alternate pricing that was included in the bid form for 3 months after the bid date, unless noted otherwise in the alternate description. Contractor will notify CM when decisions need to be made regarding the acceptance of bid alternates in order to maintain deliveries, installation, and the master project schedule.

83. The Master Project Milestone Dates include all work proposed in the Bid Alternates. No time extensions will be granted for accepted Alternates.

84. Unit prices provided on the Bid Form and incorporated into the contract shall apply to the condition described in the unit price, regardless of which subcontractor performs the work or when the work is being performed.

85. Construction work shall only be allowed during hours permitted by the City of St. Peters and St. Charles County. If Contractor opts to work outside of those hours, they must contact the City and the County to obtain permission, and also obtain permission from Owner.

86. During the warranty period of the project, this Contractor shall document, maintain and update a Warranty Log of all warranty items, weekly, to be shared with the Client and CM. Contractor shall acknowledge the Owner’s warranty call within 4 hours and keep the Owner apprised of the resolution status. Any roof or building envelope leaks or elevator issues or any issue that interferes with regular building operations shall be considered as urgent / emergencies. Contractor to provide a 24-hour on-call service for such urgent or emergency items.

87. Builder’s Risk to be carried by the General Contractor. Deductibles to be paid by General Contractor.

88. Contractor is required to maintain access to the work as needed to maintain schedule.

89. No change orders will be issued for material cost increases or impacts of tariffs that occur during the project.

90. The Owner will provide and maintain two time-lapse cameras to record progress of construction.
General Contractor to provide two sturdy 20-foot tall mounting posts in location to be coordinated with the Owner. General Contractor to mount cameras on pole. Provide access to the pole for periodic maintenance once a month for the duration of the project. Remove poles at the completion of the project. Turn over cameras to the Owner.

91. This Contractor shall provide an opportunity for a ground-breaking ceremony. General Contractor to provide a twelve-inch high mound of lose dirt, three feet wide and forty feet long to be removed after ceremony.

92. This Contractor shall provide an opportunity for a topping out ceremony. General Contractor to coordinate with Owner to provide location, parking, accessible steel beam and hoisting for ceremony.

93. If this contractor chooses to backfill foundation walls prior to that time which is approved/allowed by the structural engineer, this Contractor is responsible for designing, installing, rental (and eventual removal) of all temporary shoring of foundation walls prior to backfill.

94. Provide housekeeping pads.

95. Proof roll subgrade prior to placing base rock for paving.

96. Asphalt lifts shall be no greater than 3” thick.

97. Provide site bollards complete with footing, anchoring, concrete fill, painting and plastic covers.

98. Provide all interior and exterior signage shown on plans and indicated in specifications, including site and parking signage.

99. Regrade / restore site after temporary transformer is removed. See Site Logistics plan for location.

100. Include soil remediation below the building pad and all footings per recommendations in the geotechnical report. Include remediation to depths of 3’ below floor slab, 2’ below footings, and extending beyond the building slab to the distances indicated in the geotechnical report. Include import/placement/compaction of engineered fill (1” minus gradation crushed limestone) and haul off of unsuitable material. Include recompaction as directed by the materials testing agency at the bottom of footings following footing excavation into the granular remediation material.

101. Include aeration of soil below paved areas using a disk and allowing soil to air dry. Refer to second paragraph of 6.5 in the Geotechnical Report. Proof roll areas to be paved, under the observation of the materials testing agency, prior to applying drying efforts and again after drying, spreading and recompacting soil.

102. If more or less remediation is required beyond what is included by the two statements above, the change in work will be addressed by Unit Prices included on the Bid Form. In such case, unit quantities must be tracked by the Contractor and confirmed by the Materials Testing agency.

103. The Master Project Milestone Dates include base bid soil remediation. No time extensions will be granted for soil remediation taking place under the base bid.

104. No change orders will be awarded for additional forming or additional concrete in overexcavated footings.

105. All areas must be left at the end of each day so that there is no standing water. Grade temporary swales to drain site, if necessary to achieve this requirement.
106. Strip topsoil, stockpile, and stabilize until ready for use. Spread topsoil to the depth required by civil and landscape drawings and landscape specifications.

107. Pressure test and chlorinate site water lines. Provide test reports to Owner verifying acceptable pressures and chlorination. Coordinate with utility company / fire district and obtain approval from those parties as required.

108. Verify that all plumbing fixtures are mounted at ADA height required by AHJ.

109. Include all caulking and sealants for all systems and materials furnished and installed on the bid documents.

110. Provide access panels needed for all work installed under this contract.

111. Coordinate work between elevator subcontractor and all other trades. Trade jurisdiction disputes are not grounds for a Change Order. If a traveling raceway is necessary for installation of electrical devices in the elevator, include it in the Bid.

112. Provide a mockup per documents of the building envelope materials and construction techniques. The mockup should reflect the project document details and be installed exactly as indicated on the drawings. The purpose of the mockup is to not only review and achieve an approval of the materials, but also to ensure the transition of the materials results in a good water tight condition. Contractor to follow the mockup guidelines outlined in the project documents. If the Contractor questions a detail provided, it should be submitted as an RFI and discussed with the project team prior to the construction of the mockup.

113. Contractor must include Professional Liability and errors and omissions insurance for the design-build scopes of work that are required by specifications to designed by a professional engineer. Drawings and calculations shall be signed and sealed by a Professional Engineer registered in the State of Missouri.

114. Review with the Owner before ordering the knox box and key switch on card readers at gates. Keying should be selected for ‘mutual aid’.
BID PROPOSAL FORM

This Bid Proposal Form must be completed, sealed in an envelope and received by the St. Charles County Ambulance District no later than 2:00 PM on the specified date.

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

Below is a contact for the BIDDER submitting this bid, who will be responsible for any questions that may arise during bid review and who may also be contacted to discuss the acceptance or rejection of this bid:

<table>
<thead>
<tr>
<th>BIDDER Company Name</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BIDDER Contact Person Name</td>
<td></td>
</tr>
<tr>
<td>Address</td>
<td></td>
</tr>
<tr>
<td>City/State/Zip</td>
<td></td>
</tr>
<tr>
<td>Phone Number</td>
<td></td>
</tr>
<tr>
<td>Email Address</td>
<td></td>
</tr>
<tr>
<td>Fax Number</td>
<td></td>
</tr>
</tbody>
</table>

BIDDER accepts all of the terms and conditions of the “Invitation to Bid” and the “Instructions to Bidders”, including without limitation those dealing with the disposition of Bid security.

STIPULATED SUM BID FORM

Name of Project: **St. Charles County Ambulance District – SCCAD Headquarters**

Date: ______________________

Proposal from: ____________________________________________________________

(Hereinafter called Bidder), a corporation organized and existing under the laws of the state of __________________________, a partnership, or an individual doing business as __________________________ (cross out inapplicable).
TO:      Attn:  Craig Meckfessel, Facilities Manager  
         St. Charles County Ambulance District  
         4169 Old Mill Parkway  
         St. Peters, MO  63376  

The Bidder, in compliance with the Invitation for Bid for the project, and having carefully examined  
the Bidding Documents as set forth in the Project Manual, which documents are made a part  
hereof, as well as the site and all conditions surrounding and affecting the work, agrees to furnish  
all labor, materials, and supplies necessary to perform all the work in accordance with said  
documents and within the time and at the prices stated below.  

BASE BID  

<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>ITEM DESCRIPTION</th>
<th>UNIT</th>
<th>PRICE PER UNIT</th>
<th>QUANTITY</th>
<th>SUB-TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Unknown Site Conditions Allowance</td>
<td>Lump Sum</td>
<td>$400,000</td>
<td>1</td>
<td>$400,000.00</td>
</tr>
<tr>
<td>2</td>
<td>P&amp;P Bond</td>
<td>Lump Sum</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Remaining Scope of Work</td>
<td>Lump Sum</td>
<td>1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total of lines above shall equal the Total Lump Sum Bid Below.  

Furnish all labor, tools, equipment, and material required to perform all work  
indicated for the St. Charles County Ambulance District Headquarters, as defined  
in the Bid Documents for the TOTAL LUMP SUM AMOUNT of  

$_____________________________________________________________________

TIME  

Board approval and issuance of conditional Notice to Proceed is anticipated to occur by March 2020.  
BIDDER hereby states that the time required to perform all work indicated in the BID DOCUMENTS  
(and any accepted alternates) and work necessary to complete the project per the project per the  
duration proposed on this Bid Form is acceptable. Liquidated Damages shall be assessed for delays  
to Substantial Completion and are further described in the bidding and contract requirements.  

Bidders shall propose a contractual duration for achieving Substantial in the blank space  
development below. Proposed duration will be utilized as criteria for selection of General Contractor.  

Complete all work related to new construction, site development, bid  
alternates, and anticipated base bid soil treatment / remediation to achieve  
Substantial Completion within __________ calendar days from the issuance  
of the Notice to Proceed.
**ALTERNATES - To be submitted at the time of Bid.** Bids will not be accepted if these alternates are not provided at the time of bid. Refer to section 01 23 00 for full description of ALTERNATES.

**ALTERNATE #1: Alternate Flooring Adhesive**
Add / Deduct (circle one): $______________________________

**ALTERNATE #2: Flooring Mitigation**
Add / Deduct (circle one): $______________________________

**ALTERNATE #3: Thicker Roofing Membrane**
Add / Deduct (circle one): $______________________________

**ALTERNATE #4: Painting Interior Tilt-Up**
Add / Deduct (circle one): $______________________________

**ALTERNATE #5: Painting Exposed Interior Structure**
Add / Deduct (circle one): $______________________________

**ALTERNATE #6: Increased Tree Size Caliper**
Add / Deduct (circle one): $______________________________

**ALTERNATE #7: Acoustic Decking**
Add / Deduct (circle one): $______________________________

**ALTERNATE #8: Quiet Room Acoustic Panels**
Add / Deduct (circle one): $______________________________

**ALTERNATE #9: Additional Fiber Conduit**
Add / Deduct (circle one): $______________________________

**ALTERNATE #10: Stairwell HVAC**
Add / Deduct (circle one): $______________________________

**ALTERNATE #11: Stairwell Treads**
Add / Deduct (circle one): $______________________________

**ALTERNATE #12: Lightning Protection**
Add / Deduct (circle one): $______________________________
UNIT PRICES - To be submitted to Owner 24 Hours after Bid Date/Time.
Unit Prices for scope adjustments after award shall be provided for the items listed in section 01 22 00 – UNIT PRICES. Provide Unit Prices on the “Supplemental Bid Information” form provided in the Specifications. Submit within 24 hours of the Bid date and time.

LIST OF PROPOSED SUBCONTRACTORS – To be submitted to Owner 24 Hours after Bid Date/Time.
List all proposed subcontractors on the “Supplemental Bid Information” form provided in the Specifications. Submit within 24 hours of the Bid date and time.

APPRENTICESHIP CERTIFICATION – To be submitted to Owner 24 Hours after Bid Date/Time.

REFERENCES – To be submitted at the time of Bid.
Bids will not be accepted if references are not provided at the time of bid. Bidder shall provide at least three references of similar projects.

Company: ____________________________________________________________________________________
Address:  _____________________________________________________________________________________
Contact Person:  _______________________________________________________________________________
Telephone:  ___________________________________________________________________________________
Email: ________________________________________________________________________________________
Type of service provided:  _________________________________________________________________________
Dates/year(s) service was provided:  ______________________________________________________________

Company: ____________________________________________________________________________________
Address:  _____________________________________________________________________________________
Contact Person:  _______________________________________________________________________________
Telephone:  ___________________________________________________________________________________
Email: ________________________________________________________________________________________
Type of service provided:  _________________________________________________________________________
Dates/year(s) service was provided:  ______________________________________________________________

Company: ____________________________________________________________________________________
Address:  _____________________________________________________________________________________
Contact Person:  _______________________________________________________________________________
Telephone:  ___________________________________________________________________________________
Email: ________________________________________________________________________________________
Type of service provided:  _________________________________________________________________________
Dates/year(s) service was provided:  ______________________________________________________________
Address: _____________________________________________________________________________________
Contact Person: _______________________________________________________________________________
Telephone: ___________________________________________________________________________________
Email: ________________________________________________________________________________________
Type of service provided: _________________________________________________________________________
Dates/year(s) service was provided: ___________________________________________________________________

QUALIFICATIONS – To be submitted at the time of Bid.

Organization

1. How many years has your organization been in business as a Contractor? ______________
2. How many years has your organization been in business under its present business name? ______________
3. Under what other or former names has your organization operated?
   __________________________________________________________
   __________________________________________________________
4. How many persons do you have working for the company?
   Operators: ________ Carpenters: ________ Laborers: ________
   Superintendents: ________ Office Management: ________ Other Trades: ________
5. What is your company's EMR? ______
6. State the amount of the deductibles on all insurance that you will be providing for the Project:
   Workers Compensation Insurance: ____________________________
   Commercial General Liability Insurance: _______________________
   Automobile Liability Insurance: ______________________________

Experience

1. On a separate sheet list all projects completed by your firm in the past five (5) years, with a contract value of $15M or greater. List project name, client, architect, total contract value, date of completion and percentage of the cost of work performed with your own forces.
2. List the categories of work that your organization normally performs with its own forces:
   1. __________________________________________________________________________
   2. __________________________________________________________________________
   3. __________________________________________________________________________
   4. __________________________________________________________________________
   5. __________________________________________________________________________
Claims And Suits

If the answer to any of the questions below is “yes”, please attach written description of details.

1. Has your organization ever failed to complete any work awarded to it?
   
   Yes:____________ No:____________

2. Are there any judgments, claims, arbitration proceedings, or suits pending or outstanding against your organization or its officers?
   
   Yes:____________ No:____________

3. Has your organization filed any lawsuits or requested arbitration with regard to construction contracts within the last five (5) years?

   Yes:____________ No:____________

Other Construction Work

1. On a separate sheet, list major construction projects your organization has in backlog and in progress, giving the name of project, owner, architect, contract amount, percent complete and scheduled completion date.

2. State total worth of work in progress and under contract: $______________________________

3. State average annual amount of construction work performed during the past five years: $______________________________

4. State current bonding capacity: $______________________________

5. State name of scheduling system currently being used:
   
   ____________________________________________

6. On a separate sheet, list the construction experience and present commitments of the key individuals of your organization. Please identify which individuals you intend to commit to this project if awarded the Contract.

BID DOCUMENTS

A. Bidder acknowledges receipt of the following Documents and Addenda:

1. Drawings and Specifications

2. Addenda
   
   a. Addenda No. _____ Dated _____
   b. Addenda No. _____ Dated _____
   c. Addenda No. _____ Dated _____
   d. Addenda No. _____ Dated _____
   e. Addenda No. _____ Dated _____
MISCELLANEOUS BID REQUIREMENTS

A. The undersigned understands that this bid shall be good and may not be withdrawn for a period of sixty (60) calendar days after the scheduled closing time and date for receiving bids.

B. The undersigned understands that the Owner reserves the right to reject any or all bids or subcontractors.

C. The undersigned further agrees to indemnify and save the Owner from and against all losses, judgments of every nature and description made, brought, or recovered against the Owner by reason of any act or omission of the undersigned, his agents, subcontractors, or employees in the execution of the work or in guarding the same.

D. The undersigned hereby declares that this Stipulated Sum Bid is based solely upon the materials and equipment described in the bidding documents (including Addenda), and that no substitutions are contemplated.

E. The Bidder declares that he/she has had an opportunity to examine the site of the work and he/she has examined the bidding Documents therefore, and that he/she has carefully prepared his/her Bid upon the basis thereof and that he/she has carefully examined and checked this Bid and the materials, equipment and labor required thereunder, the cost thereof, and the figures therefor, and hereby states that the amount or amounts set forth in this Bid is, or are, correct and that no mistake or error has occurred in this bid.

F. See next page for signatures. Refer to specification section 00 21 13 for instructions on submitting as a Joint Venture, Partnership or Corporation.
IF A CORPORATION

Name of Corporation  ________________________________  Signature of Officer  ________________________________  

Name and Title of Officer  ________________________________  

Incorporated under the laws of the State of _______________________ (Print)  

Licensed to do business in Missouri?  [ ] Yes  [ ] No  

Address for Communications  ________________________________  

(Seal if bid is by a corporation.)  

IF A PARTNERSHIP  State name and address of all partners.  Each partner shall execute the Bid Form under their respective seals.  Attach a copy of the Partnership / Joint Venture agreement to the Bid Form.  

Name of Partnership  ________________________________  Signature of Authorized Partner  ________________________________  

IF INDIVIDUAL  

Name of Firm (if any)  ________________________________  Address for Communications  ________________________________  

Signature of Individual  ________________________________  

Name of Individual (Print)  ________________________________

IF BIDDING AS A JOINT VENTURE  List all parties, and indicate which party will be designated as the ‘Lead.’  Each party of the Joint Venture shall execute the Bid Form under their respective seals.  Attach a copy of the Partnership / Joint Venture agreement to the Bid Form.  

______________________________  ________________________________  

______________________________  ________________________________  

00 41 00 - Bid Proposal Form  Page 8 of 8
SUPPLEMENTAL BID INFORMATION

ATTN: Craig Meckfessel
St. Charles County Ambulance District
4169 Old Mill Parkway
St. Peters, MO  63376

Proposal for:
St. Charles County Ambulance District – SCCAD Headquarters
2000 Salt River Road, St. Peters, MO  63376

This form shall be completed and submitted in its entirety no later than 24 hours following the receipt of the Bids to the Owner. Bidder must submit Supplemental Bid Information via email as follows:

Re: Supplemental Bid Information for SCCAD Headquarters
Attn: Craig Meckfessel, St. Charles County Ambulance District; cmeckfessel@sccad.com
CC: Collette Koscielski, Navigate Building Solutions; collette@navigatebuildingsolutions.com

Name of Project:  St. Charles County Ambulance District – SCCAD Headquarters

Date:  

Proposal from:  

UNIT PRICES for SCCAD Headquarters:

<table>
<thead>
<tr>
<th>Unit Price Description</th>
<th>Unit</th>
<th>$/Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit Price No. 1: Removal and haul-off of rippable rock.</td>
<td>Per CY</td>
<td></td>
</tr>
<tr>
<td>Unit Price No. 2: Removal and haul-off of non-rippable rock.</td>
<td>Per CY</td>
<td></td>
</tr>
<tr>
<td>Unit Price No. 3: Removal and haul-off of trench rock.</td>
<td>Per CY</td>
<td></td>
</tr>
<tr>
<td>Unit Price No. 4: Removal and disposal of existing buried concrete man-made structures.</td>
<td>Per CY</td>
<td></td>
</tr>
<tr>
<td>Unit Price No. 5: Removal, haul-off and disposal of unsuitable soils and placement of lean concrete for soil remediation.</td>
<td>Per CY</td>
<td></td>
</tr>
<tr>
<td>Unit Price No.</td>
<td>Description</td>
<td>Unit</td>
</tr>
<tr>
<td>-----------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>No. 6</td>
<td>Removal, haul-off and disposal of unsuitable soils and import &amp; compaction of 1” granular material for soil remediation per recommendations in Geotechnical Report.</td>
<td>Per CY</td>
</tr>
<tr>
<td>No. 7</td>
<td>Removal, haul-off and disposal of unsuitable soils and import &amp; compaction of suitable soils per recommendations in Geotechnical Report.</td>
<td>Per CY</td>
</tr>
<tr>
<td>No. 8</td>
<td>Lime treatment of on-site unsatisfactory soils, tilled into a depth directed by Geotechnical Engineer. Include tilling, spreading and recompaclion of treated soil. See section 6.1 in the Geotechnical Report for percentages of Code-L or quicklime additive.</td>
<td>Per CY</td>
</tr>
<tr>
<td>No. 9</td>
<td>Moisture conditioning existing subgrade material by aerating soil with a disk and allowing to air dry. Include spreading and recompaclion.</td>
<td>Per CY</td>
</tr>
<tr>
<td>No. 10</td>
<td>Load and haul-off of surplus soils.</td>
<td>Per CY</td>
</tr>
<tr>
<td>No. 11</td>
<td>Import, placement and compaction of suitable soil.</td>
<td>Per CY</td>
</tr>
<tr>
<td>No. 12</td>
<td>1” clean rock placement and compaction</td>
<td>Per CY</td>
</tr>
<tr>
<td>No. 13</td>
<td>1” minus rock placement and compaction</td>
<td>Per CY</td>
</tr>
<tr>
<td>No. 14</td>
<td>2” clean rock placement and compaction</td>
<td>Per CY</td>
</tr>
<tr>
<td>No. 15</td>
<td>2” minus rock placement and compaction</td>
<td>Per CY</td>
</tr>
<tr>
<td>No. 16</td>
<td>Topsoil place and final grade</td>
<td>Per CY</td>
</tr>
</tbody>
</table>
**LIST OF PROPOSED SUBCONTRACTORS** for SCCAD Headquarters:

Please list the two subcontractors in each category that the referenced Bidder is considering for subcontract award for materials, services, supplies, specialty contractors, etc. in each category below. Also indicate if your firm has previously worked with the listed Subcontractor. Where not applicable for this Bid Package, please indicate “N/A.”

If you do not plan to use subcontractors, indicate below and return this form with your bid.

<table>
<thead>
<tr>
<th>Scope of Work</th>
<th>Proposed Subcontractors</th>
<th>Have You Worked with Previously?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Earthwork / Clearing</td>
<td>1.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.</td>
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</tr>
<tr>
<td>Site Utilities</td>
<td>1.</td>
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<td></td>
<td>2.</td>
<td></td>
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<tr>
<td>Asphalt</td>
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<tr>
<td></td>
<td>2.</td>
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<td>Landscaping/ Irrigation</td>
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<tr>
<td></td>
<td>2.</td>
<td></td>
</tr>
<tr>
<td>Site Concrete</td>
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<tr>
<td></td>
<td>2.</td>
<td></td>
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<tr>
<td>Footings/ Foundations</td>
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<tr>
<td></td>
<td>2.</td>
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<td>Concrete Flatwork</td>
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<td>2.</td>
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</tr>
<tr>
<td>Tilt-Up Concrete</td>
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<td></td>
<td>2.</td>
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<td>Masonry</td>
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<tr>
<td></td>
<td>2.</td>
<td></td>
</tr>
<tr>
<td>Steel Fabricator</td>
<td>1.</td>
<td></td>
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<tr>
<td>Task</td>
<td>1.</td>
<td>2.</td>
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**APPRENTICESHIP CERTIFICATION** – Complete separate form contained in Project Manual and submit with this Supplemental Bid Information.
Submitted By:

Bidder: ____________________________________________

Address: ____________________________________________

____________________________________________________

Business Telephone: ___________________ Fax: ________________

Typed/Printed Name: ____________________________________________

Authorized Signature: ____________________________________________

Title: ____________________________________________ (Seal, if bid by a Corporation)

Date: ____________________________________________

END: SUPPLEMENTAL BID INFORMATION
ST. CHARLES COUNTY AMBULANCE DISTRICT
SCCAD Headquarters, 2000 Salt River Road, St. Peters MO

APPRENTICESHIP PROGRAM CERTIFICATION

General Contractor Bidders to complete and submit to Owner 24 hours after bids are due, with Supplemental Bid Information.

Subcontractors to complete and submit to Owner, via the General Contractor, prior to beginning work onsite.

________________________________________
hereby certifies that
(Company name of Contractor/Subcontractor)

A. All contractors and subcontractors who will be performing work on the St. Charles County Ambulance District project referenced above participate in an apprenticeship and training program registered with the US Department of Labor Employment and Training Administration (ETA) Office of Apprenticeship (OA), formerly known as the Bureau of Apprenticeship and Training (BAT) or applicable state apprenticeship agency (hereinafter referred to as “Approved Program”) covering the type of work to be performed pursuant to the applicable contract. An Approved Program shall be one that has graduated at least one apprentice per year for three of the five calendar years (January 1st to December 31st) immediately preceding the date of the bid.

B. 100% of the workers of all contractors and subcontractors performing work on the St. Charles County Ambulance District project referenced above who are classified as apprentices are enrolled in an Approved Program for the type of work they will be performing.

These terms do not apply to contractors or subcontractors that sole perform supplying and/or hauling work.

________________________________________
Signature Date

________________________________________
Print Name Title
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PART 1 GENERAL

1.01  SUMMARY

A. The Contract Form is AIA A101-2017, as amended by these Supplementary Conditions.

B. The General Conditions Form is AIA A201-2017, as amended by these Supplementary Conditions.

1.02  Construction Manager, Navigate Building Solutions

A. The Construction Manager for the Project shall be Navigate Building Solutions (“Navigate”). All communications between Contractor and Owner shall be through Navigate on behalf of Owner. Navigate has the authority to take all actions on behalf of the Owner permitted by the Contract Documents, with the sole exception of agreeing to any Modifications to the Contract. Only the Owner’s representatives Craig Meckfessel, Taz Meyer and Kelly Cope have the authority on behalf of the Owner to agree to any Change Order and/or to otherwise agree to authorize any Modifications, with it being understood and agreed that any Modifications to the Contract must be executed by Craig Meckfessel, Taz Meyer or Kelly Cope on behalf of the Owner in order to be effective.

1.04  MODIFICATIONS TO CONTRACT FORM

A.  AIA Document A101, 2017 Edition is hereby modified as follows:

1. Delete Section 3.1 in its entirety and replace with the following:

   The Date of Commencement for the Contractor’s Work shall be the date fixed by the Owner’s written Notice to Proceed.

2. Delete Sections 3.3.1 and 4.5 in their entirety and replace with the following:

   Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall achieve Substantial Completion of all work related to new construction, bid alternates, anticipated soil treatment/remediation identified as being included in the Base Bid, and associated Site Work within ____* calendar days from issuance of the Notice to Proceed.
LIQUIDATED DAMAGES: Time is of the essence. If the Contractor fails to achieve Substantial Completion of the Contractor’s Work within the period of ____* calendar days from issuance of the Notice to Proceed (as such Contract Time may be adjusted by time extensions otherwise permitted by the Contract Documents), the Contractor shall pay, and the Owner will assess, Liquidated Damages in the amount of $3,000.00 per day for each calendar day until Substantial Completion of the Contractor’s Work is achieved. The Owner may deduct any such Liquidated Damages from any amount due or payable to the Contractor.

Final Completion: In the event that the Contractor fails to timely complete all punch list items and all requirements necessary to achieve Final Completion of the Contractor’s Work within 30 calendar days following Substantial Completion, Contractor shall be responsible to Owner for any actual damages that the Owner incurs due to such delay with regard to additional costs the Owner expends to its Architect and/or Construction Manager. The Owner may deduct any such damages from amounts otherwise due the Contractor at Final Completion.

[*Contractual duration to be proposed by bidders on Bid Form, and incorporated into Contract as accepted by the Owner prior to contract award.]

3. Delete Sections 3.3.2 and 3.3.3.

4. Add new Section 3.3.2:
The Contractor has contemplated all adverse weather within the project schedule and the Contract Time. Contractor accepts all risks associated with adverse weather. No time extensions will be granted related to claims of adverse weather. No claims for extra costs will be granted related to adverse weather and/or taking action to deal with adverse weather and/or the effects of adverse weather. All provisions in the A101 and A201 otherwise respecting weather are superseded by this provision, and are of no force and effect.

5. Add a new Section 3.4: Recovery Clause: If at any time during the course of the work, the Owner reasonably determines that the Contractor has fallen behind the critical path of the schedule, the Owner may upon written notice to the Contractor, require the Contractor to recover schedule by any means appropriate (including but not limited to the provision of extra shifts and/or overtime and/or adjustments to the schedule). Within five days of Contractor’s receipt of such written notice, the Contractor shall provide the Owner with a written recovery plan and shall commence recovery efforts. So long as the Contractor has fallen behind schedule for reasons attributable to the Contractor (and not to force majeure events), all costs associated with the recovery of schedule shall be borne by Contractor. If, however, the
Contractor is not at fault for the delay in the work (due to force majeure events or other causes that would otherwise entitle the Contractor to an extension of the Contract Time) then the Contractor shall be paid for the costs of recovering schedule pursuant to the provisions of the Contract Documents applicable to changes in the work.

6. Section 5.1.3 shall be modified to state as follows:

Provided that an Application for Payment is received by the Architect not later than the 1st day of a month, the Owner shall make payment to the Contractor not later than the 20th day of the same month. If an Application for Payment is received by the Architect after the application date fixed above, payment shall be made by the Owner not later than 20 days after the Architect receives the Application for Payment.

7. Retainage shall be 5%. All references to retainage in the Contract Documents shall incorporate this provision.

8. Delete Section 5.1.7 and replace with the following: Retainage shall be invoiced and paid upon Final Completion of the Contractor’s Work, less such amounts as are attributable to 150% of the value of incomplete work and unsettled claims.

9. Delete the provisions of Section 5.1.8.

10. Revise 5.2.1 to read as follows: Final payment, constituting the entire unpaid balance of the Contract Sum minus disputed sums and authorized deductions, shall be made by the Owner to the Contractor after:
   .1 the Contractor has fully performed the Contract except for the Contractor’s responsibility to correct Work as provided in Article 12.2.2 of AIA Document A201–2017, and to satisfy other requirements, if any, which extend beyond final payment; and
   .2 a final Certificate for Payment has been issued by the Architect.
   .3 The Contractor has completed all punchlist items to the satisfaction of the Construction Manager, Architect and Owner.
   .4 The Contractor has delivered all closeout Documentation required under the Contractor Documents, which include (1) original final release of claims from Contractor (AIA G706 and G706A), in triplicate; operation and maintenance instructions/manuals; (1) original of final certified payrolls from Contractor and all lower tiered subcontractors; (1) original affidavit of compliance with prevailing wage laws from contractor and all lower tiered subcontractors; as-built documents; proof that surveyed utility as-builts required by project documents have been accepted by AHJ’s; and any other closeout documents reasonably required by the Owner.
11. Delete the provisions of Section 5.3 and replace with the following:
Payments due and unpaid under the Contract shall bear interest from the
date payment is due at the rate of five percent per annum.

12. Delete the provisions of Section 6.1. Delete all provisions referring to the
"Initial Decision Maker" in the Contract Documents.

13. In Section 6.2 insert "Arbitration" as the agreed upon dispute resolution
method.

14. Delete the provisions of Section 7.1.1.

15. Delete Sections 8.5 and 8.6. Insurance and bond requirements are as
stated in these Supplementary Conditions and in the General Conditions.
There is no "Exhibit A, Insurance and Bonds" that is part of the Contract
Documents.

16. Add a new Section 8.7.1 as follows: Owner is an equal employment
opportunity employer. Unless exempt, Contractor shall comply with the
Equal Employment Opportunities of the Civil Rights Act of 1964 (as
amended), Executive Orders 11246 and 11357 (as amended), Age
Discrimination in Employment Act of 1967, Rehabilitation Act of 1973, and
the Vietnam Era Readjustment Act of 1974, and with all other governmental
laws, orders and regulations relative to wages and hours of labor and other
matters which may refer to Contractor in connection with its execution of this
order.

17. Add a new Section 8.7.2 as follows: Prevailing Wage: Contractor and its
subcontractors shall pay the workmen employed in the execution of this
contract not less than the prevailing hourly rate of wages as determined by
the Missouri Department of Labor and Industrial Relations and will in all other
respects comply with the provisions of Section 290.210 to 290.340 inclusive,
of the Revised Statutes of Missouri, 1986, as amended. The contractor will
forfeit a penalty to the contracting public body of $100 per day (or portion of
a day) for each worker that is paid less than the prevailing rate for any work
done under the contract by the contractor or by any subcontractor per
Section 290.250, RSMo. The contractor and all subcontractors to the
contract must require all on-site employees to complete the ten-hour
construction safety training program required under Section 292.675, RSMo,
unless they have previously completed the program and have documentation
of having done so. The contractor will forfeit a penalty to the contracting
public body of $2500 plus an additional $100 for each employee employed
by the contractor or subcontractor, for each calendar day, or portion thereof,
such employee is employed without the required training.

18. Add a new Section 8.7.3 as follows: The Owner intends to use the tax
exempt purchase procedure authorized by Section 144.062, Missouri
Revised Statutes. The procedure includes, among other requirements, the
issuance of project exemption certificates to all contractors and subcontractors, who use those certificates to effect tax exempt purchases.

19. Add a new Section 8.7.4 as follows: In accordance with the Domestic Product Procurement Act (hereinafter referred to as the Buy American Act) RSMO 34.350-34.359, all goods provided by the Contractor where the purchase, lease or contract involves the expenditure to $25,000 or more, shall be manufactured or produced in the United States.

20. Add a new Section 8.7.5 as follows: Owner shall pay for the building permit and fire permit. Contractor shall pick up the building and fire permits. Contractor shall obtain and pay for all other permits as applicable to the Contractor’s Work.

21. Add a new Section 8.7.6 as follows: Contractor waives all claims for consequential damages against the Owner and Construction Manager arising out of this Agreement and/or the performance of the Owner’s obligations thereunder.

22. Add Section 8.8 Certified Payroll

§ 8.8.1 The Contractor & each Subcontractor are required to submit, WEEKLY, ONE (1) Certified ORIGINAL for each week that work is in progress & SHOULD BE NUMBERED SEQUENTIALLY. If work is temporarily suspended, the last payroll should be appropriately marked to note that it would be the last payroll until work is resumed. Submitter shall make sure that each payroll is numbered and dated, includes the name of the Project on it as well as the name of the Subcontractor. It is important that submittor number ALL payrolls sequentially. This will keep Contractor from having to send “No Work” payrolls when no hours are logged for a pay period. It will also make it easier to track and communicate any inconsistencies. Submitter shall label each of the “Final Payrolls” from each contractor/subcontractor as such.

§ 8.8.2 The Contractor must submit one (1) certified originals of each weekly payroll within 7 days of the payment date of the payroll. The certification may be attached to the payroll or may be on the payroll itself. The Contractor will be considered responsible for submittal of payrolls and certifications for all their sub recipients on the project. The certification must be properly signed originals. Electronic submittal of certified payrolls is not permitted. Failure to submit these payrolls within the 7-day period will result in delay in submittal of pay applications. All certified payrolls must be certified by an officer of the company only. Contractor cannot certify several pay periods with only one payroll certification. This is unacceptable to the Department of Labor. Each certification must also be dated and signed to be valid. Owner would prefer that the certification be signed in a color other than black. Owner can accept Xeroxed payrolls; however, the certifications must each be signed with an
original, live signature. THE OWNER CANNOT ACCEPT COPIED SIGNATURES ON THE PAYROLL CERTIFICATIONS.
The employee’s full name must be used. Addresses are not optional and MUST be listed on publicly funded projects such as this one. Social Security numbers are no longer allowed on certified payrolls, however, in lieu of the Social Security number; the contractor must assign the employee an identification number and place that identification number on the certified payroll. The identification number can be the last four digits of the employee’s Social Security number. Employers (prime contractors and subcontractors) must maintain the current address and full SSN for each employee and must provide this information upon request to the contracting agency or other authorized representative responsible for labor standards compliance. All deductions must be clearly identified. Only approved deductions should be used in wage rate calculations as per the Code of Federal Regulations. The US Department of Labor Form LS-57 may be used, as this form complies with all code requirements. If any part of the payroll or payroll certification is illegible or not completely filled out, they will be returned to your office for correction and re-submission. IMPORTANT NOTE: APPRENTICE CERTIFICATION LETTERS MUST ACCOMPANY CERTIFIED PAYROLLS THE 1ST TIME THEIR NAME APPEARS ON A CERTIFIED PAYROLL-IF NOT ATTACHED IT WILL DELAY APPROVAL OF CERTIFIED PAYROLL, AND THEREFORE PAY APPLICATION SUBMISSION.

23. Delete Section 9.1 and replace with the following: This Agreement is comprised of the following documents: (a) AIA Document A101-2017; (b) AIA Document A201-2017;; (c) these Supplementary Conditions;; (d) Bid Proposal Form and Bid Bond; (e) Supplemental Bid Information Form; (f) Bid Scope of Work; (g) Exhibit D: Change Order Calculation; (h) Exhibit E: Contract Document Log (Drawings, Specifications and Front Ends).

1.05 MODIFICATIONS TO GENERAL CONDITIONS

A. AIA Document A201, 2017 Edition is hereby modified as follows:

1. The Contractor and each of its Subcontractors shall provide a sworn affidavit and verification that they are registered with the U.S. Citizenship and Immigration Services E-Verify service and have records of all employees working on this project. Provide records to Owner.

2. Add the following Sections 1.1.9, 1.1.10 and 1.1.11:
ADD § 1.1.9 Site
The term Site refers to that portion of the property on which the Work is to be performed or which has been otherwise set aside for use by the Contractor.
ADD § 1.1.10 Punch List
The term Punch List means, collectively, unfinished items of the construction of the Project, which are minor or insubstantial details of construction, mechanical adjustment or decoration remaining to be performed, the non-completion of which would not materially affect the use of the Project.

ADD § 1.1.11 Float
Float-Float is a measurement of time indicating how late any activity or group of activities in a schedule can be completed without impacting the critical path and the scheduled end date of the Project. Float belongs to the Project and is not for exclusive use of the Contractor.

3. Add section 1.4.1: In the event of discrepancies or conflicts among or between the Contract Documents or observable conditions exist, the Contractor shall request an interpretation in writing from the Owner and Architect before proceeding with the Work. If the Contractor fails to request such interpretation from the Architect, it is presumed that the more stringent, better quality or higher quality requirement is included in the Work. The Contractor shall be responsible for the cost and installation of such requirement at no additional cost to the Owner. Before ordering any materials or doing any Work, the Contractor shall verify measurements at the Project site and shall be responsible for correctness of such measurements. Any difference which may be found shall be submitted to the Architect for interpretation before proceeding with the Work as a condition precedent to any claim for an increase in the Contract Sum. If conflict among various provisions of the Contract Documents is found, and the quality or stringency of the conflicts are not in question, the terms shall be interpreted in the following order of priority:
   .1 Modifications to the Contract
   .2 The Contract
   .3 Special Conditions
   .4 General Conditions

Specifications shall control over Drawings, and details in drawings shall control over large-scale drawings.

4. Delete Section 1.1.8.

5. Replace Section 1.5.1 with the following:
§ 1.5.1 The drawings, specifications, and other instruments of service are owned by the District. The Contractor, Subcontractors, Sub- subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Owner’s reserved rights.
6. Section 1.6.1: Add the following: E-mail may be used for routine correspondence, but is not sufficient to constitute official notice.

7. Delete Sections 1.7 and 1.8.

8. Delete Section 2.1.2.

9. Delete Section 2.2.

10. Delete Section 2.3.6.

11. Section 2.5: change the reference to “ten-day” to “five-day”. Add the following: In lieu of correcting defective Work, the Owner may in its discretion decide to accept such defective Work and backcharge the Contractor a reasonable amount equivalent to what it would have cost to replace the defective Work.

12. Add Section 2.6 Architect’s and Construction Manager’s Compensation for Services to Remedy Defective Work
When the Architect’s and Construction Manager’s additional services are required because of defective work, neglect, failure, deficiencies, or default by the Contractor, the Contractor shall be responsible to the Owner for the cost of such additional services.

13. Add new Section 3.2.5: If the Contractor performs any Work involving an apparent error, inconsistency, ambiguity, construction impracticality, omission or code violation in the Contract Documents of which the Contractor is aware, or which could reasonably have been discovered by the review required by Section 3.2, without prompt written notice to the Owner and the Architect and request for correction, clarification or additional information, as appropriate, the Contractor does so at its own risk and expense and all claims relating thereafter are specifically waived.

14. In Section 3.7.1, delete “the building permit as well as for other”. After “permits” add “other than the building and fire permit.”

15. Section 3.7.4: Change the reference to “14 days” to “7 days”. Add “and Construction Manager” to all references to “the Architect.”

16. Section 3.9.2: Add “Construction Manager” after “Owner” in the first sentence. In the second sentence add “or Construction Manager” after “Architect.” In the last sentence add “or Construction Manager” after “Architect.”

17. Section 3.10.1 through 3.10.3: Add “and Construction Manager” to all references to Architect.
18. Section 3.17: Add “Construction Manager” after all references to Owner.

19. Section 3.18.1: Add the word “Construction Manager” after “Owner” in the first line.

20. Section 4.2.1: Delete the reference to the Architect acting as the Owner’s representative during construction. The Construction Manager will be acting at all times as the Owner’s representative.

21. Section 4.2.4: Delete the second sentence.

22. Section 4.2.8: Change all references to “the Architect” to “Construction Manager”.

23. Section 5.2: Add “and Construction Manager” to all references to Architect.

24. Section 6.2.2.: Change all references to “the Architect” to “the Construction Manager”.

25. Article 7: Add “and Construction Manager” to all references to Architect.

26. Add Section 7.2.2 Change Proposals: The Contractor must submit change proposals covering a contemplated Change Order within ten (10) days after the request of the Owner, Architect or Construction Manager or within ten (10) days of the event giving rise to the Contractor's claim for a change in the Contract Sum or Contract Time. No increase in the Contract Sum or extension of the Contract Time will be allowed the Contractor for the cost or time involved in making change proposals. Change proposals will define or confirm in detail the Work that is proposed to be added, deleted, or changed and must include any adjustment which the Contractor believes to be necessary in the Contract Sum or the Contract Time. Any proposed adjustment must include detailed documentation, including but not limited to: cost, properly itemized and supported by sufficient substantiating data to permit evaluation including cost of labor, materials, supplies and equipment, rental cost of machinery and equipment, and additional bond cost. Change proposals will be binding upon the Contractor and may be accepted or rejected by the Owner in its discretion. The Owner may, at its option, instruct the Contractor to proceed with the Work involved in the Change Proposal in accordance with this Section 7.2.2 without accepting the Change Proposal in its entirety. See Exhibit D, entitled Change Order Calculations which shall govern and apply to Change Orders. A Change Order is not effective until the Owner and Architect issue and sign the Change Order.

27. Add to Section 8.2.3: If Contractor's work shall fall behind schedule for reasons that are not excused under the terms of the Contract, Contractor shall add additional workers or shifts, and/or work overtime as necessary to maintain the Construction Schedule.

28. Add the following sections:
8.2.4 The Contractor must conform to the most recently approved Construction Schedule. The Contractor must complete the indicated work or achieve the required percentage of completion, as applicable, with any interim completion dates established in the most recently approved Construction Schedule.

8.2.5 The Contractor must maintain at the Site, available to the Owner and the Architect for their reference during the progress of the Work, a copy of the approved Construction Schedule and any approved revisions thereto. The Contractor must keep current records of and mark on a copy of the approved Construction Schedule the actual commencement date, progress, and completion date of each scheduled activity indicated on the Construction Schedule.

8.2.6 The Contractor represents that its bid includes all costs, overhead and profit which may be incurred throughout the Contract Time and the period between Substantial and Final Completion. Accordingly, the Contractor may not make any claim for delay damages based in whole or in part on the premise that the Contractor would have completed the Work prior to the expiration of the Contract Time but for any claimed delay.

8.2.7 The Owner reserves the right to issue a written directive to accelerate the Work that may be subject to an appropriate adjustment, if any, in the Contract Sum. Contractor must substantiate any costs associated with such Owner directive.

29. Add to the end of Section 8.3.1: The sole remedy for delays other than Owner caused delays will be non-compensable time extensions for completion of the Work.

30. Add new Section 8.3.4: If Owner’s ability to provide Contractor with unimpeded access to the project site is delayed by neglect, default or interference of other governmental bodies, utilities (including gas, electric, sewer, and water companies) or other causes beyond the Owner’s reasonable control, then Owner’s obligation to provide Contractor with access to the project site shall be excused until such time as the impediment to access has been removed.

31. Delete Section 9.1.2.

32. Section 9.2: Change all references to “the Architect” to “Construction Manager”.

33. In Section 9.3.1 add “and Construction Manager” to all references to “Architect.”
34. Add new Section 9.3.4: Until the conditions set forth in this Section have been satisfied by Contractor, the amount of each monthly Application for Payment must include the value of each line item as indicated on the approved Schedule of Values, to the extent completed, less Contract retainage of five percent (5%). The retainage will not be paid to the Contractor until thirty (30) days after all of the following conditions have been satisfied: (A) the Contractor has fully performed the Contract; (B) the Contractor has completed all Punch List items to the satisfaction of the Owner and the Architect; (C) the Contractor has delivered to the Owner all Project close-out documents in duplicate, including (1) all maintenance and operating manuals; (2) marked sets of as-built drawings; (3) all guarantees and warranties required under the Contract Documents; (4) a list of names, addresses, and telephone numbers for all subcontractors and others providing guarantees and warranties; and (D) the applicable governmental authorities have issued to the Owner the final use and occupancy permit for the Project.

35. In 9.8.2, add “and Construction Manager” to all references to “Architect.”

36. In 9.8.3, add “and/or Construction Manager” to all references to “Architect.”

37. In 9.8.5, strike everything beyond the first sentence.

38. Add § 9.8.6: Unless otherwise provided in the Certificate for Substantial Completion, the Contractor must complete or correct all items included in the final Punch List within thirty (30) days after the Date of Substantial Completion.

39. In Section 9.10.1 add “and Construction Manager” to the first two references to “Architect.”

40. Delete Section 9.10.4.

41. Delete Section 11.1.1.

42. Delete Sections 11.1.4 through 11.2.3.

43. Delete Section 11.3.

44. Delete Section 11.4.

45. Delete Section 11.5.

46. Add the following insurance provisions at the end of Article 11:

CONTRACTORS INSURANCE REQUIREMENTS   THESE SPECIFICATIONS APPLY TO ALL CONTRACTORS WHO WILL BE ON THE JOBSITE, WHETHER A GENERAL CONTRACTOR OR ANY
SUBCONTRACTOR. Contractor shall, at its expense, procure and maintain at a minimum for the duration of the Project and through the correction period stated in the agreement, except as otherwise set forth herein, the types and amounts of the insurance described below or as otherwise required by law on all of its operations, in companies registered to do business in the State of Missouri and having an A.M. Best Rating of A, V or higher:

a. Workers’ Compensation and Employers Liability Insurance.

Contractor shall carry Workers’ Compensation Insurance as required by any applicable law or regulation. Employers Liability Insurance shall be in amounts no less than $1,000,000 each accident for bodily injury, $1,000,000 for bodily injury by disease and $1,000,000 each employee for bodily injury by disease. If there is an exposure of injury to Contractor’s employees under the U.S. Longshoremen’s and Harbor Works Compensation act, the Jones Act or under laws, regulations or statutes applicable to maritime employees, coverage shall be included for such injuries or claims. If the contractor’s Employers Liability limits are below those stated above an umbrella liability policy may be used to the requested limit.

All personnel on Owners job sites must be covered under a Workers Compensation policy within the statutory limits as provided under the laws of the state in which the work is performed. If subcontractor is a sole proprietor and has no other employees, Subcontractor MUST still purchase a Workers’ Compensation Policy. When Subcontractor purchases Workers’ Compensation Insurance, the certificate must indicate whether coverage has been waived for Officers, Partners, Shareholders, LLC Members and/or Sole Proprietors.

b. Commercial General Liability Insurance

Contractor shall carry Commercial General Liability Insurance written on ISO occurrence form CG 00 01 07 98 or later edition (or a substitute form providing equivalent coverage) and shall cover all operations by or on behalf of the Contractor, providing insurance for bodily injury liability and property damage liability for the limits indicated below and for the following coverage:

1. Premises and Operations
2. Products and Completed Operations
3. Contractual Liability insuring the obligations assumed by the Contractor under this contract.
4. Personal Injury Liability and Advertising Injury Liability
Except with respect to bodily injury and property damage included within the products and completed operations hazards, the general aggregate limit shall apply separately to the Contractor's project under this Contract. Completed Operations coverage must be maintained for the correction period provided in the agreement.

**Limit of Liability**
The Commercial General Liability policy limits shall not be less than:
- $1,000,000 Each Occurrence (Combined Single Limit for Bodily Injury and Property Damage)
- $2,000,000 Aggregate for Products/Completed Operations
- $1,000,000 Personal Injury/Advertising Injury
- $2,000,000 General Aggregate (provide endorsement to apply the General Aggregate per project, if available. If not, see Umbrella Liability section)

**Additional Insured**
The Owner, all of its officers, directors and employees ("The St. Charles County Ambulance District"), and the Construction Manager shall be named as Additional Insured under the Commercial General Liability Insurance using ISO Additional Insured Endorsements CG 20 10 or substitute providing equivalent coverage. If additional insured status is required for a correction period then CG 20 37 or equivalent should also be used. These endorsements must be stated on the insurance certificate provided to the Owner and a copy of the endorsements confirming coverage should accompany the insurance certificate.

**Primary Coverage**
The Contractor’s Commercial General Liability Policy shall apply as primary insurance and any other insurance carried by the Architect or the Owner shall be excess only and will not contribute with Contractor’s insurance. This must be stated on the insurance certificate and a copy of the endorsement confirming coverage should accompany the insurance certificate.

c. **Business Automobile Liability Insurance**

The policy should be written on ISO form CA 0001, CA 0005, CA 0002, CA 0020 or a substitute form providing equivalent coverage and shall provide coverage for all owned, hired and non-owned vehicles. The limit of liability should be at least $1,000,000 Combined Single Limit for Bodily Injury and Property Damage each accident and should also cover Automobile Contractual Liability. The policy should name the Owner and all of its officers, directors and employees and the Construction Manager as Additional Insureds. The policy shall be endorsed to be primary coverage and any other insurance carried by the Owner shall be excess.
only and will not contribute with Contractor’s insurance. To confirm coverage, a copy of the Additional Insured Endorsement and the Primary Insurance Endorsement should accompany the insurance certificate.

d. **Umbrella Excess Liability**

The contractor should provide an excess liability policy that will provide a minimum of $10,000,000 per occurrence/$10,000,000 aggregate over the above listed coverages. This policy should “follow-form” of the underlying policies and comply with all insurance requirements of those policies. If the General Aggregate of the Commercial General Liability policy does not apply per project, the limits should be $10,000,000 per occurrence/$10,000,000 aggregate.

e. **Waiver of Subrogation**

The Commercial General Liability and Automobile Liability policies shall each contain a waiver of subrogation in favor of the Owner and its officers, directors, and employees and the Construction Manager.

f. **Certificates of Insurance**

Prior to commencing work on behalf of Owner, Contractor and each Subcontractor shall obtain and pay for the insurance coverages identified herein, until completion and final acceptance of work for a period of ten years from the date of completion of the work. As evidence of the insurance, limits and endorsements required, a standard ACORD or equivalent Certificate of Insurance executed by a duly authorized representative of each insurer shall be furnished by the Contractor to the Owner, the Construction Manager and the Architect before any Work under the Contract is commenced by the Contractor. Owner shall have the right, but not the obligations, to prohibit Contractor or any Subcontractor from entering the Project site until such certificates are received and approved by the Owner. With respect to insurance to be maintained after final payment, an additional certificate(s) evidencing such coverage shall be promptly provided to Owner as a precondition to final payment. The Certificate of Insurance shall provide that there will be no cancellation or deduction of coverage without 30 days prior written notice to the Owners. Failure to maintain the insurance required herein may result in termination of the Contract at Owner’s option. In the event the Contractor does not comply with the requirements of this section, the Owner shall have the right, but not the obligation, provide insurance coverage to protect the Owner and Architect, and charge the Contractor for the cost of that Insurance. The required insurance shall be subject to the approval of the Architect, but any acceptance of insurance
certificates by the Architect or Owner shall in no way limit or relieve the Contractor of their duties and responsibilities in this Agreement.

g. **Copies of Policies**

Contractor shall furnish a certified copy of any and all insurance policies required under this Contract within ten (10) days of Owner’s written request for said policies.

h. **Subcontractors**

Contractor shall cause each Subcontractor to purchase and maintain insurance of the types and amounts specified herein. Limits of such coverage may be reduced only upon written agreement of Owner. Contractor shall provide to Owner copies of certificates evidencing coverage for each Subcontractor. Subcontractors’ commercial general liability and business automobile liability insurance shall name Owner, Construction Manager and Architect as Additional Insureds and have the Waiver of Subrogation endorsement added.

i. **Other Insurance**

Owner may require insurance coverage in excess of the types and amounts required above. Contractor shall attempt in good faith to obtain quotes for such additional coverage and provide them Owner for review. Contractor shall purchase any such additional insurance as may be requested by the Owner in writing. Owner shall pay any additional premium for such additional coverage.

j. **Builder’s Risk Insurance**

PROPERTY INSURANCE: Contractor shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located, property insurance written on a builder’s risk “all-risk” or equivalent policy form in the amount of the initial Contract Sum, plus value of subsequent Contract Modifications and cost of materials supplied or installed by others, comprising total value for the entire Project at the site on a replacement cost basis without optional deductibles. This insurance shall include interests of the Owner, Contractor, and Subcontractors in the Project. Property insurance shall be on an “all-risk” or equivalent policy form and shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake, flood, windstorm, falsework, testing and startup, temporary buildings and debris removal including demolition occasioned by
enforcement of any applicable legal requirements, and shall cover reasonable compensation for Contractor’s services and expenses required as a result of such insured loss. If the property insurance requires deductibles, the Contractor shall pay costs not covered because of such deductibles. This property insurance shall cover portions of the Work stored off the site, and also portions of the Work in transit.

WAIVERS OF SUBROGATION: The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents and employees, each of the other, and (2) the Architect, the Construction Manager, their respective consultants, Separate Contractors described in Article 6, if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other causes of loss to the extent covered by property insurance obtained pursuant to these provisions, except such rights as they have to proceeds of such insurance held by the Owner as fiduciary. The Contractor shall require its subcontractors, sub-subcontractors, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

A loss insured under property insurance obtained pursuant to these provisions shall be adjusted by the Contractor as fiduciary and made payable to the Contractor as fiduciary for the insureds, as their interests may appear. The Contractor shall pay Subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their Sub-subcontractors in similar manner. If after such loss no other special agreement is made and unless the Owner terminates the Contract for convenience, replacement of damaged property shall be performed by the Contractor after notification of a Change in the Work in accordance with Article 7.

k. Bonds
Contractor shall provide payment and performance bonds covering the faithful performance of the Contract and payment of obligations arising thereunder in sums equal to 100 percent of the Contract amount. Sureties shall be secured through the Contractor’s usual sources and shall be acceptable to the Owner. The cost for the bonds shall be
included on the Contractor’s Bid Proposal Form and in the Contract price.

I. Professional Liability Insurance

Professional Liability Insurance: Contractor shall maintain Project Specific Professional Liability insurance, including contractual liability insurance against the liability assumed by Contractor in contractually agreeing to perform design services, and including coverage for any professional liability caused by any of the Contractor’s consultants. Contractor shall maintain at least the limits of liability in a company satisfactory to the Owner as follows:

$ 2,000,000 Each Claim/Aggregate

The Professional Liability Insurance shall contain prior acts coverage sufficient to cover all contract services rendered by the Contractor. Said insurance shall be continued in effect with an extended period of five years following final payment to Contractor. Such insurance may be maintained on a claims made basis. Contractor shall provide Owner with a certificate of insurance evidencing such coverage, and such other proof of such insurance as the Owner may reasonably request.

47. Section 12.2.2.1: Delete the second to last sentence.

48. Delete Section 13.5.

49. Section 14.1.3: Delete the words “as well as reasonable overhead and profit on Work not executed.”

50. Add new Section 14.1.5: The Contractor has no right to stop Work as a consequence of non-payment. In the event of any disagreement between the Contractor and Owner involving the Contractor’s entitlement to payment, the Contractor’s only remedy is to file a Claim in accordance with Article 15. The Contractor must diligently proceed with the Work pending resolution of the Claim. If, however, an Application for Payment has been approved for payment by the Owner, and the Owner fails to make payment within sixty (60) days of the approval for payment by the Owner, the Contractor may upon ten (10) days written notice to the Owner, stop work if payment is not made by the Owner within ten (10) days following the notice.

51. Section 14.2.4: In the first sentence add “or Construction Manager’s” after “Architect’s.” Delete the last sentence.

52. Section 14.4.3: Delete everything after the word “Subcontracts”.

53. Delete Section 15.1.7.
54. In Section 15.1.3 Add “and the Construction Manager” after all references to “Architect.”

55. In Section 15.1.3.1 replace all references to “21 days” with “10 days.”

56. Delete Sections 15.2.1 through 15.2.6. There is no Initial Decision Maker on this Project and all references thereto shall be of no force and effect.

57. Section 15.3: Add the following: The Owner may add to any mediation with the Contractor any Separate Contractor in the Owner’s discretion.

58. Section 15.4.4: The Owner may add to any arbitration with the Contractor any Separate Contractor in the Owner’s discretion.

59. Add the following new Section 15.5: Prevailing Party Fees. In any dispute between Owner and Contractor related to this Agreement, the prevailing party shall be entitled to recover its attorney’s fees, expert fees, and costs from the non-prevailing party. Determination of which party prevailed shall be made by the arbitrator(s). Determination of which party prevailed shall be made by reviewing the Claims resolved at arbitration (and shall not include Claims resolved prior to the taking of evidence at the arbitration hearings), considering the quantum of the Claims being prosecuted and defended, and then determining which party achieved the greater success by quantifying the amounts awarded the party recovering damages and comparing same with the amounts that the party paying damages saved (i.e., the damages actually awarded versus those that were claimed).

60. Add the following new Section 15.6: Timing For Arbitration Hearings. The arbitration hearings for any arbitration conducted pursuant to this Agreement shall commence within 180 days after the Demand for Arbitration is filed, and shall continue to completion on successive week days (not including Saturdays, Sundays and holidays) until the taking of evidence is completed; provided, however, that the arbitrator(s) shall have the right in their discretion to adjust the schedule of the hearings after they have commenced based upon the special needs and considerations related to the circumstances of the dispute.

61. Add the following new Section 15.7: Notwithstanding the foregoing provisions respecting mediation and arbitration, Owner at its option may invoke the following dispute resolution provisions, to which Contractor agrees to be bound in lieu of the mediation and arbitration provisions otherwise stated herein. Specifically, upon written application of Owner, the parties agree to submit their dispute to resolution before the American Arbitration Association ("AAA") in accordance with the Construction Industry Mediation Rules of the AAA currently in effect at the time of the mediation, adjusted as follows: (a) Owner will file a written demand with the AAA for mediation of the dispute, with the dispute to be heard by a mediator in the St. Louis, Missouri metropolitan area; (b) the mediation shall be completed within 60 days after
written demand for mediation is served upon the other party; (c) by no later than 14 days prior to the mediation, the parties shall serve upon the mediator and each other a written position statement, with exhibits, outlining their respective claims and defenses; (d) by no later than 3 days prior to the mediation, the parties shall serve upon the mediator and each other a written position statement in reply to that earlier filed by the other party; (e) after eight hours of actual mediation time to be conducted in a single day, if the matter is not resolved, the mediator shall immediately assume the role of an arbitrator; (f) the arbitrator shall not consider any item of evidence which was not produced by the parties in their respective statements of position nor disclosed to the other in the course of the Mediation, all as determined by the arbitrator; (g) at such time as the mediator shall become an arbitrator, each party shall promptly make one last, best and final offer and demand in writing, which shall be simultaneously submitted to the arbitrator; (h) the arbitrator shall then disclose to the parties the amounts of said last offers and demands; (i) within five days of having received said last offers and demands (but not earlier than seventy-two hours of having received said last offers and demands), the arbitrator shall issue an Award which shall adopt one and only one of said last offers or demands, without modification or amendment, and the same shall then constitute the Award. Each side shall bear its own attorney's fees, costs and expenses, including AAA fees and expenses. The Award of the arbitrator shall be final and binding, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof. If the Award is issued prior to final completion of the Project, then the parties agree to sign a Change Order to reflect the Award.
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SECTION 01 10 00
SUMMARY

PART 1 GENERAL

1.01 PROJECT

A. Project Name: SCCAD Headquarters
   2000 Salt River Road, St. Peters, Missouri 63376.

B. Owner's Name: St. Charles County Ambulance District (SCCAD).
   4169 Old Mill Parkway, St. Peters, Missouri 63376.

C. Architect's Name: Archimages.
   143 West Clinton Place, St. Louis, Missouri 63122.

D. The Project consists of the construction of a new two story, 134,485 square foot St. Charles County Ambulance District Headquarters plus a 7,077 square foot Mezzanine.

1.02 CONTRACT DESCRIPTION

A. Contract Type: A single prime contract based on a Stipulated Price as described in the Documents.

1.03 OWNER OCCUPANCY

A. Owner intends to occupy the Project upon Substantial Completion.

B. Cooperate with Owner to minimize conflict and to facilitate Owner’s operations.

C. Schedule the Work to accommodate Owner occupancy.

1.04 WORK SEQUENCE

A. Coordinate construction schedule and operations with Owner.

END OF SECTION
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SECTION 01 20 00
PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Procedures for preparation and submittal of applications for progress payments.
B. Documentation of changes in Contract Sum and Contract Time.
C. Procedures for preparation and submittal of application for final payment.

1.02 RELATED REQUIREMENTS

A. Section 00 52 00 - Agreement Form: Contract Sum, retainages, payment period, monetary values of unit prices.
B. Section 00 72 00 - General Conditions: Additional requirements for progress payments, final payment, changes in the Work.
C. Section 01 20 01 - Change Order Calculations.
D. Section 01 22 00 - Unit Prices: Monetary values of unit prices; Payment and modification procedures relating to unit prices.
E. Section 01 78 00 - Closeout Submittals: Project record documents.

1.03 SCHEDULE OF VALUES

A. Use Schedule of Values Form: AIA G703, edition stipulated in the Agreement.
B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit draft to Architect for approval.
C. Forms filled out by hand will not be accepted.
D. Submit Schedule of Values in duplicate within 15 days after date of Owner-Contractor Agreement.
E. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the specification section. Identify site mobilization and bonds and insurance.
F. Revise schedule to list approved Change Orders, with each Application For Payment.

1.04 APPLICATIONS FOR PROGRESS PAYMENTS

A. Payment Period: Submit at intervals stipulated in the agreement or similar.
B. Use Form AIA G702 - Application and Certification for Payment & AIA G703 - Continuation Sheet or similar.
C. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect for approval.
D. Forms filled out by hand will not be accepted.
E. Execute certification by signature of authorized officer.
F. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored products.
G. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of work.
H. Submit three hard-copies of each Application for Payment.
I. Include the following with the application:
   1. Updated construction progress schedule, revised and current as specified in Section 01 30
      00.
   2. Partial release of liens from major subcontractors and vendors.
   3. Lien waivers.
   4. For stored materials:
      a. Affidavits attesting to off-site stored products.
      b. Proof of Insurance covering stored materials.
      c. Photographs and itemized description of materials.
   5. Certified payroll reports.

J. When Architect requires substantiating information, submit data justifying dollar amounts in
   question.

1.05 MODIFICATION PROCEDURES

A. Submit name of the individual authorized to receive change documents and who will be
   responsible for informing others in Contractor’s employ or subcontractors of changes to
   Contract Documents.

B. For minor changes not involving an adjustment to the Contract Sum or Contract Time, Architect
   will issue instructions directly to Contractor.

C. For other required changes, Architect will issue a document signed by Owner instructing
   Contractor to proceed with the change, for subsequent inclusion in a Change Order.
   1. The document will describe the required changes and will designate method of
      determining any change in Contract Sum or Contract Time.
   2. Promptly execute the change.

D. For changes for which advance pricing is desired, Architect will issue a document that includes a
   detailed description of a proposed change with supplementary or revised drawings and
   specifications, a change in Contract Time for executing the change with a stipulation of any
   overtime work required and the period of time during which the requested price will be
   considered valid. Contractor shall prepare and submit a fixed price quotation within five (5)
   days.

E. Contractor may propose a change by submitting a request for change to Architect, describing
   the proposed change and its full effect on the work, with a statement describing the reason for
   the change, and the effect on the Contract Sum and Contract Time with full documentation
   and a statement describing the effect on work by separate or other contractors. Document any
   requested substitutions in accordance with Section 01 60 00.

F. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of
   the Contract.
   1. For change requested by Architect for work falling under a fixed price contract, the amount
      will be based on Contractor's price quotation.
   2. For change requested by Contractor, the amount will be based on the Contractor's request
      for a Change Order as approved by Architect.
   3. For pre-determined unit prices and quantities, the amount will based on the fixed unit
      prices.
   4. For change ordered by Architect without a quotation from Contractor, the amount will be
      determined by Architect based on the Contractor's substantiation of costs as specified for
      Time and Material work.

G. See 01 20 01 - Change Order Calculations.
H. Substantiation of Costs: Provide full information required for evaluation.
   1. Provide the following data:
      a. Quantities of products, labor, and equipment.
      b. Taxes, insurance, and bonds.
      c. Overhead and profit.
      d. Justification for any change in Contract Time.
      e. Credit for deletions from Contract, similarly documented.
   2. Support each claim for additional costs with additional information:
      a. Origin and date of claim.
      b. Dates and times work was performed, and by whom.
      c. Time records and wage rates paid.
      d. Invoices and receipts for products, equipment, and subcontracts, similarly documented.
   3. For Time and Material work, submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract.

I. Execution of Change Orders: Architect will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

J. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum.

K. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.

L. Promptly enter changes in Project Record Documents.

1.06 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. Application for Final Payment will not be considered until the following have been accomplished:
   1. All closeout procedures specified in Section 01 70 00.

END OF SECTION
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St. Charles County Ambulance District
Change Order Calculations

The maximum that will be allowed for overhead and profit on changes in work shall be as follows, expressed as a percentage of the basic cost of the change. The allowable percentages for profit or overhead may be less, depending on the nature, extent or complexity of the change, where the percentage is not commensurate with the responsibility and administration involved (such as the Contractor merely processing substantial Change Order to a Subcontractor) but in no event shall they exceed the following:

To the Contractor and/or its Subcontractor for work performed with their own forces 12%
To the Contractor for work performed by other than its own forces 5%
To the Subcontractor/Supplier for work performed with their own forces 12%
To the Subcontractor/Supplier for work performed by other than its own forces 5%

Not more than above specified percentages for overhead, profit and commission will be allowed to be added to the basic cost, regardless of the number of tiers of Contractors, Subcontractors or Sub-subcontractors.

The burden on labor may be indicated as a dollar/cents addition to the hourly rate or may be expressed as a percentage of the extended hourly rate costs. If required by the Owner, the Contractor shall provide a detailed breakdown to justify the labor burden. The Owner reserves the right to reject any labor burden which is inconsistent with other similar contractors or where the cost of fringe benefits are in excess of established labor agreements.

Material, equipment, and supply costs shall be quoted at the actual cost to the Contractor, or Subcontractor. Upon request, the Contractor (or Subcontractor) shall submit evidence to substantiate the costs. Said costs shall be quoted at trade discount prices, with quantity discounts also applied where the quantities warrant. In any proposal with material, equipment and supply credit, the credit shall be based on the actual Contract cost of the material (including trade and quantity discounts) less any charges actually incurred for handling or returning a material which has been delivered.

The percentages allowed for overhead and profit herein shall be deemed to include, and no further addition allowed the Contractor, Subcontractor or Sub-subcontractors for: (1) field and office supervision and administration, including the field superintendent and non-working foremen; (2) general insurance; (3) use or replacement of tools; (4) shop burden; (5) engineering costs; (6) performance (guaranty) and labor/material payment bonds; (7) cost of safety measure (including those imposed by OSHA); (8) permits, unless a new permit type is required.

Cost changes shall be computed by determining the basic costs enumerated below (as further specified under this Subparagraph), to which the overhead may be added, then the profit figure may be added, and finally adding the sales tax on materials if allowable.

For changes in the Work, the cost shall be determined as provided under this section. The Contractor shall submit an itemized list of quantities with the applicable unit costs and extended price for each, in such form and detail as required by the Owner. As a minimum, the detailed breakdown shall include and indicate the items enumerated below. Items (a) and (b) constitute the cost of labor, and items (a), (b), (c) and (d) constitute the basic costs referred to under this section.

a) Labor costs, itemized by each trade involved, showing the hourly rates for each, and the hours required for the change. Labor rates shall be the same for extra and credit computations and shall be the actual rate paid the workmen in accordance with established management labor agreements.

b) Burden on labor, which shall be only the actual costs of mandatory fringe benefits required by established agreements, taxes on labor, worker's or workmen's compensation, insurance on labor
as affected by payroll, unemployment taxes and insurance, including FICA and FUTA. No other costs will be allowed as burden on labor.

c) Quantities of materials, equipment, and supplies, at their actual costs, with unit costs indicated.

d) The cost of subcontracted work, computed in the same way as provided for under this section.

e) Overhead, profit and commission as set forth herein.

f) Applicable sales tax on materials, added after the above computations are complete.

Subcontractors (or Sub-subcontractors) shall compute their costs in the same way and are subject to the same conditions of what may be included in the cost and the same maximum percentages for overhead and profit. To the Subcontractor’s price, the Contractor may add up to a maximum of five percent (5%). For changes involving work of the Contractor with its own forces and work by a Subcontractor (or Sub-subcontractor), the commission shall be applied directly to the Subcontractor’s price, with the overhead and profit figure applied only to the Work the Contractor performs with its own forces.

For changes involving both extra and credit amounts, the overhead and profit, or commission, shall be applied only to net difference where the extra exceeds the credit.

For changes resulting in a credit in the basic costs, a reasonable allowance for overhead, profit or commission may be required to be credited to the Owner, as approved by the Owner. In general, no credit for overhead, profit or commission will be required where the net change credit is minor or where the Change in Work indicates it is reasonable that no credit be allowed to the Owner due to the effort, cost or responsibility of the Contractor. In the event of substantial subcontract credits or for Work the Contractor does not provide or perform, a reasonable overhead, profit or commission credit shall be allowed to the Owner, as determined by the Owner.

Contractor may be directed to proceed in writing by the Owner or Construction Manager on a time and material basis for a change. In such case, the Contractor must notify Construction Manager when work is beginning, when it is complete and daily tickets must be submitted as backup documentation. Daily tickets to be signed daily and verified by the Contractor’s onsite superintendent and submitted daily to the Construction Manager. Any change order request submitted without these daily signed tickets will be rejected and will not be compensated.
SECTION 01 22 00
UNIT PRICES

PART 1 GENERAL

1.01 SECTION INCLUDES
A. List of unit prices, for use in preparing Bids.

1.02 RELATED REQUIREMENTS
A. Document 00 21 13 - Instructions to Bidders: Instructions for preparation of pricing for Unit
   Prices.
B. Document 00 41 00 - Bid Proposal Form: Unit prices proposed.
C. Section 01 20 00 - Price and Payment Procedures: Additional payment and modification
   procedures.

1.03 COSTS INCLUDED
A. Unit Prices included on the Bid Form shall include full compensation for all required labor,
   products, tools, equipment, plant, transportation, services and incidentals; erection, application
   or installation of an item of the Work; overhead and profit.

1.04 UNIT QUANTITIES SPECIFIED
A. Quantities indicated in the Bid Form are for bidding and contract purposes only. Quantities and
   measurements of actual Work will determine the payment amount.

1.05 MEASUREMENT OF QUANTITIES
A. Measurement methods delineated in the individual specification sections complement the
   criteria of this section. In the event of conflict, the requirements of the individual specification
   section govern.
B. Take all measurements and compute quantities. Measurements and quantities will be verified
   by Architect or Engineer.
C. Assist by providing necessary equipment, workers, and survey personnel as required.
D. Measurement by Volume: Measured by cubic dimension using mean length, width and height
   or thickness.

1.06 PROCEDURES
A. Unit prices include all necessary material, plus cost for delivery, installation, insurance,
   overhead and profit.
B. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use
   of established unit prices and to have this work measured, at Owner's expense, by an
   independent surveyor acceptable to Contractor.

1.07 PAYMENT
A. Payment for Work governed by unit prices will be made on the basis of the actual
   measurements and quantities of Work that is incorporated in or made necessary by the Work
   and accepted by the Architect, multiplied by the unit price.
B. Payment will not be made for any of the following:
   1. Products wasted or disposed of in a manner that is not acceptable.
   2. Products determined as unacceptable before or after placement.
   3. Products not completely unloaded from the transporting vehicle.
   4. Products placed beyond the lines and levels of the required Work.
   5. Products remaining on hand after completion of the Work.
1.08 DEFECT ASSESSMENT

A. Replace Work, or portions of the Work, not complying with specified requirements.

B. If, in the opinion of Architect, it is not practical to remove and replace the Work, Architect will direct one of the following remedies:
   1. The defective Work will be partially repaired to the instructions of the Architect, and the unit price will be adjusted to a new unit price at the discretion of Architect.

C. If, in the opinion of Owner, it is not practical to remove and replace the Work, Owner will direct one of the following remedies:
   1. The defective Work may remain, but the unit price will be adjusted to a new unit price at the discretion of Owner.

D. The authority of Owner to assess the defect and identify payment adjustment is final.

PART 2 PRODUCTS - NOT USED
PART 3 EXECUTION - NOT USED

END OF SECTION
SECTION 01 23 00
ALTERNATES

PART 1 GENERAL

1.01 SECTION INCLUDES
   A. Description of Alternates.
   B. Procedures for pricing Alternates.
   C. Documentation of changes to Contract Sum and Contract Time.

1.02 RELATED REQUIREMENTS
   A. Document 00 21 13 - Instructions to Bidders: Instructions for preparation of pricing for Alternates.
   B. Document 00 41 00 - Bid Proposal Form.
   C. Document AIA A101 and AIA A201: Incorporating monetary value of accepted Alternates.

1.03 SUMMARY
   A. Section includes administrative and procedural requirements for alternates.

1.04 DEFINITIONS
   A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
      1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
      2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.05 PROCEDURES
   A. Coordination: Revise or adjust affected adjacent civil, mechanical, plumbing, fire protection, electrical and structural project features and work as necessary to completely integrate work of the alternate into Project.
      1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
   B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated revisions to alternates.
   C. Execute accepted alternates under the same conditions as other work of the Contract.
   D. Except as otherwise indicated, complete work described in Alternates with no increase to Contract Time.
   E. This section includes non-technical descriptions of Alternates. Refer to specific sections of the Specifications and to Drawings for technical descriptions of Alternates.
   F. Owner reserves the right to award none, any one or more in any order, or all Alternates in combination with work covered by Base Bid.
   G. Owner reserves the right to determine low bid as Base Bid alone or sum of Base Bid and any combination of Alternates.
   H. Each Alternate is intended to cover all work required for a complete finished job.
   I. Alternates are additive or deductive to the Base Bid. Provide costs in appropriate spaces provided on Bid Form.
J. Submit bids for Base Bid and all Alternates listed on Bid Form. Failure to quote an amount, or insertion of the words "no bid," "none" or words of similar meaning, will be considered as not completing the proposal and may constitute disqualification of entire bid, at Owner's discretion. When there is no change in base bid due to using the Alternate, use the words "No Change". The words "No Change" will be interpreted to mean that work described in the Alternate shall be completed at no adjustment or change in cost of Base Bid.

K. Base Bid and Alternates are exclusive in their scope of work. There is no overlap between or among Base Bid and Alternates. The cost of any item of work shall be included only once, in Base Bid or in Alternates.

L. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

1.06 ACCEPTANCE OF ALTERNATES

A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Owner's option. Accepted Alternates will be identified in the Owner-Contractor Agreement.

B. Coordinate related work and modify surrounding work to integrate the Work of each Alternate.

1.07 SCHEDULE OF ALTERNATES

A. Alternate No. 1 - Adhesive Flooring:
   1. Base Bid: Include the product cost and labor to install the specified flooring adhesive.
   2. Alternate Item: Exclude the Base Bid. Provide the cost of labor and material to use an alternate adhesive (that works with the high moisture content or PH) for flooring installation, should test results indicate high moisture or pH. Cost to include all square footage of each material with moisture sensitive issues. Refer to Section 09 05 61 – Common Work Results for Flooring Preparation.

B. Alternate No. 2 - Flooring Mitigation:
   1. Base Bid: Floors to receive the flooring adhesive specified.
   2. Alternate Item: Base bid specified adhesive shall be used. Provide the cost of labor and material to use a floor coating approved by the flooring manufacturers, should test results indicate high moisture or pH. Cost to include all square footage of each material with moisture sensitive issues. Refer to Section 09 05 61 – Common Work Results for Flooring Preparation.

C. Alternate No. 3 - Thicker Roofing:
   1. Base Bid: Include the product cost and labor to install the specified 60mil thickness of roofing membrane.
   2. Alternate Item: Exclude the Base Bid. Provide the cost of labor and material to install a 80mil thickness of roofing membrane.

D. Alternate No. 4 - Painting Exposed Interior CONCRETE TILTUP PANELS:
   1. Base Bid: Vertical exposed concrete tiltup walls in the PARKING, SERVICE CENTER and OPERATIONS will remain exposed concrete at the interior, except for tiltup walls in Training Bays (1500) and STAGING BAY (1619) and associated support rooms, which is to be primed and painted. All gypsum board, CMU, and other surfaces to be painted as specified. All exterior Tiltup to be painted.
   2. Alternate Item: Provide the cost of labor and material to install primer and paint over all exposed interior tiltup wall surfaces in the PARKING, SERVICE CENTER and OPERATIONS (not painted in base bid.)
E. Alternate No. 5 - Painting Exposed Interior Roof/Floor Structure with in PARKING, SERVICE CENTER and OPERATIONS area:
   1. Base Bid: Exclude the cost to paint all roof and floor decking, primary and secondary steel, joists, girders, beams, columns and misc. steel in exposed deck areas in PARKING, SERVICE CENTER and OPERATIONS including Mezzanine areas. Also exclude painting all conduit, piping, ductwork and other miscellaneous items as noted on the finish plans and schedule. For structural items specified to be shop primed, provide grey primer. Training Bay (1500) and Staging Bay (1619) to be painted in Base Bid.
   2. Alternate Item: Provide the cost of labor and material to paint all items excluded above to be primed and painted.

F. Alternate No. 6 - Tree Size:
   1. Base Bid: Include the product cost and labor to install the minimum 1 1/2" caliper tree size.
   2. Alternate Item: Provide the additional cost of labor and material to install a minimum 2 1/2" caliper tree size.

G. Alternate No. 7 - Acoustic Decking:
   1. Base Bid: Include the product cost and labor to install the standard roof decking in the SERVICE CENTER as indicated on the structural drawings.
   2. Alternate Item: Provide the additional cost of labor and material to install Acoustic decking with fiberglass web inserts (sound absorbing material in the flutes), located over the SERVICE CENTER area from column grid line 24 to 30, and from grid J to the South facade. See structural drawings for more information.

H. Alternate No. 8 - Quiet Room Acoustic Panels:
   1. Base Bid: Paint walls as indicated.
   2. Alternate Item: Quiet room 2336 - Provide the cost of labor and material to install Acoustical 3'-0" high wall panels.

I. Alternate No. 9 - Fiber Conduit:
   1. Base Bid: Include the product cost and labor to install a single fiber conduit into the front of the building. See Electrical Drawings for extent of work.
   2. Alternate Item: Include the product cost and labor to install a secondary fiber conduit into the back of the building. See Electrical drawings for extent of work.

J. Alternate No. 10 - Stairwell HVAC:
   1. Base Bid: Stairwells 2 and 3 to have include a cabinet heater only and NO Fan Coil Unit.
   2. Alternate Item: Provide the cost of labor and material to install a wall mounted Fan Coil Unit (HVAC) in Stairs 2 and 3 as indicated on the Mechanical and Electrical drawings.

K. Alternate No. 11 - Stairwell Treads:
   1. Base Bid: Stairwells 2, 3 and 4 to be concrete filled pan stair with exposed sealed concrete pan treads and painted exposed steel.
   2. Alternate Item: Exclude the Base Bid sealer on the concrete treads. Provide the cost of materials and labor to include stair treads at each tread including one at the top landing of each stairwell (Stairwells 2, 3 and 4).

L. Alternate No. 12 - Lightning Protection:
   1. Base Bid: Lightning protection not included.
   2. Alternate Item: Provide the cost of labor and material to add a lightning protection system including but not limited to a network of air terminals, bonding conductors, and ground electrodes for the entire building to provide a low impedance path to ground for potential strikes. The System to be designed and installed by a licensed subcontractor. See Electrical drawings for design criteria. Shop drawings are required to be signed and sealed by a professional engineer.
PART 2 PRODUCTS - NOT USED
PART 3 EXECUTION - NOT USED

END OF SECTION
SECTION 01 30 00
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General administrative requirements.
B. Preconstruction meeting.
C. Progress meetings.
D. Construction progress schedule.
E. Photo Documentation.
F. Submittals for review, information, and project closeout.
G. Number of copies of submittals.
H. Submittal procedures.

1.02 RELATED REQUIREMENTS

A. Section 01 70 00 - Execution and Closeout Requirements: Additional coordination requirements.
B. Section 01 78 00 - Closeout Submittals: Project record documents; operation and maintenance data; warranties and bonds.

1.03 GENERAL ADMINISTRATIVE REQUIREMENTS

A. Comply with requirements of Section 01 70 00 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRECONSTRUCTION MEETING

A. Attendance Required:
   1. Owner.
   3. Contractor.
B. Agenda:
   1. Execution of Owner-Contractor Agreement.
   2. Submission of executed bonds and insurance certificates.
   4. Submission of list of products, schedule of values, and progress schedule.
   5. Submission of initial Submittal schedule.
   7. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
   8. Scheduling.
   9. Site Logistics.
C. 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.
3.02 PROGRESS MEETINGS
   A. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
   B. Attendance Required:
      1. Contractor.
      2. Owner.
      3. Architect.
      4. Contractor's superintendent.
      5. Major subcontractors.
   C. Agenda:
      1. Review minutes of previous meetings.
      2. Review of work progress.
      3. Field observations, problems, and decisions.
      4. Identification of problems that impede, or will impede, planned progress.
      5. Review of submittals schedule and status of submittals.
      6. Review of off-site fabrication and delivery schedules.
      7. Maintenance of progress schedule.
      8. Corrective measures to regain projected schedules.
      9. Planned progress during succeeding work period.
     10. Maintenance of quality and work standards.
     11. Effect of proposed changes on progress schedule and coordination.
     13. Other business relating to work.
   D. 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.

3.03 CONSTRUCTION PROGRESS SCHEDULE
   A. Within 10 days after date of the 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.

3.04 PHOTO DOCUMENTATION
   A. Submit photographic record documentation of all the wall construction when framing is complete. Photos shall include all mechanical, plumbing, electrical and fire protection piping. Multiple photos shall be taken of each wall to clearly show all aspects of wall construction and MEPFP items and all related items.
   B. Photography Type: Digital; electronic files.
   C. Digital Photographs: 24 bit color, minimum resolution of 1024 by 768, in JPG format; provide files unaltered by photo editing software.
      1. Delivery Medium: Via email.
      2. File Naming: Include project identification, date and time of view, and view identification.
      3. Point of View Sketch: Include digital copy of point of view sketch with each electronic submittal; include point of view identification in each photo file name.
      4. PDF File: Assemble all photos into printable pages in PDF format, with 2 to 3 photos per page, each photo labeled with file name; one PDF file per submittal.
      5. Hard Copy: Printed hardcopy (grayscale) of PDF file and point of view sketch.
D. Submit photographs and plan to owner, not more than 3 days after photos are taken.
E. Maintain one set of all photographs and plans at project site for reference; same copies as submitted, identified as such. When project is complete, give owner the hard copy of the photos and plans for their records.

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 78 00 - 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. Other types indicated.
B. Submit for Architect's knowledge as contract administrator or for Owner. No action will be taken.

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 78 00 - Closeout Submittals:
   1. Project record documents.
   2. Operation and maintenance data.
   3. Warranties.
   5. Other types as indicated.
D. Submit for Owner's benefit during and after project completion.

3.08 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.
B. Samples: Submit the number specified in individual specification sections; one of which will be retained by Architect.
   1. After review, produce duplicates.
   2. Retained samples will not be returned to Contractor unless specifically so stated.
3.09 SUBMITTAL PROCEDURES

A. General Requirements:
   1. Use a separate transmittal for each item.
   2. Submit separate packages of submittals for review and submittals for information, when included in the same specification section.
   3. Sequentially identify each item. For revised submittals use original number and a sequential numerical suffix.
   4. 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.
   5. Schedule submittals to expedite the Project, and coordinate submission of related items.
      a. For each submittal for review, allow 15 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 7 days.
      c. For sequential reviews involving approval from authorities having jurisdiction (AHJ), in addition to Architect's approval, allow an additional 30 days.
   6. Submittals not requested will not be recognized or processed.

B. Shop Drawing Procedures:
   1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting Contract Documents and coordinating related work.
   2. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.

C. 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. Product color shall be selected from actual samples that match the material to be used. Archimages will not select a color from a color card.

3.10 SUBMITTAL REVIEW

A. Submittals for Review: Architect will review each submittal, and approve, or take other appropriate action.

B. Submittals for Information: Architect will acknowledge receipt and review. See below for actions to be taken.

C. Architect's actions will be reflected by marking each returned submittal using virtual stamp on electronic submittals.

D. Architect's and consultants' actions on items submitted for review:
   1. Authorizing purchasing, fabrication, delivery, and installation:
      a. "Approved", or language with same legal meaning.
      b. "Approved as Noted, Resubmission not required", or language with same legal meaning.
         1) At Contractor's option, submit corrected item, with review notations acknowledged and incorporated.
      c. "Approved as Noted, Resubmit for Record", or language with same legal meaning.
   2. Not Authorizing fabrication, delivery, and installation:
      a. "Revise and Resubmit".
         1) Resubmit revised item, with review notations acknowledged and incorporated.
         2) Non-responsive resubmittals may be rejected.
      b. "Rejected".
         1) Submit item complying with requirements of Contract Documents.
E. Architect's and consultants' actions on items submitted for information:

1. Items for which no action was taken:
   a. "Received" - to notify the Contractor that the submittal has been received for record only.

2. Items for which action was taken:
   a. "Reviewed" - no further action is required from Contractor.

END OF SECTION
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SECTION 01 40 00
QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Submittals.
B. Quality assurance.
C. References and standards.
D. Testing and inspection agencies and services.
E. Control of installation.
F. Tolerances.
G. Manufacturers' field services.
H. Defect Assessment.

1.02 RELATED REQUIREMENTS
A. Section 01 21 00 - Allowances: Allowance for payment of testing services.
B. Section 01 30 00 - Administrative Requirements: Submittal procedures.
C. Section 01 60 00 - Product Requirements: Requirements for material and product quality.

1.03 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Test Reports: After each test/inspection, promptly submit two copies of report to Architect and to Contractor.
   1. Include:
      a. Date issued.
      b. Project title and number.
      c. Name of inspector.
      d. Date and time of sampling or inspection.
      e. Identification of product and specifications section.
      f. Location in the Project.
      g. Type of test/inspection.
      h. Date of test/inspection.
      i. Results of test/inspection.
      j. Compliance with Contract Documents.
      k. When requested by Architect, provide interpretation of results.
   2. Test report submittals are for Architect's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for Owner's information.
C. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Architect, in quantities specified for Product Data.
   1. Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
   2. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect.
D. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.
E. Manufacturer's Field Reports: Submit reports for Architect's benefit as contract administrator or for Owner.
1. Submit report within 30 days of observation to Architect for information.
2. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents.

1.04 QUALITY ASSURANCE

A. Testing Agency Qualifications:
   1. Prior to start of work, submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.
   2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.

1.05 REFERENCES AND STANDARDS

A. For products and 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 reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.
C. Obtain copies of standards where required by product specification sections.
D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.
E. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.
F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Architect shall be altered from Contract Documents by mention or inference otherwise in any reference document.

1.06 TESTING AND INSPECTION AGENCIES AND SERVICES

A. Owner will employ services of an independent testing agency to perform certain specified testing; payment for cost of services will be derived from allowance specified in Section 01 21 00; see Section 01 21 00 and applicable sections for description of services included in allowance.
B. 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 CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.
B. Comply with manufacturers’ instructions, including each step in sequence.
C. Should manufacturers’ instructions conflict with Contract Documents, request clarification from Architect before proceeding.
D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
E. Have work performed by persons qualified to produce required and specified quality.
F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.
3.02 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.

3.03 TESTING AND INSPECTION
   A. See individual specification sections for testing and inspection required.
   B. Testing Agency Duties:
      2. Perform specified sampling and testing of products in accordance with specified standards.
      3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
      4. Promptly notify Architect and Contractor of observed irregularities or non-compliance of Work or products.
      5. Perform additional tests and inspections required by Architect.
      6. Submit reports of all tests/inspections specified.
   C. 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.
   D. 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.
   E. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Architect.
   F. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

3.04 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. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

3.05 DEFECT ASSESSMENT

A. Replace Work or portions of the Work not complying with specified requirements.

B. If, in the opinion of Architect, it is not practical to remove and replace the work, Architect will direct an appropriate remedy or adjust payment.

END OF SECTION
SECTION 01 50 00
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Temporary utilities.
B. Temporary telecommunications services.
C. Temporary sanitary facilities.
D. Temporary Controls: Barriers, enclosures, and fencing.
E. Vehicular access and parking.
F. Waste removal facilities and services.
G. Project identification sign.

1.02 RELATED REQUIREMENTS
A. Section 01 51 00 - Temporary Utilities.

1.03 TEMPORARY UTILITIES - SEE SECTION 01 51 00
A. Provide and pay for all electrical power, lighting, water, heating and cooling, and ventilation required for construction purposes.
B. New permanent facilities may not be used.
C. Use trigger-operated nozzles for water hoses, to avoid waste of water.

1.04 TELECOMMUNICATIONS SERVICES
A. Provide, maintain, and pay for telecommunications services to field office at time of project mobilization.
B. Telecommunications services shall include:
   1. Telephone Land Lines: One line, minimum; one handset per line.

1.05 TEMPORARY SANITARY FACILITIES
A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.
B. New permanent facilities may not be used during construction operations.
C. Maintain daily in clean and sanitary condition.
D. At end of construction, return facilities to same or better condition as originally found.

1.06 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.

1.07 FENCING
A. Provide 6 foot high fence around construction site; equip with vehicular gates with locks.

1.08 EXTERIOR ENCLOSURES
A. Provide temporary 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.
1.09 VEHICULAR ACCESS AND PARKING
   A. Comply with regulations relating to use of streets and sidewalks, access to emergency facilities, and access for emergency vehicles.
   B. Coordinate access and haul routes with governing authorities and Owner.
   C. Provide and maintain access to fire hydrants, free of obstructions.
   D. Provide means of removing mud from vehicle wheels before entering streets.
   E. Provide temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking.

1.10 WASTE REMOVAL
   A. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.
   B. Provide containers with lids. Remove trash from site periodically.
   C. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.
   D. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.11 PROJECT IDENTIFICATION
   A. Provide project identification sign of design and construction indicated on drawings.
   B. Erect on site at location established by Architect.
   C. No other signs are allowed without Owner permission except those required by law.

1.12 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS
   A. Remove temporary utilities, equipment, facilities, materials, prior to Date of Substantial Completion inspection.
   B. Remove underground installations to a minimum depth of 2 feet. Grade site as indicated.
   C. Clean and repair damage caused by installation or use of temporary work.
   D. Restore new permanent facilities used during construction to specified condition.

PART 2 PRODUCTS - NOT USED
PART 3 EXECUTION - NOT USED

END OF SECTION
SECTION 01 57 13
TEMPORARY EROSION AND SEDIMENT CONTROL

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Prevention of erosion due to construction activities.
B. Prevention of sedimentation of waterways, open drainage ways, and storm and sanitary sewers due to construction activities.
C. Restoration of areas eroded due to insufficient preventive measures.
D. Performance bond.
E. Compensation to owner for fines levied by authorities having jurisdiction due to non-compliance by Contractor.

1.02 RELATED REQUIREMENTS

A. Section 31 1000 - Site Clearing: Limits on clearing; disposition of vegetative clearing debris.
B. Section 31 2200 - Grading: Temporary and permanent grade changes for erosion control.
C. Section 32 9219 - Seeding: Permanent turf for erosion control.
D. Section 32 9223 - Sodding: Permanent turf for erosion control.
E. Section 32 9300 - Plants: Permanent plantings for erosion control.
F. Section 03 3000 - Cast-in-Place Concrete: Concrete for temporary and permanent erosion control structures indicated on drawings.

1.03 REFERENCE STANDARDS

G. EPA (NPDES) - National Pollutant Discharge Elimination System (NPDES), Construction General Permit; current edition.
J. City of St. Peters Stormwater Management Plan
K. It is the Contractor's responsibility to obtain a copy of these standard Specifications and details, whether at the state, county, or local level.

1.04 PERFORMANCE REQUIREMENTS

A. Comply with all requirements of U.S. Environmental Protection Agency for erosion and sedimentation control, as specified for the National Pollutant Discharge Elimination System (NPDES), Phases I and II, under requirements for the 2003 Construction General Permit (CGP),
whether the project is required by law to comply or not.

B. Comply with all requirements of City of St. Peters Stormwater Management Plan

C. Do not begin clearing, grading, or other work involving disturbance of ground surface cover until applicable permits have been obtained; furnish all documentation required to obtain applicable permits.

D. All erosion control shall be installed as soon as possible and before precipitation occurs. The erosion control measures shall be continuously maintained by the Contractor until final acceptance of the project. Upon acceptance of the project, temporary erosion controls shall be removed unless otherwise instructed by the architect.

E. The architect will notify the Contractor in writing of any noncompliance with the provisions of these specifications. The Contractor shall, after receipt of such notice, immediately take corrective action. Such notice, when delivered to the Contractor or his authorized representative at the site of the work, shall be deemed sufficient for the purpose. If the Contractor fails or refuses to comply promptly, the architect may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to any such stop orders shall be made the subject of a claim for extension of time or for excess costs or damage by the Contractor unless it was later determined that the Contractor was in compliance. Absence of any such notification does not relieve the contractor of his responsibilities to comply with all these specifications.

F. Storm Water Runoff: Control increased storm water runoff due to disturbance of surface cover due to construction activities for this project.
   1. Prevent runoff into storm and sanitary sewer systems, including open drainage channels, in excess of actual capacity or amount allowed by authorities having jurisdiction, whichever is less.
   2. Anticipate runoff volume due to the most extreme short term and 24-hour rainfall events that might occur in 25 years.

G. Erosion On Site: Minimize wind, water, and vehicular erosion of soil on project site due to construction activities for this project.
   1. Control movement of sediment and soil from temporary stockpiles of soil.
   2. Prevent development of ruts due to equipment and vehicular traffic.
   3. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to the owner.

H. Erosion Off Site: Prevent erosion of soil and deposition of sediment on other properties caused by water leaving the project site due to construction activities for this project.
   1. Prevent windblown soil from leaving the project site.
   2. Prevent tracking of mud onto public roads outside site.
   3. Prevent mud and sediment from flowing onto sidewalks and pavements.
   4. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to the owner.

I. Sedimentation of Waterways On Site: Prevent sedimentation of waterways on the project site, including open drainage ways, storm sewers, and sanitary sewers.
   1. If sedimentation occurs, install or correct preventive measures immediately at no cost to owner; remove deposited sediments; comply with requirements of authorities having jurisdiction.
   2. If sediment basins are used as temporary preventive measures, pump dry and remove deposited sediment after each storm.

J. Sedimentation of Waterways Off Site: Prevent sedimentation of waterways off the project site, including open drainage ways, storm sewers, and sanitary sewers.
   1. If sedimentation occurs, install or correct preventive measures immediately at no cost to owner; remove deposited sediments; comply with requirements of authorities having jurisdiction.

K. Open Water: Prevent standing water that could become stagnant.
L. Maintenance: Maintain temporary preventive measures until permanent measures have been established.

1.05 SUBMITTALS

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

B. Erosion and Sedimentation Control Plan: The contractor shall reference the approved Storm Water Pollution Prevention Plan (SWPPP) for erosion control means and methods.

C. Inspection Reports: Submit reports of each inspection to architect and engineer; identify each preventive measure, indicate condition, and specify maintenance or repair required and accomplished.

D. Maintenance Instructions: Provide instructions covering inspection and maintenance for temporary measures that must remain after Substantial Completion.

PART 2 - PRODUCTS

2.01 MATERIALS

A. General: Surface drainage from cuts, fills, topsoil or other material stockpiles, within the construction limits, whether or not completed, and from borrow and waste disposal areas, shall, if turbidity producing materials are present, be held in sedimentation ponds or shall be graded to control erosion. Temporary erosion and sediment control measures including but not limited to berms, drains, or sedimentation basins, are required to meet these standards and shall be provided and maintained until permanent drainage and erosion control facilities are completed and operating. The area of bare soil exposed by construction operations at any one time should be held to a minimum.

B. Grading Operations:

1. Grading operations shall be scheduled so excavated materials shall be immediately placed into compacted embankments.

2. Where steep slopes or abrupt changes in grade are required, a division channel or berm shall be constructed at the top of the slope to cause the surface water to flow along the diversion to controlled slope drains. The contractor shall reference the approved Storm Water Pollution Prevention Plan (SWPPP) for erosion control means and methods.

C. Mulch: Use one of the following:

1. Wood waste, chips, or bark.

2. Erosion control matting or netting.

3. Grass

4. Mulch shall be applied to slopes in excess of one foot vertical to ten feet horizontal unless otherwise shown.

D. Grass Seed For Temporary Cover: Select a species appropriate to climate, planting season, and intended purpose. If same area will later be planted with permanent vegetation, do not use species known to be excessively competitive or prone to volunteer in subsequent seasons.

1. Earth areas outside of building, walks and paving that are not to be immediately planted with permanent grass or landscaping shall be seeded with a temporary seed that will produce a fast growing cover resistant to erosion as required per St. Louis County’s Model Best Management Practices (BMP) for Land Disturbance.

2. Temporary grassing and mulching shall conform to St. Louis County’s Model Best Management Practices (BMP) for Land Disturbance.

E. Silt Fence Fabric: Polypropylene geotextile resistant to common soil chemicals, mildew, and insects; non-biodegradable; in longest lengths possible; Silt fence shall be per St. Louis County’s Model Best Management Practices (BMP) for Land Disturbance.

1. Silt fences shall be constructed at the toe of embankment or perimeter of all disturbed earth areas and shall be located to interrupt silt transport conveyed by overland surface drainage runoff from the disturbed areas.

2. Sediment accumulated behind silt fences shall be removed, redistributed and compacted immediately prior to beginning temporary grassing.
F. Inlet Barriers:
   1. Block and gravel inlet protection, silt fence or inlet protection fabric drops where indicated, shall be installed around perimeter at each inlet where inlets are near to work performed as part of this project. Fiber and filter rolls may be used around inlets that are constructed within paved areas or at inlets in pavement, downstream of construction areas. Silt deposits shall be periodically removed during construction and immediately prior to final acceptance.

G. Dust Control:
   1. The Contractor shall maintain all excavations, embankments, stockpiles, haul roads, temporary and permanent access roads, plant sites, waste areas, borrow areas and all other work areas within or without the project boundaries free from dust and to minimize offsite transport of soil by wheels which would cause a hazard or nuisance or nuisance to others.
   2. Temporary or permanent graded access drives from adjacent paved public or private roads or rights-of-way shall be temporarily surfaced per St. Louis County’s Model Best Management Practices (BMP) for Land Disturbance. Maintain throughout construction period. Sprinkle regularly to settle accumulated silt.
   3. Approved temporary methods of stabilization of all areas other than the construction entrance road shall consist of sprinkling, chemical treatment, light bituminous treatment, gravel surfacing or similar methods to control dust. Sprinkling to be approved and must be repeated at such intervals as to keep all parts of the disturbed area at least damp at all times. Contractor must have sufficient competent equipment on the job at all times if sprinkling is used.
   4. Dust control shall be performed as the work proceeds and whenever a dust nuisance or hazard occurs.

PART 3 - EXECUTION

3.01 EXAMINATION
   A. Examine site and identify existing features that contribute to erosion resistance; maintain such existing features to greatest extent possible.

3.02 PREPARATION
   A. Schedule all work so that soil surfaces are left exposed for the minimum amount of time.

3.03 SCOPE OF PREVENTIVE MEASURES
   A. All erosion control shall be installed and continuously maintained by the Contractor until final acceptance of the project. Upon acceptance of the project, temporary erosion controls shall be removed unless otherwise instructed by the architect.
   B. Construction Entrances: Traffic-bearing aggregate surface.
      1. Width: As required; 24 feet, minimum (2-way); 14 feet, minimum (1-way).
      2. Length: 50 feet, minimum.
      3. Provide at each construction entrance from public right-of-way.
      4. Where necessary to prevent tracking of mud onto right-of-way, provide wheel washing area out of direct traffic lane, with drain into sediment trap or basin.
   C. Linear Sediment Barriers: Made of silt fences, fiber and filter rolls
      1. Provide linear sediment barriers:
         a. Along downhill perimeter edge of disturbed areas, including soil stockpiles.
         b. Along the top of the slope or top bank of drainage channels and swales that traverse disturbed areas.
         c. Along the toe of cut slopes and fill slopes.
         d. Perpendicular to flow across the bottom of existing and new drainage channels and swales that traverse disturbed areas or carry runoff from disturbed areas
         e. Across the entrances to culverts that receive runoff from disturbed areas.
   D. Storm Drain Inlet Sediment Traps: As detailed on drawings.
   E. Temporary Splash Pads: Stone aggregate over filter fabric; size to suit application; provide at downspout outlets and storm water outlets.
F. Soil Stockpiles: Protect using one of the following measures:
   1. Cover with polyethylene film, secured by placing soil on outer edges.
   2. Cover with mulch at least 4 inches thickness of pine needles, sawdust, bark, wood chips, or shredded leaves, or 6 inches of straw or hay.

G. Mulching: Use only for areas that may be subjected to erosion for less than 6 months.
   1. Wood Waste: Use only on slopes 3:1 or flatter; no anchoring required.

H. Temporary Seeding: Use where temporary vegetated cover is required.

3.04 INSTALLATION
A. Refer to “Model Best Management Practices (BMP) for Land Disturbance – Sediment and Erosion Control”, St. Louis County (latest edition) for installation requirements.

3.05 MAINTENANCE
A. Inspect preventive measures weekly, within 24 hours of any storm event at the project site, and daily during prolonged rainfall.
B. Repair deficiencies immediately.
C. Silt Fences:
   1. Promptly replace fabric that deteriorates unless need for fence has passed.
   2. Remove silt deposits that exceed one-third of the height of the fence.
   3. Repair fences that are undercut by runoff or otherwise damaged, whether by runoff or other causes.
D. Clean out temporary sediment control structures weekly and relocate soil on site or remove from site as directed by architect.

3.06 CLEAN UP
A. Remove temporary measures after permanent measures have been installed, unless permitted to remain by architect.
B. Clean out temporary sediment control structures that are to remain as permanent measures.
C. Where removal of temporary measures would leave exposed soil, shape surface to an acceptable grade and finish to match adjacent ground surfaces.

END OF SECTION
SECTION 01 60 00
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES
A. General product requirements.
B. Transportation, handling, storage and protection.
C. Product option requirements.
D. Substitution limitations.
E. Procedures for Owner-supplied products.

1.02 RELATED REQUIREMENTS
A. Section 01 40 00 - Quality Requirements: Product quality monitoring.

1.03 SUBMITTALS
A. Proposed Products List: Submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
   1. Submit within 15 days after date of Agreement.
B. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
C. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
D. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
   1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

PART 2 PRODUCTS

2.01 EXISTING PRODUCTS
A. Unforeseen historic items encountered remain the property of the Owner; notify Owner promptly upon discovery; protect, remove, handle, and store as directed by Owner.

2.02 NEW PRODUCTS
A. Provide new products unless specifically required or permitted by Contract Documents.
B. Use of products having any of the following characteristics is not permitted:
   1. Containing lead, cadmium, or asbestos.
C. Where other criteria are met, Contractor shall give preference to products that:
   1. If used on interior, have lower emissions, as defined in Section 01 61 16.
   2. If wet-applied, have lower VOC content, as defined in Section 01 61 16.

2.03 PRODUCT OPTIONS
A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.
B. 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 OWNER-SUPPLIED PRODUCTS
A. Owner's Responsibilities:
   1. Arrange for and deliver Owner reviewed shop drawings, product data, and samples, to Contractor.
2. Arrange and pay for product delivery to site.
3. On delivery, inspect products jointly with Contractor.
4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
5. Arrange for manufacturers’ warranties, inspections, and service.

B. Contractor’s Responsibilities:
1. Review Owner reviewed shop drawings, product data, and samples.
2. Receive and unload products at site; inspect for completeness or damage jointly with Owner.
3. Handle, store, install and finish products.
4. Repair or replace items damaged after receipt.

3.02 TRANSPORTATION AND HANDLING

A. Package products for shipment in manner to prevent damage; 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. Transport and handle products in accordance with manufacturer’s instructions.
E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.
F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.
H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.03 STORAGE AND PROTECTION

A. 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 74 19.
B. Store and protect products in accordance with manufacturers’ instructions.
C. Store with seals and labels intact and legible.
D. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.
E. For exterior storage of fabricated products, place on sloped supports above ground.
F. Provide bonded off-site storage and protection when site does not permit on-site storage or protection.
G. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.
H. Comply with manufacturer’s warranty conditions, if any.
I. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
J. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
K. Prevent contact with material that may cause corrosion, discoloration, or staining.
L. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
M. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION
# SUBSTITUTION REQUEST

(During the Bidding Phase)

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Attached data includes product description, specifications, drawings, photographs, and performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.

Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.

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A/E’s REVIEW AND ACTION

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

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Supporting Data Attached:  
- [ ] Drawings  
- [ ] Product Data  
- [ ] Samples  
- [ ] Tests  
- [ ] Reports  
- [ ] Other:  

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CSI Form 1.5C  September 1996
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SUBSTITUTION REQUEST
(After the Bidding Phase)

Project: __________________________ Substitution Request Number: __________________________

To: __________________________ Date: __________________________

Re: __________________________ Contract For: __________________________

From: __________________________ A/E Project Number: __________________________

Specification Title: __________________________ Description: __________________________

Section: __________________________ Page: __________________________ Article/Paragraph: __________________________

Proposed Substitution: __________________________

Manufacturer: __________________________ Address: __________________________ Phone: __________________________

Trade Name: __________________________ Model No.: __________________________

Installer: __________________________ Address: __________________________ Phone: __________________________

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

Differences between proposed substitution and specified product: __________________________

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

Reason for not providing specified item: __________________________

Similar Installation:

Project: __________________________ Architect: __________________________

Address: __________________________ Owner: __________________________

Date Installed: __________________________

Proposed substitution affects other parts of Work: □ No □ Yes; explain __________________________

Savings to Owner for accepting substitution: __________________________ ($ _________).

Proposed substitution changes Contract Time: □ No □ Yes [Add] [Deduct] __________________________ days.

Supporting Data Attached: □ Drawings □ Product Data □ Samples □ Tests □ Reports □ _________

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Alexandria, VA 22314
Page    of    September 1996
CSI Form 13.1A
The Undersigned certifies:
• Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
• Same warranty will be furnished for proposed substitution as for specified product.
• Same maintenance service and source of replacement parts, as applicable, is available.
• Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
• Cost data as stated above is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.
• Proposed substitution does not affect dimensions and functional clearances.
• Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.
• Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Submitted by: ________________________________
Signed by: ________________________________
Firm: ______________________________________
Address: __________________________________
__________________________
Telephone: ________________________________
Attachments: ________________________________

A/E’s REVIEW AND ACTION
☐ Substitution approved - Make submittals in accordance with Specification Section 01330.
☐ Substitution approved as noted - Make submittals in accordance with Specification Section 01330.
☐ Substitution rejected - Use specified materials.
☐ Substitution Request received too late - Use specified materials.
Signed by: ________________________________ Date: ________________________________

Additional Comments: ________________________________
☐ Contractor ☐ Subcontractor ☐ Supplier ☐ Manufacturer ☐ A/E ☐
SECTION 01 70 00
EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1  GENERAL

1.01  SECTION INCLUDES

A. Examination, preparation, and general installation procedures.
B. Cutting and patching.
C. Surveying for laying out the work.
D. Cleaning and protection.
E. Starting of systems and equipment.
F. Demonstration and instruction of Owner personnel.
G. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.
H. General requirements for maintenance service.

1.02  RELATED REQUIREMENTS

A. Section 01 30 00 - Administrative Requirements: Submittals procedures, Electronic document submittal service.
B. Section 01 40 00 - Quality Requirements: Testing and inspection procedures.
C. Section 01 78 00 - Closeout Submittals: Project record documents, operation and maintenance data, warranties, and bonds.
D. Section 01 79 00 - Demonstration and Training: Demonstration of products and systems to be commissioned and where indicated in specific specification sections

1.03  PROJECT CONDITIONS

A. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
B. 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. Provide temporary measures such as berms, dikes, and drains, to prevent water flow.
   2. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

1.04  COORDINATION

A. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
B. Notify affected utility companies and comply with their requirements.
C. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
D. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
E. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
F. Coordinate completion and clean-up of work of separate sections.
G. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.
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 60 00 - 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 misfabrication.

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.
   2. Grid or axis for structures.
   3. Building foundation, column locations, ground floor elevations.

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, and so as to avoid waste due to necessity for replacement.

B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.

C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.

D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.

E. Make neat transitions between different surfaces, maintaining texture and appearance.

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-conforming 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 84 00, 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. 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. Protect work from spilled liquids. If work is exposed to spilled liquids, immediately remove protective coverings, dry out work, and replace protective coverings.
   G. 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.
   H. Prohibit traffic from landscaped areas.
   I. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.08 SYSTEM STARTUP
   A. Coordinate schedule for start-up of various equipment and systems.
   B. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.
   C. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
   D. Verify that wiring and support components for equipment are complete and tested.
   E. Execute start-up under supervision of applicable Contractor personnel and manufacturer’s representative in accordance with manufacturers’ instructions.
   F. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.09 DEMONSTRATION AND INSTRUCTION
   A. See Section 01 79 00 - Demonstration and Training.

3.10 ADJUSTING
   A. Adjust operating products and equipment to ensure smooth and unhindered operation.
   B. Testing, adjusting, and balancing HVAC systems: See Section 23 05 93 - Testing, Adjusting, and Balancing for HVAC.

3.11 FINAL CLEANING
   A. Use cleaning materials that are nonhazardous.
   B. 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.
   C. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.
   D. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
   E. Clean filters of operating equipment.
   F. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, and drainage systems.
   G. Clean site; sweep paved areas, rake clean landscaped surfaces.
H. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.12 CLOSEOUT PROCEDURES

A. Make submittals that are required by governing or other authorities.
   1. Provide copies to Owner.

B. Accompany Project Coordinator on preliminary inspection to determine items to be listed for completion or correction in the Contractor's Correction Punch List for Contractor's Notice of Substantial Completion.

C. Notify Architect when work is considered ready for Architect's Substantial Completion inspection.

D. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's Substantial Completion inspection.

E. Conduct Substantial Completion inspection and create Final Correction Punch List containing Architect's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Architect.

F. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.

G. Notify Architect when work is considered finally complete and ready for Architect's Substantial Completion final inspection.

H. Complete items of work determined by Architect listed in executed Certificate of Substantial Completion.

END OF SECTION
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SECTION 01 78 00
CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Project Record Documents.
B. Operation and Maintenance Data.

1.02 RELATED REQUIREMENTS
A. Section 00 72 00 - General Conditions and 00 73 00 - Supplementary Conditions: Performance bond and labor and material payment bonds, warranty, and correction of work.
B. Section 01 30 00 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.
C. Section 01 70 00 - Execution and Closeout Requirements: Contract closeout procedures.
D. Individual Product Sections: Specific requirements for operation and maintenance data.
E. Individual Product Sections: Warranties required for specific products or Work.

1.03 SUBMITTALS
A. Project Record Documents: Submit documents to Architect with claim for final Application for Payment.
B. Operation and Maintenance Data:
   1. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
   2. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect comments. Revise content of all document sets as required prior to final submission.
   3. Submit one sets of revised final documents in final form within 10 days after final inspection.
C. Warranties and Bonds:
   1. For equipment or component parts of equipment put into service during construction with Owner’s permission, submit documents within 10 days after acceptance.
   2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
   3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 3 EXECUTION

2.01 PROJECT RECORD DOCUMENTS
A. Maintain on site one set of the following record documents; record actual revisions to the Work:
   1. Drawings.
   2. Addenda.
   3. Change Orders and other modifications to the Contract.
B. Ensure entries are complete and accurate, enabling future reference by Owner.
C. Store record documents separate from documents used for construction.
D. Record information concurrent with construction progress.
E. Record Drawings: Legibly mark each item to record actual construction including:
   1. Field changes of dimension and detail.
   2. Details not on original Contract drawings.
2.02 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.

2.03 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

A. For Each Product, Applied Material, and Finish:

B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.

C. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

END OF SECTION
SECTION 01 79 00
DEMONSTRATION AND TRAINING

PART 1 GENERAL

1.01 SUMMARY
A. Demonstration of products and systems where indicated in specific specification sections.
B. Training of Owner personnel in operation and maintenance is required for:
   1. All software-operated systems.
   2. HVAC systems, equipment and controls.
   3. Electrical systems and equipment.
   4. Landscape irrigation.
   5. Security, access control, A/V, fire alarm and all low voltage systems.
   6. Fire protection system and equipment.
   7. Landscape irrigation.
   8. Traffic gates.
  10. Door operators.
C. Training of Owner personnel in care, cleaning, maintenance, and repair is required for:
   1. Roofing, waterproofing, and other weather-exposed or moisture protection products.
   2. Finishes, including flooring, wall finishes, ceiling finishes.
   3. Fixtures and fittings.

1.02 RELATED REQUIREMENTS
A. Section 01 78 00 - Closeout Submittals: Operation and maintenance manuals.

1.03 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 DEMONSTRATION - GENERAL
A. Demonstrations conducted during system start-up do not qualify as demonstrations for the purposes of this section, unless approved in advance by Owner.
B. Demonstration may be combined with Owner personnel training if applicable.
C. Operating Equipment and Systems: Demonstrate operation in all modes, including start-up, shut-down, seasonal changeover, emergency conditions, and troubleshooting, and maintenance procedures, including scheduled and preventive maintenance.
   1. Perform demonstrations not less than two weeks prior to Substantial Completion.
   2. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
D. Non-Operating Products: Demonstrate cleaning, scheduled and preventive maintenance, and repair procedures.
   1. Perform demonstrations not less than two weeks prior to Substantial Completion.
3.02 TRAINING - GENERAL

A. Conduct training on-site unless otherwise indicated.

B. Provide training in minimum two hour segments.

C. Training schedule will be subject to availability of Owner's personnel to be trained; re-schedule training sessions as required by Owner; once schedule has been approved by Owner failure to conduct sessions according to schedule will be cause for Owner to charge Contractor for personnel "show-up" time.

D. Review of Facility Policy on Operation and Maintenance Data: During training discuss:
   1. The location of the O&M manuals and procedures for use and preservation; backup copies.
   2. Typical contents and organization of all manuals, including explanatory information, system narratives, and product specific information.
   3. Typical uses of the O&M manuals.

E. Product- and System-Specific Training:
   1. Review the applicable O&M manuals.
   2. For systems, provide an overview of system operation, design parameters and constraints, and operational strategies.
   3. Review instructions for proper operation in all modes, including start-up, shut-down, seasonal changeover and emergency procedures, and for maintenance, including preventative maintenance.
   4. Provide hands-on training on all operational modes possible and preventive maintenance.
   5. Emphasize safe and proper operating requirements; discuss relevant health and safety issues and emergency procedures.
   6. Discuss common troubleshooting problems and solutions.
   7. Discuss any peculiarities of equipment installation or operation.
   8. Discuss warranties and guarantees, including procedures necessary to avoid voiding coverage.
   9. Review recommended tools and spare parts inventory suggestions of manufacturers.
   10. Review spare parts and tools required to be furnished by Contractor.
   11. Review spare parts suppliers and sources and procurement procedures.

F. Be prepared to answer questions raised by training attendees; if unable to answer during training session, provide written response within three days.

END OF SECTION
SECTION 02 41 00
DESTRUCTION

PART 1 GENERAL

1.01 SECTION INCLUDES
   A. Selective demolition of built site elements.

1.02 RELATED REQUIREMENTS
   A. Section 01 10 00 - Summary: Limitations on Contractor's use of site and premises.
   B. Section 01 50 00 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.
   C. Section 01 57 13 - Temporary Erosion and Sediment Control.
   D. Section 01 70 00 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring.
   E. Section 31 10 00 - Site Clearing: Vegetation and existing debris removal.
   F. Section 31 22 00 - Grading: Fill material for filling holes, pits, and excavations generated as a result of removal operations.

PART 2 PRODUCTS -- NOT USED

PART 3 EXECUTION

3.01 SCOPE
   A. Remove paving and curbs as required to accomplish new work.

3.02 GENERAL PROCEDURES AND PROJECT CONDITIONS
   A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
      1. Obtain required permits.
      2. Provide, erect, and maintain temporary barriers and security devices.
      3. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
      4. Do not close or obstruct roadways or sidewalks without permit.
      5. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
      6. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.
   B. Do not begin removal until receipt of notification to proceed from Owner.
   C. Protect existing structures and other elements that are not to be removed.
      1. Provide bracing and shoring.
      2. Prevent movement or settlement of adjacent structures.
   D. Partial Removal of Paving and Curbs: Neatly saw cut at right angle to surface.

3.03 EXISTING UTILITIES
   A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.
   B. Protect existing utilities to remain from damage.
   C. Do not disrupt public utilities without permit from authority having jurisdiction.
3.04 DEBRIS AND WASTE REMOVAL

A. Remove debris, junk, and trash from site.
B. Leave site in clean condition, ready for subsequent work.
C. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION
SECTION 03 05 16
UNDERSLAB VAPOR BARRIER

PART 1 GENERAL
1.01 SECTION INCLUDES
   A. Sheet vapor barrier under concrete slabs on grade.

1.02 RELATED REQUIREMENTS
   A. Section 03 30 00 - Cast-in-Place Concrete: Preparation of subgrade, granular fill, placement of concrete.

1.03 REFERENCE STANDARDS
   A. ASTM E1643 - Standard Practice for Selection, Design, Installation and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs; 2011 (Reapproved 2017).
   B. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs; 2017.

1.04 SUBMITTALS
   A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
   B. Product Data: Submit manufacturers' data on manufactured products.
   C. Samples: Submit samples of underslab vapor barrier to be used.
   D. Manufacturer's Installation Instructions: Indicate installation procedures and interface required with adjacent construction.

PART 2 PRODUCTS
2.01 MATERIALS
   A. Underslab Vapor Barrier:
      1. Permeance as tested before and after mandatory conditioning (ASTM E 1745 Section 7.1 and sub-paragraphs 7.1.1-7.1.5): less than 0.01 Perms [grains/(ft2 - hr - inHg)].
      2. Complying with ASTM E1745 Class A.
      3. Thickness: 15 mils.
      4. Basis of Design:
      5. Other approved manufacturer's:
         a. W.R. Meadows; Perminator Vapor Barrier (15-mil).
         b. Reef Industries; Griffolyn Green (15-mil).
         c. Substitutions: See Section 01 60 00 - Product Requirements.
   B. Accessory Products: Vapor barrier manufacturer's recommended tape, adhesive, mastic, etc., for sealing seams and penetrations in vapor barrier.
   C. Seam Tape must have the following qualities:
      1. Water Vapor Transmission Rate ASTM E 96 0.3 perms or lower.
   D. Vapor Proofing Mastic must have the following qualities:
      1. Water Vapor Transmission Rate ASTM E 96 0.3 perms or lower.
   E. Pipe Boots: Construct pipe boots from vapor barrier material, pressure sensitive tape and/or mastic per manufacturer's instructions.
   F. Columns: Wrap similar to pipe boots.
PART 3 EXECUTION

3.01 EXAMINATION
   A. Verify that surface over which vapor barrier is to be installed is complete and ready before proceeding with installation of vapor barrier.

3.02 INSTALLATION
   A. Install vapor barrier in accordance with manufacturer's instructions and ASTM E1643.
   B. Install vapor barrier under interior slabs on grade; lap sheet over footings and seal to foundation walls.
   C. Lap joints minimum 6 inches.
   D. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions.
   E. No penetration of vapor barrier is allowed except for reinforcing steel and permanent utilities.
   F. Repair damaged vapor retarder before covering with other materials.

END OF SECTION
SECTION 03 20 00 - CONCRETE REINFORCING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Steel reinforcement bars.
2. Welded-wire reinforcement.

1.3 ACTION SUBMITTALS

A. Product Data: For the following:

1. Each type of steel reinforcement.
2. Bar supports.
3. Mechanical splice couplers.

B. Shop Drawings: Comply with ACI SP-066:

1. Include placing drawings that detail fabrication, bending, and placement.
2. Include bar sizes, lengths, materials, grades, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, location of splices, lengths of lap splices, details of mechanical splice couplers, details of welding splices, tie spacing, hoop spacing, and supports for concrete reinforcement.

C. Construction Joint Layout: Indicate proposed construction joints required to build the structure.

1. Location of construction joints is subject to approval of the Architect.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Statements: For testing and inspection agency.

B. Welding certificates.

1. Reinforcement To Be Welded: Welding procedure specification in accordance with AWS D1.4/D1.4M

C. Material Test Reports: For the following, from a qualified testing agency:

1. Steel Reinforcement:
a. For reinforcement to be welded, mill test analysis for chemical composition and carbon equivalent of the steel in accordance with ASTM A706/A706M.

2. Mechanical splice couplers.

D. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent agency, qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.

B. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.4/D 1.4M.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

1. Store reinforcement to avoid contact with earth.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A615/A615M, Grade 60, deformed.

B. Low-Alloy Steel Reinforcing Bars: ASTM A706/A706M, deformed.

C. Headed-Steel Reinforcing Bars: ASTM A970/A970M.

D. Steel Bar Mats: ASTM A184/A184M, fabricated from ASTM A615/A615M, Grade 60, deformed bars, assembled with clips.

E. Plain-Steel Welded-Wire Reinforcement: ASTM A1064/A1064M, plain, fabricated from as-drawn steel wire into flat sheets.

2.2 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A615/A615M, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.

B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place.

1. Manufacture bar supports from steel wire, plastic, or precast concrete in accordance with CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
a. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire, all-plastic bar supports, or CRSI Class 2 stainless steel bar supports.

C. Mechanical SpliceCouplers: ACI 318 Type 1, same material of reinforcing bar being spliced; tension-compression type.

D. Steel Tie Wire: ASTM A1064/A1064M, annealed steel, not less than 0.0508 inch in diameter.
   1. Finish: Plain.

2.3 FABRICATING REINFORCEMENT

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

PART 3 - EXECUTION

3.1 PREPARATION

A. Protection of In-Place Conditions:
   1. Do not cut or puncture vapor retarder.
   2. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.

3.2 INSTALLATION OF STEEL REINFORCEMENT

A. Comply with CRSI's "Manual of Standard Practice" for placing and supporting reinforcement.

B. Accurately position, support, and secure reinforcement against displacement.
   1. Locate and support reinforcement with bar supports to maintain minimum concrete cover.
   2. Do not tack weld crossing reinforcing bars.

C. Preserve clearance between bars of not less than 1 inch, not less than one bar diameter, or not less than 1-1/3 times size of large aggregate, whichever is greater.

D. Provide concrete coverage in accordance with ACI 318.

E. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

F. Splices: Lap splices as indicated on Drawings.
   1. Bars indicated to be continuous, and all vertical bars shall be lapped not less than 36 bar diameters at splices, or 24 inches, whichever is greater.
   2. Stagger splices in accordance with ACI 318.
   3. Mechanical Splice Couplers: Install in accordance with manufacturer's instructions.
   4. Weld reinforcing bars in accordance with AWS D1.4/D 1.4M, where indicated on Drawings.
G. Install structural thermal break insulated connection system in accordance with manufacturer's instructions.

H. Install welded-wire reinforcement in longest practicable lengths.
      a. For reinforcement less than W4.0 or D4.0, continuous support spacing shall not exceed 12 inches.
   2. Lap edges and ends of adjoining sheets at least one wire spacing plus 2 inches for plain wire and 8 inches for deformed wire.
   3. Offset laps of adjoining sheet widths to prevent continuous laps in either direction.
   4. Lace overlaps with wire.

3.3 JOINTS

A. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
   1. Place joints perpendicular to main reinforcement.
   2. Continue reinforcement across construction joints unless otherwise indicated.
   3. Do not continue reinforcement through sides of strip placements of floors and slabs.

B. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length, to prevent concrete bonding to one side of joint.

3.4 INSTALLATION TOLERANCES

A. Comply with ACI 117.

3.5 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Inspections:
   1. Steel-reinforcement placement.
   2. Steel-reinforcement mechanical splice couplers.
   3. Steel-reinforcement welding.

END OF SECTION 03 20 00
SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Cast-in-place concrete, including concrete materials, mixture design, placement procedures, and finishes.

B. Related Requirements:
   1. Section 03 20 00 "Concrete Reinforcing" for steel reinforcing bars and welded-wire reinforcement.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.

B. Water/Cement Ratio (w/cm): The ratio by weight of water to cementitious materials.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

   1. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
      a. Contractor's superintendent.
      b. Independent testing agency responsible for concrete design mixtures.
      c. Ready-mix concrete manufacturer.
      d. Concrete Subcontractor.
      e. Special concrete finish Subcontractor.

   2. Review the following:
      a. Special inspection and testing and inspecting agency procedures for field quality control.
      b. Construction joints, control joints, isolation joints, and joint-filler strips.
      c. Vapor-retarder installation.
      d. Anchor rod and anchorage device installation tolerances.
      e. Cold and hot weather concreting procedures.
f. Concrete finishes and finishing.
g. Curing procedures.
h. Methods for achieving specified floor and slab flatness and levelness.
i. Floor and slab flatness and levelness measurements.
j. Concrete repair procedures.
k. Concrete protection.

1.5 ACTION SUBMITTALS

A. Product Data: For each of the following.
   1. Portland cement.
   2. Fly ash.
   3. Aggregates.
   4. Admixtures:
      a. Include limitations of use, including restrictions on cementitious materials, supplementary cementitious materials, air entrainment, aggregates, temperature at time of concrete placement, relative humidity at time of concrete placement, curing conditions, and use of other admixtures.
   5. Vapor retarders.
   7. Curing materials.
   8. Joint fillers.

B. Design Mixtures: For each concrete mixture, include the following:
   1. Mixture identification.
   2. Minimum 28-day compressive strength.
   3. Historical strength data per ACI 318
   4. Durability exposure class.
   5. Maximum w/cm.
   7. Air content.
   8. Nominal maximum aggregate size.
   9. Indicate amounts of mixing water to be withheld for later addition at Project site if permitted.
   10. Intended placement method.
   11. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

C. Shop Drawings:
   1. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
      a. Location of construction joints is subject to approval of the Architect.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For the following:
1. Installer: Include copies of applicable ACI certificates.
2. Ready-mixed concrete manufacturer.
3. Testing agency: Include copies of applicable ACI certificates.

B. Material Certificates: For each of the following, signed by manufacturers:
   1. Cementitious materials.
   2. Admixtures.
   3. Curing compounds.
   5. Adhesives.
   6. Vapor retarders.
   7. Semirigid joint filler.

C. Material Test Reports: For the following, from a qualified testing agency:
   1. Portland cement.
   2. Fly ash.
   3. Aggregates.
   4. Admixtures:

D. Floor surface flatness and levelness measurements report, indicating compliance with specified tolerances.

E. Research Reports: For concrete admixtures in accordance with ICC's Acceptance Criteria AC198.

F. Field quality-control reports.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs Project personnel qualified as an ACI-certified Flatwork Technician and Finisher and a supervisor who is a certified ACI Flatwork Concrete Finisher/Technician or an ACI Concrete Flatwork Technician.
   1. Post-Installed Concrete Anchors Installers: ACI-certified Adhesive Anchor Installer.

B. Ready-Mixed Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.
   1. Manufacturer certified in accordance with NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

C. Laboratory Testing Agency Qualifications: A testing agency qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated and employing an ACI-certified Concrete Quality Control Technical Manager.
   1. Personnel performing laboratory tests shall be an ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade I. Testing agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician, Grade II.
D. Field Quality Control Testing Agency Qualifications: An independent agency, qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.

1. Personnel conducting field tests shall be qualified as an ACI Concrete Field Testing Technician, Grade 1, in accordance with ACI CPP 610.1 or an equivalent certification program.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Comply with ASTM C94/C94M and ACI 301.

1.9 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with ACI 301 and ACI 306.1 and as follows.

1. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
2. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
3. Do not use frozen materials or materials containing ice or snow.
4. Do not place concrete in contact with surfaces less than 35 deg F, other than reinforcing steel.
5. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

B. Hot-Weather Placement: Comply with ACI 301 and ACI 305.1, and as follows:

1. Maintain concrete temperature at time of discharge to not exceed 95 deg F.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with ACI 301 unless modified by requirements in the Contract Documents.

2.2 CONCRETE MATERIALS

A. Source Limitations:

1. Obtain each type or class of cementitious material of the same brand from the same manufacturer’s plant.
2. Obtain aggregate from single source.
3. Obtain each type of admixture from single source from single manufacturer.

B. Cementitious Materials:
2. Fly Ash: ASTM C618, Class C or F.

C. Normal-Weight Aggregates: ASTM C33/C33M, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source.

1. Alkali-Silica Reaction: Comply with one of the following:
   a. Expansion Result of Aggregate: Not more than 0.04 percent at one-year when tested in accordance with ASTM C1293.
   b. Expansion Results of Aggregate and Cementitious Materials in Combination: Not more than 0.10 percent at an age of 16 days when tested in accordance with ASTM C1567.
   c. Alkali Content in Concrete: Not more than 4 lb./cu. yd. for moderately reactive aggregate or 3 lb./cu. yd. for highly reactive aggregate, when tested in accordance with ASTM C1293 and categorized in accordance with ASTM C1778, based on alkali content being calculated in accordance with ACI 301.


D. Air-Entraining Admixture: ASTM C260/C260M.

E. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride in steel-reinforced concrete.

1. Water-Reducing Admixture: ASTM C494/C494M, Type A.
2. Retarding Admixture: ASTM C494/C494M, Type B.
3. Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
5. High-Range, Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C1017/C1017M, Type II.

F. Water and Water Used to Make Ice: ASTM C94/C94M, potable

2.3 VAPOR RETARDERS

A. Sheet Vapor Retarder, Class A: ASTM E1745, Class A; not less than 10 mils thick. Include manufacturer's recommended adhesive or pressure-sensitive tape.

2.4 LIQUID FLOOR TREATMENTS

A. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; that penetrates, hardens, and densifies concrete surfaces.

2.5 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.


E. Water: Potable or complying with ASTM C1602/C1602M.

F. Clear, Waterborne, Membrane-Forming, Dissipating Curing Compound: ASTM C309, Type 1, Class B.

G. Clear, Waterborne, Membrane-Forming, Nondissipating Curing Compound: ASTM C309, Type 1, Class B, certified by curing compound manufacturer to not interfere with bonding of floor covering.

2.6 RELATED MATERIALS


B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 in accordance with ASTM D2240.

C. Bonding Agent: ASTM C1059/C1059M, Type II, nonre dispersible, acrylic emulsion or styrene butadiene.

D. Epoxy Bonding Adhesive: ASTM C881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade and class to suit requirements, and as follows:

1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

2.7 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C150/C150M portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand, as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 4100 psi at 28 days when tested in accordance with ASTM C109/C109M.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations.
1. Cement Binder: ASTM C150/C150M portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5000 psi at 28 days when tested in accordance with ASTM C109/C109M.

2.8 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, in accordance with ACI 301.

1. Use a qualified testing agency for preparing and reporting proposed mixture designs, based on laboratory trial mixtures.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash or Other Pozzolans: 25 percent by mass.
2. Slag Cement: 50 percent by mass.
3. Silica Fume: 10 percent by mass.
4. Total of Fly Ash or Other Pozzolans, Slag Cement, and Silica Fume: 50 percent by mass, with fly ash or pozzolans not exceeding 25 percent by mass and silica fume not exceeding 10 percent by mass.
5. Total of Fly Ash or Other Pozzolans and Silica Fume: 35 percent by mass with fly ash or pozzolans not exceeding 25 percent by mass and silica fume not exceeding 10 percent by mass.

C. Admixtures: Use admixtures in accordance with manufacturer's written instructions.

1. Use water-reducing, high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs concrete for parking structure slabs, and concrete with a w/cm below 0.50.
4. Use permeability-reducing admixture in concrete mixtures where indicated.

2.9 CONCRETE MIXTURES

A. Class A: Normal-weight concrete used for footings, grade beams, and foundation walls.

1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Maximum w/cm: 0.45.
3. Slump Limit: 8 inches, plus or minus 1 inch for concrete with verified slump of 3 inches plus or minus 1 inch before adding high-range water-reducing admixture or plasticizing admixture at Project site.
4. Air Content:
   a. 6 percent, plus or minus 1.5 percent at point of delivery for concrete containing 1-inch nominal maximum aggregate size.
5. Limit water-soluble, chloride-ion content in hardened concrete to 1.00 percent by weight of cement.

B. Class C: Normal-weight concrete used for interior slabs-on-ground.

1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Maximum w/cm: 0.45.
4. Slump Limit: 8 inches, plus or minus 1 inch for concrete with verified slump of 3 inches plus or minus 1 inch before adding high-range water-reducing admixture or plasticizing admixture at Project site.
5. Air Content:
   a. Do not use an air-entraining admixture or allow total air content to exceed 3 percent for concrete used in trowel-finished floors.

6. Limit water-soluble, chloride-ion content in hardened concrete to 1.00 percent by weight of cement.

C. Class D: Normal-weight concrete used for interior suspended slabs.

1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Maximum w/cm: 0.45.
4. Slump Limit: 8 inches, plus or minus 1 inch for concrete with verified slump of 3 inches plus or minus 1 inch before adding high-range water-reducing admixture or plasticizing admixture at Project site.
5. Air Content:
   a. Do not use an air-entraining admixture or allow total air content to exceed 3 percent for concrete used in trowel-finished floors.

6. Limit water-soluble, chloride-ion content in hardened concrete to 1.00 percent by weight of cement.

D. Class I: Normal-weight concrete used for interior metal pan stairs and landings:

1. Minimum Compressive Strength: 3000 psi at 28 days.
2. Maximum w/cm: 0.50.
5. Slump Limit: 3 inches, plus 1 inch or minus 2 inches.
6. Air Content: 0 percent, plus or minus 0.5 percent at point of delivery.
7. Limit water-soluble, chloride-ion content in hardened concrete to 1.00 percent by weight of cement.

E. Class J: Normal-weight concrete used for exterior retaining walls.

1. Minimum Compressive Strength: 4500 psi at 28 days.
2. Maximum w/cm: 0.45.
3. Slump Limit: 8 inches, plus or minus 1 inch for concrete with verified slump of 3 inches plus or minus 1 inch before adding high-range water-reducing admixture or plasticizing admixture at Project site.
4. Air Content:
   a. 6 percent, plus or minus 1.5 percent at point of delivery for concrete containing 1-inch nominal maximum aggregate size.

5. Limit water-soluble, chloride-ion content in hardened concrete to 1.00 percent by weight of cement.

2.10 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete in accordance with ASTM C94/C94M, and furnish batch ticket information.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions:
   1. Before placing concrete, verify that installation of concrete forms, accessories, and reinforcement, and embedded items is complete and that required inspections have been performed.
   2. Do not proceed until unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining Work that is attached to or supported by cast-in-place concrete.
   1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
   2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of ANSI/AISC 303.
   3. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.

3.3 INSTALLATION OF VAPOR RETARDER

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder in accordance with ASTM E1643 and manufacturer's written instructions.
   1. Install vapor retarder with longest dimension parallel with direction of concrete pour.
   2. Face laps away from exposed direction of concrete pour.
   3. Lap vapor retarder over footings and grade beams not less than 6 inches, sealing vapor retarder to concrete.
   4. Lap joints 6 inches and seal with manufacturer's recommended tape.
   5. Terminate vapor retarder at the top of floor slabs, grade beams, and pile caps, sealing entire perimeter to floor slabs, grade beams, foundation walls, or pile caps.
   6. Seal penetrations in accordance with vapor retarder manufacturer's instructions.
   7. Protect vapor retarder during placement of reinforcement and concrete.
3.4 JOINTS

A. Construct joints true to line, with faces perpendicular to surface plane of concrete.

B. Construction Joints: Coordinate with floor slab pattern and concrete placement sequence.
   1. Install so strength and appearance of concrete are not impaired, at locations indicated on
      Drawings or as approved by Architect.
   2. Place joints perpendicular to main reinforcement.
      a. Continue reinforcement across construction joints unless otherwise indicated.
      b. Do not continue reinforcement through sides of strip placements of floors and
         slabs.
   3. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
   4. Locate joints for beams, slabs, joists, and girders at third points of spans. Offset joints in
      girders a minimum distance of twice the beam width from a beam-girder intersection.
   5. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and
      girders and at the top of footings or floor slabs.
   6. Space vertical joints in walls as indicated on Drawings. Unless otherwise indicated on
      Drawings, locate vertical joints beside piers integral with walls, near corners, and in
      concealed locations where possible.
   7. Use a bonding agent at locations where fresh concrete is placed against hardened or
      partially hardened concrete surfaces.

C. Control Joints in Slabs-on-Ground: Form weakened-plane control joints, sectioning concrete
   into areas as indicated. Construct control joints for a depth equal to at least one-fourth of
   concrete thickness as follows:
   1. Grooved Joints: Form control joints after initial floating by grooving and finishing each
      edge of joint to a radius of 1/8 inch. Repeat grooving of control joints after applying
      surface finishes. Eliminate groover tool marks on concrete surfaces.
   2. Sawed Joints: Form control joints with power saws equipped with shatterproof abrasive
      or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action
      does not tear, abrade, or otherwise damage surface and before concrete develops
      random cracks.

D. Isolation Joints in Slabs-on-Ground: After removing formwork, install joint-filler strips at slab
   junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and
   other locations, as indicated.
   1. Extend joint-filler strips full width and depth of joint, terminating flush with finished
      concrete surface unless otherwise indicated on Drawings.
   2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below
      finished concrete surface, where joint sealants, specified in Section 079200 "Joint
      Sealants," are indicated.
   3. Install joint-filler strips in lengths as long as practicable. Where more than one length is
      required, lace or clip sections together.

E. Doweled Joints:
1. Install dowel bars and support assemblies at joints where indicated on Drawings.
2. Lubricate or asphalt coat one-half of dowel bar length to prevent concrete bonding to one side of joint.

F. Dowel Plates: Install dowel plates at joints where indicated on Drawings.

3.5 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, embedded items, and vapor retarder is complete and that required inspections are completed.

1. Immediately prior to concrete placement, inspect vapor retarder for damage and deficient installation, and repair defective areas.
2. Provide continuous inspection of vapor retarder during concrete placement and make necessary repairs to damaged areas as Work progresses.

B. Notify Architect and testing and inspection agencies 24 hours prior to commencement of concrete placement.

C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301, but not to exceed the amount indicated on the concrete delivery ticket.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness.

1. If a section cannot be placed continuously, provide construction joints as indicated.
2. Deposit concrete to avoid segregation.
3. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
4. Consolidate placed concrete with mechanical vibrating equipment in accordance with ACI 301.
   a. Do not use vibrators to transport concrete inside forms.
   b. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer.
   c. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity.
   d. At each insertion, limit duration of vibration to time necessary to consolidate concrete, and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Do not place concrete floors and slabs in a checkerboard sequence.
2. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
4. Screed slab surfaces with a straightedge and strike off to correct elevations.
5. Level concrete, cut high areas, and fill low areas.
6. Slope surfaces uniformly to drains where required.
7. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface.
8. Do not further disturb slab surfaces before starting finishing operations.

3.6 FINISHING FORMED SURFACES

A. As-Cast Surface Finishes:

1. ACI 301 Surface Finish SF-1.0: As-cast concrete texture imparted by form-facing material.
   a. Patch voids larger than 1-1/2 inches wide or 1/2 inch deep.
   b. Remove projections larger than 1 inch.
   c. Tie holes do not require patching.
   d. Surface Tolerance: ACI 117 Class D.
   e. Apply to concrete surfaces not exposed to public view.

2. ACI 301 Surface Finish SF-2.0: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams.
   a. Patch voids larger than 3/4 inch wide or 1/2 inch deep.
   b. Remove projections larger than 1/4 inch.
   c. Patch tie holes.
   d. Surface Tolerance: ACI 117 Class B.
   e. Locations: Apply to concrete surfaces exposed to public view, to receive a rubbed finish, or to be covered with a coating or covering material applied directly to concrete.

B. Rubbed Finish: Apply the following to as cast surface finishes where indicated on Drawings:

1. Smooth-Rubbed Finish:
   a. Perform no later than one day after form removal.
   b. Moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture.
   c. If sufficient cement paste cannot be drawn from the concrete by the rubbing process, use a grout made from the same cementitious materials used in the in-place concrete.

C. Related Unformed Surfaces:

1. At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a color and texture matching adjacent formed surfaces.
2. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.7 FINISHING FLOORS AND SLABS

A. Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
B. Float Finish:

1. When bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operation of specific float apparatus, consolidate concrete surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats.
2. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture and complies with ACI 117 tolerances for conventional concrete.
3. Apply float finish to surfaces to receive trowel finish.

C. Trowel Finish:

1. After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel.
2. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance.
3. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
4. Do not add water to concrete surface.
5. Do not apply hard-troweled finish to concrete, which has a total air content greater than 3 percent.
6. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
7. Finish surfaces to the following tolerances, in accordance with ASTM E1155, for a randomly trafficked floor surface:

   a. Slabs on Ground:
      1) Specified overall values of flatness, $F_F = 25$; and of levelness, $F_L = 20$; with minimum local values of flatness, $F_{F_{min}} = 17$; and of levelness, $F_{L_{min}} = 15$.
      2) Polished Concrete: Specified Overall Value (SOV): $F_F = 50$ and $F_L = 25$ with minimum local value (MLV): $F_{F_{min}} = 40$ and $F_{L_{min}} = 17$.

D. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thinset method. While concrete is still plastic, slightly scarify surface with a fine broom perpendicular to main traffic route.

1. Coordinate required final finish with Architect before application.
2. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

E. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and locations indicated on Drawings.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.
2. Coordinate required final finish with Architect before application.

F. Slip-Resistive Finish: Before final floating, apply slip-resistive aggregate finish to concrete stair treads, platforms, ramps as indicated on Drawings

1. Apply in accordance with manufacturer’s written instructions and as follows:

   a. Uniformly spread 25 lb/100 sq. ft. of dampened slip-resistive aggregate over surface in one or two applications.
   b. Tamp aggregate flush with surface, but do not force below surface.
   c. After broadcasting and tamping, apply float finish.
d. After curing, lightly work surface with a steel wire brush or an abrasive stone and water to expose slip-resistant aggregate.

3.8 INSTALLATION OF MISCELLANEOUS CONCRETE ITEMS

A. Filling In:
   1. Fill in holes and openings left in concrete structures after Work of other trades is in place unless otherwise indicated.
   2. Mix, place, and cure concrete, as specified, to blend with in-place construction.
   3. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Equipment Bases and Foundations:
   1. Coordinate sizes and locations of concrete bases with actual equipment provided.
   2. Construct concrete bases 4 inches high unless otherwise indicated on Drawings, and extend base not less than 6 inches in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated on Drawings, or unless required for seismic anchor support.
   3. Minimum Compressive Strength: 4000 psi at 28 days.
   4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
   5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete substrate.
   6. Prior to pouring concrete, place and secure anchorage devices.
      a. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
      b. Cast anchor-bolt insert into bases.
      c. Install anchor bolts to elevations required for proper attachment to supported equipment.

C. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items.
   1. Cast-in inserts and accessories, as shown on Drawings.
   2. Screed, tamp, and trowel finish concrete surfaces.

3.9 CONCRETE CURING

A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
   1. Comply with ACI 301 and ACI 306.1 for cold weather protection during curing.
   2. Comply with ACI 301 and ACI 305.1 for hot-weather protection during curing.
   3. Maintain moisture loss no more than 0.2 lb/sq. ft. x h before and during finishing operations.

B. Curing Formed Surfaces: Comply with ACI 308.1 as follows:
   1. Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces.
   2. Cure concrete containing color pigments in accordance with color pigment manufacturer's instructions.
   3. If forms remain during curing period, moist cure after loosening forms.
4. If removing forms before end of curing period, continue curing for remainder of curing period, as follows:
   a. Continuous Fogging: Maintain standing water on concrete surface until final setting of concrete.
   b. Continuous Sprinkling: Maintain concrete surface continuously wet.
   c. Absorptive Cover: Pre-dampen absorptive material before application; apply additional water to absorptive material to maintain concrete surface continuously wet.
   d. Water-Retention Sheeting Materials: Cover exposed concrete surfaces with sheeting material, taping, or lapping seams.
   e. Membrane-Forming Curing Compound: Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.
      1) Recoat areas subject to heavy rainfall within three hours after initial application.
      2) Maintain continuity of coating and repair damage during curing period.

C. Curing Unformed Surfaces: Comply with ACI 308.1 as follows:
   1. Begin curing immediately after finishing concrete.
   2. Interior Concrete Floors:
      a. Floors to Receive Floor Coverings Specified in Other Sections: Contractor has option of the following:
         1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
            a) Lap edges and ends of absorptive cover not less than 12-inches.
            b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.
         2) Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive.
            a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
            b) Cure for not less than seven days.
         3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:
            a) Water.
            b) Continuous water-fog spray.
      b. Floors to Receive Penetrating Liquid Floor Treatments: Contractor has option of the following:
1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.

   a) Lap edges and ends of absorptive cover not less than 12 inches.
   b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.

2) Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive.

   a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
   b) Cure for not less than seven days.

3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:

   a) Water.
   b) Continuous water-fog spray.

c. Floors to Receive Polished Finish: Contractor has option of the following:

1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.

   a) Lap edges and ends of absorptive cover not less than 12 inches.
   b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.

2) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:

   a) Water.
   b) Continuous water-fog spray.

d. Floors to Receive Curing Compound:

1) Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.

2) Recomt areas subjected to heavy rainfall within three hours after initial application.

3) Maintain continuity of coating, and repair damage during curing period.

4) Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound does not interfere with bonding of floor covering used on Project.
3.10 TOLERANCES
A. Conform to ACI 117.

3.11 APPLICATION OF LIQUID FLOOR TREATMENTS
A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment in accordance with manufacturer's written instructions.
   1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
   2. Do not apply to concrete that is less than 14 days old.
   3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing.
   4. Rinse with water; remove excess material until surface is dry.
   5. Apply a second coat in a similar manner if surface is rough or porous.

3.12 JOINT FILLING
A. Prepare, clean, and install joint filler in accordance with manufacturer's written instructions.
   1. Defer joint filling until concrete has aged at least six month(s).
   2. Do not fill joints until construction traffic has permanently ceased.
B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.
C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints.
D. Overfill joint, and trim joint filler flush with top of joint after hardening.

3.13 CONCRETE SURFACE REPAIRS
A. Defective Concrete:
   1. Repair and patch defective areas when approved by Architect.
   2. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
   1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete.
      a. Clean, dampen with water, and brush-coat holes and voids with bonding agent.
      b. Fill and compact with patching mortar before bonding agent has dried.
c. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.

2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement, so that, when dry, patching mortar matches surrounding color.
   a. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching.
   b. Compact mortar in place and strike off slightly higher than surrounding surface.

3. Repair defects on concealed formed surfaces that will affect concrete’s durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces:

1. Test unformed surfaces, such as floors and slabs, for finish, and verify surface tolerances specified for each surface.
   a. Correct low and high areas.
   b. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

2. Repair finished surfaces containing surface defects, including spalls, popouts, honeycombs, rock pockets, crazing, and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.

3. After concrete has cured at least 14 days, correct high areas by grinding.

4. Correct localized low areas during, or immediately after, completing surface-finishing operations by cutting out low areas and replacing with patching mortar.
   a. Finish repaired areas to blend into adjacent concrete.

5. Correct other low areas scheduled to receive floor coverings with a repair underlayment.
   a. Prepare, mix, and apply repair underlayment and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
   b. Feather edges to match adjacent floor elevations.

6. Correct other low areas scheduled to remain exposed with repair topping.
   a. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations.
   b. Prepare, mix, and apply repair topping and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.

7. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete.
   a. Remove defective areas with clean, square cuts, and expose steel reinforcement with at least a 3/4-inch clearance all around.
   b. Dampen concrete surfaces in contact with patching concrete and apply bonding agent.
c. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate.
d. Place, compact, and finish to blend with adjacent finished concrete.
e. Cure in same manner as adjacent concrete.

8. Repair random cracks and single holes 1 inch or less in diameter with patching mortar.
   a. Groove top of cracks and cut out holes to sound concrete, and clean off dust, dirt, and loose particles.
   b. Dampen cleaned concrete surfaces and apply bonding agent.
   c. Place patching mortar before bonding agent has dried.
   d. Compact patching mortar and finish to match adjacent concrete.
   e. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.14 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

1. Testing agency shall be responsible for providing curing container for composite samples on Site and verifying that field-cured composite samples are cured in accordance with ASTM C31/C31M.
2. Testing agency shall immediately report to Architect, Contractor, and concrete manufacturer any failure of Work to comply with Contract Documents.
3. Testing agency shall report results of tests and inspections, in writing, to Owner, Architect, Contractor, and concrete manufacturer within 48 hours of inspections and tests.

   a. Test reports shall include reporting requirements of ASTM C31/C31M, ASTM C39/C39M, and ACI 301, including the following as applicable to each test and inspection:

       1) Project name.
       2) Name of testing agency.
       3) Names and certification numbers of field and laboratory technicians performing inspections and testing.
       4) Name of concrete manufacturer.
       5) Date and time of inspection, sampling, and field testing.
       6) Date and time of concrete placement.
       7) Location in Work of concrete represented by samples.
       8) Date and time sample was obtained.
       9) Truck and batch ticket numbers.
       10) Design compressive strength at 28 days.
       11) Concrete mixture designation, proportions, and materials.
       12) Field test results.
       13) Information on storage and curing of samples before testing, including curing method and maximum and minimum temperatures during initial curing period.
14) Type of fracture and compressive break strengths at seven days and 28 days.

B. Batch Tickets: For each load delivered, submit three copies of batch delivery ticket to testing agency, indicating quantity, mix identification, admixtures, design strength, aggregate size, design air content, design slump at time of batching, and amount of water that can be added at Project site.

C. Inspections:
   1. Headed bolts and studs.
   2. Verification of use of required design mixture.
   3. Concrete placement, including conveying and depositing.
   4. Curing procedures and maintenance of curing temperature.
   5. Verification of concrete strength before removal of shores and forms from beams and slabs.

D. Concrete Tests: Testing of composite samples of fresh concrete obtained in accordance with ASTM C 172/C 172M shall be performed in accordance with the following requirements:
   1. Testing Frequency: Obtain one composite sample for each day’s pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
      a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
   2. Slump: ASTM C143/C143M:
      a. One test at point of placement for each composite sample, but not less than one test for each day’s pour of each concrete mixture.
      b. Perform additional tests when concrete consistency appears to change.
   3. Air Content: ASTM C231/C231M pressure method, for normal-weight concrete;
      a. One test for each composite sample, but not less than one test for each day’s pour of each concrete mixture.
   4. Concrete Temperature: ASTM C1064/C1064M:
      a. One test hourly when air temperature is 40 deg F and below or 80 deg F and above, and one test for each composite sample.
   5. Compression Test Specimens: ASTM C31/C31M:
      a. Cast and laboratory cure two sets of two 6-inch by 12-inch or two sets of three 4-inch by 8-inch cylinder specimens for each composite sample.
      a. Test one set of two (or three) laboratory-cured specimens at seven days and one set of two specimens at 28 days.
b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

7. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength, and no compressive-strength test value falls below specified compressive strength by more than 500 psi if specified compressive strength is 5000 psi, or no compressive strength test value is less than 10 percent of specified compressive strength if specified compressive strength is greater than 5000 psi.

8. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.

9. Additional Tests:
   a. Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
   b. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42/C42M or by other methods as directed by Architect.

1) Acceptance criteria for concrete strength shall be in accordance with ACI 301 section 1.6.6.3.

10. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

11. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

E. Measure floor and slab flatness and levelness in accordance with ASTM E1155 within 72 hours of completion of floor finishing and promptly report test results to Architect.

3.15 PROTECTION

A. Protect concrete surfaces as follows:

1. Protect from petroleum stains.
2. Diaper hydraulic equipment used over concrete surfaces.
4. Prohibit use of pipe-cutting machinery over concrete surfaces.
5. Prohibit placement of steel items on concrete surfaces.
6. Prohibit use of acids or acidic detergents over concrete surfaces.
7. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.
8. Protect concrete surfaces scheduled to receive surface hardener or polished concrete finish using Floor Slab Protective Covering.

END OF SECTION 03 30 00
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PART 1 GENERAL

1.01 SECTION INCLUDES
A. Surface treatments for concrete floors and slabs.
B. Staining of concrete floors.

1.02 RELATED REQUIREMENTS
A. Section 03 30 00 - Cast-in-Place Concrete: Finishing of concrete surface to tolerance; floating, troweling, and similar operations; curing.

1.03 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Manufacturer's published data on each finishing product, including information on compatibility of different products and limitations.
C. Maintenance Data: Provide data on maintenance and renewal of applied finishes.

1.04 MOCK-UP
A. For coatings, construct mock-up area under conditions similar to those that will exist during application, with coatings applied.
B. Mock-Up Size: 10 feet square.
C. Mock-up may remain as part of the work.

1.05 DELIVERY, STORAGE, AND HANDLING
A. Deliver materials in manufacturer's sealed packaging, including application instructions.

1.06 FIELD CONDITIONS
A. Maintain light level equivalent to a minimum 200 W light source at 8 feet above the floor surface over each 20 foot square area of floor being finished.
B. Do not finish floors until interior heating system is operational.
C. Maintain ambient temperature of 50 degrees F minimum.

PART 2 PRODUCTS

2.01 CONCRETE FLOOR FINISH APPLICATIONS
A. Unless otherwise indicated, all concrete floors are to be finished using liquid densifier/hardener.
B. Liquid Densifier/Hardener:
   1. Use at following locations: At all locations except where it is not recommended by the manufacturer to be used with the stain, sealer or polished floor applications.
C. Concrete Stain:
   1. Use at following locations: As indicated on the finish floor plan and schedule.
D. Clear Sealer:
   1. Use at following locations: As indicated on the finish floor plan and schedule.
E. Polished Finish:
   1. Use at following locations: As indicated on the finish floor plan and schedule.
2.02 CURING, DENSIFIERS AND HARDENERS
A. Liquid Curing, Densifier/Hardener: Penetrating chemical compound that reacts with concrete, filling the pores and dustproofing; for application to concrete prior to set.
   1. Composition: Sodium or Lithium Silicate.
   2. Products:
      a. Scofield Company; Cureseal-W.
      b. Scofield Company; Formula One Lithium Densifier MO.
      f. or equal.

2.03 FLOOR ENHANCER
A. Concrete Sealer: Materials furnished by a single manufacturer.
   1. Acceptable Systems:
      a. Scofield Company; Formula One Guard-S.
      c. Or Architect approved equal.
         1) Substitutions: See Section 01 60 00 - Product Requirements.

2.04 STAINED CONCRETE SYSTEM
A. Stained Concrete System: Materials, equipment and procedures designed by one Manufacturer to produce polished colored concrete where indicated.
   1. Acceptable Systems:
      b. American Decorative Concrete; Ameripolish acetone dye, color to be selected by Architect.: www.ameripolish.com.
      c. Prosoco, Inc; PolishGuard, top coating: www.prosoco.com
      d. Or Architect approved equal.
         1) Substitutions: See Section 01 60 00 - Product Requirements.

PART 3 EXECUTION
3.01 EXAMINATION
A. Verify that floor surfaces are acceptable to receive the work of this section.
B. Verify that flaws in concrete have been patched and joints filled with methods and materials suitable for further finishes.

3.02 GENERAL
A. Apply materials in accordance with manufacturer’s instructions.

3.03 COATING APPLICATION
A. Verify that surface is free of previous coatings, sealers, curing compounds, water repellents, laitance, efflorescence, fats, oils, grease, wax, soluble salts, residues from cleaning agents, and other impediments to adhesion.
B. Protect adjacent non-coated areas from drips, overflow, and overspray; immediately remove excess material.
C. Hardener/Densifier:
   1. To be applied by sprayer, squeegee or broom, in quantities indicated by manufacturers
      instructions for Existing Concrete.
   2. Apply no earlier than 7 days after initial concrete pour and cure.
   3. Keep slab wet with product for a minimum of 30 minutes or until gelled. Once gelled, mist
      with water and agitate for a minimum of 10 minutes to work product into concrete.
   4. Rinse well with clean water.

D. Enhancer:
   1. To be spray applied in quantities indicated by manufacturers instructions for Existing
      Concrete and uniformly spread by with micro-fiber applicator.
   2. Apply 2 coats.
      a. First Coat:
         1) May be applied 1 day after Hardener/Densifier has dried.
      b. Second Coat:
         1) May be applied 2-3 hours after first coat has dried.
         2) Apply perpendicular (90 degrees) to first coat.

3.04 COATING APPLICATION
A. Verify that surface is free of previous coatings, sealers, curing compounds, water repellents,
   laitance, efflorescence, fats, oils, grease, wax, soluble salts, residues from cleaning agents, and
   other impediments to adhesion.
B. Protect adjacent non-coated areas from drips, overflow, and overspray; immediately remove
   excess material.
C. Stain: applied as indicated in manufacturer's written instructions.
D. Polishing: apply as indicated in manufacturer's written instructions.
E. Burnishing: a 3,000 grit pad using a minimum 2,000 rpm burnisher.

3.05 CONCRETE POLISHING
A. Execute using materials, equipment, and procedures specified by manufacturer, using
   manufacturer approved installer.
   1. Final Polished Sheen: Satin finish; other sheens are included as comparison to illustrate
      required sheen; final sheen is before addition of any sealer or coating, regardless of
      whether that is also specified or not.
   2. Satin Finish: Reflecting images from side lighting.
B. Protect finished surface as required and as recommended by manufacturer of polishing system.

END OF SECTION
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SECTION 03 45 00
PRECAST ARCHITECTURAL CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES
   A. Architectural precast concrete wall panels.
   B. Supports, anchors, and attachments.
   C. Grouting under panels.

1.02 RELATED REQUIREMENTS
   A. Section 07 62 00 - Sheet Metal Flashing and Trim: Reglets recessed in units.
   B. Section 09 91 13 - Exterior Painting: Field applied painting of precast panels.

1.03 REFERENCE STANDARDS

1.04 ADMINISTRATIVE REQUIREMENTS
A. Preinstallation Meeting: Convene one week prior to commencing work of this section.

1.05 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Manufacturer's information on accessory products, including pigments, admixtures, inserts, plates, etc.
C. Shop Drawings: Indicate layout, unit locations, configuration, unit identification marks, reinforcement, connection details, support items, location of lifting devices, dimensions, openings, and relationship to adjacent materials. Provide erection drawings.
   1. Detail fabrication and installation of architectural precast concrete units. Indicate locations, plans, elevations, dimensions, shapes, and cross sections of each unit. Indicate joints, reveals, and extent and location of each surface finish. Indicate details at building corners.
      a. Indicate separate face and backup mixture locations and thicknesses.
      b. Indicate welded connections by AWS standard symbols. Detail loose and cast-in hardware and connections.
      c. Indicate locations, tolerances, and details of anchorage devices to be embedded in or attached to structure or other construction.
      d. Indicate locations, extent, and treatment of dry joints if two-stage casting is proposed.
      e. Include plans and elevations showing unit location and sequence of erection for special conditions.
      f. Indicate relationship of architectural precast concrete units to adjacent materials.
      g. Design Modifications: If design modifications are proposed to meet performance requirements and field conditions, submit design calculations and shop drawings. Do not adversely affect the appearance, durability, or strength of units when modifying details or materials and maintain the general design concept.
   2. Include details of mix designs.
   3. Include structural design calculations.
      a. Comprehensive engineering analysis signed and sealed by the qualified professional engineer responsible for its preparation. Show governing panel types, connections, and types of reinforcement, including special reinforcement. Indicate location, type, magnitude, and direction of loads imposed on the building structural frame from architectural precast concrete.
D. Samples: Submit two panels, 12" by 12" inch in size, illustrating surface finish, color and texture.
   1. For each type of finish indicated on exposed surfaces of architectural precast concrete units, in sets of 3, illustrating full range of finish, color, and texture variations expected.
   2. When other faces of precast concrete units are exposed, include Samples illustrating workmanship, color, and texture of backup concrete as well as facing concrete.
      a. Grout Samples for Initial Selection: Color charts consisting of actual sections of grout showing manufacturer's full range of colors.
E. Welders' Certificates.
F. Material Certificates: For the following items (if used), signed by manufacturers:
   1. Cementitious materials.
   2. Reinforcing materials.
   3. Admixtures.
   5. Structural-steel shapes and hollow structural sections.

G. Material Test Reports: For aggregates.

H. Designer's Qualification Statement.

I. Fabricator's Qualification Statement: Provide documentation showing precast concrete fabricator is accredited under IAS AC157.

1.06 QUALITY ASSURANCE

A. Design Engineer Qualifications: Design precast concrete units under direct supervision of a Professional Structural Engineer experienced in design of precast concrete and licensed in Missouri.

B. Fabricator Qualifications:
   1. A firm that assumes responsibility for engineering architectural precast concrete units to comply with performance requirements. This responsibility includes preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.
   2. Firm having at least 2 years of documented experience in production of precast concrete of the type required.
   3. Plant certified under Precast/Prestressed Concrete Institute Plant Certification Program; product group and category A1 - Architectural Precast Concrete.
   5. Manufacturers who by past experience have demonstrated their ability to produce quality Architectural Precast Products of the scope required under this contract and who possess adequate resources to follow manufacturing guidelines set forth in PCI-MNL-117 "Manual for Quality Control for Plants and Production of Architectural Precast Products".
   6. Fabricators shall at the request of the Architect, provide a copy of the Quality Control Manual used to assure conformance to PCI MNL-117. Plant procedures set forth in the QC manual shall be subject to inspection by the architect or engineer of record or their representatives.

C. Installer Qualifications: A precast concrete erector qualified and designated by PCI's Certificate of Compliance to erect Category A (Architectural Systems) for non-load bearing members.
   1. A precast concrete erector who has retained a "PCI-Certified Field Auditor" to conduct a field audit of a project in same category as this Project before erection of precast concrete and who can produce an Erectors' Post-Audit Declaration.

D. Welder Qualifications: Qualified within previous 12 months in accordance with AWS D1.1/D1.1M and AWS D1.4/D1.4M.

E. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, and qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

F. Design Standards: Comply with ACI 318 and design recommendations of PCI MNL 120, "PCI Design Handbook - Precast and Prestressed Concrete," applicable to types of architectural precast concrete units indicated.

G. Quality-Control Standard: For manufacturing procedures and testing requirements, quality control recommendations, and dimensional tolerances for types of units required, comply with PCI MNL 117, "Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products."
1.07 PERFORMANCE
A. Structural Performance: Provide architectural precast concrete units and connections capable of withstanding the following design loads within limits and under conditions indicated:
   1. Loads: As indicated in structural notes on the drawings.

1.08 MOCK-UP
A. After sample approval and before fabricating architectural precast concrete units, produce a minimum of (2) sample panels approximately 16 sq. ft. in area for review by Architect. Incorporate full-scale details of architectural features, finishes, textures, and transitions in sample panels.
   1. Build mockup (when required) as indicated on drawings for architectural precast concrete complete with anchors, connections, flashings, and joint fillers.
   2. Approved mockups may become part of the completed Work if undamaged at time of Substantial Completion.
   3. Approval of mockups does not constitute approval of deviations from the Contract Documents unless such deviations are specifically approved by Architect in writing.

B. Include mock-up panel with typical window.

C. Locate where directed.

D. Damage part of an exposed-face surface for each finish, color, and texture, and demonstrate adequacy of repair techniques proposed for repair of surface blemishes.
   1. After acceptance of repair technique, maintain one sample panel at manufacturer's plant and one at Project site in an undisturbed condition as a standard for judging the completed Work.
   2. Demolish and remove sample panels when directed.

1.09 DELIVERY, STORAGE, AND HANDLING
A. Deliver architectural precast concrete units in such quantities and at such times to limit unloading units temporarily on the ground.

B. Handling: Lift and support precast units only from support points.

C. Blocking and Lateral Support During Transport and Storage: Use materials that are clean, non-staining, and non-harmful to exposed surfaces. Provide temporary lateral support to prevent bowing and warping.

D. Protect units to prevent staining, chipping, or spalling of concrete.

E. Store units with adequate dunnage and bracing and protect units to prevent contact with soil, to prevent staining, and to prevent cracking, distortion, warping or other physical damage.

F. Mark units with date of production in location that will be concealed after installation.

1.10 SEQUENCING
A. Furnish loose connection hardware and anchorage items to be embedded in or attached to other construction without delaying the Work. Provide locations, setting diagrams, templates, instructions, and directions, as required, for installation.

PART 2 PRODUCTS
2.01 MANUFACTURERS
A. Architectural Precast Concrete:
   1. Basis of Design Fabricators: (TEXTURE TO MATCH THE CONCRETE TILT-UP PANELS) Subject to compliance with requirements, fabricators offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Devinci Precast, LLC, 4520 S. MacArthur Blvd, Oklahoma City, Oklahoma 73179, Phone 405-680-5600, Fax 405-680-9314. Contact: Neil Stepanek
   2. Any manufacturer holding a PCI Group A Plant Certification for the types of products specified; see www.pci.org/#sle as long as the same appearance can be achieved.
2.02 MOLD MATERIALS

A. Molds: Rigid, dimensionally stable, non-absorptive material, warp and buckle free, that will provide continuous and true precast concrete surfaces within fabrication tolerances indicated; nonreactive with concrete and suitable for producing required finishes.
   1. Mold-Release Agent: Commercially produced liquid-release agent that will not bond with, stain or adversely affect precast concrete surfaces and will not impair subsequent surface or joint treatments of precast concrete.
      a. Form Liners: Units of face design, texture, arrangement, and configuration to match those used for precast concrete design reference sample. Furnish with manufacturer's recommended liquid release agent that will not bond with, stain, or adversely affect precast concrete surfaces and will not impair subsequent surface or joint treatments of precast concrete.
      b. Surface Retarder: Chemical set retarder, capable of temporarily delaying final hardening of newly placed concrete mixture to depth of reveal specified.

2.03 REINFORCEMENT

A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).
   1. Deformed billet-steel bars.
   2. Galvanized in accordance with ASTM A767/A767M, Class I.
   3. Epoxy coated in accordance with ASTM A775/A775M.
B. Steel Welded Wire Reinforcement (WWR): Plain type, ASTM A1064/A1064M.
   1. Form: Flat Sheets.
   2. WWR Style: 6 by 12-W12 by W5.

2.04 CONCRETE MATERIALS

A. Cement: ASTM C150/C150M, Type I - Normal Portland type.
B. Other Cementitious Materials:
   1. Fly Ash or Natural Pozzolans: Comply with ASTM C618.
   2. Ground Granulated Blast Furnace Slag: ASTM C989/C989M.
C. Fine and Coarse Structural Aggregates: ASTM C33/C33M.
D. Lightweight Structural Aggregate: ASTM C330/C330M.
E. Surface Finish Aggregate: Complying with sample in office of Architect.
F. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to concrete.
G. Air Entrainment Admixture: ASTM C260/C260M.
   1. Certified by manufacturer to be compatible with other required admixtures.
H. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and to not contain calcium chloride, or more than 0.15 percent chloride ions or other salts by weight of admixture.
   1. Water-Reducing Admixtures: ASTM C 494/C 494M, Type A.
   2. Retarding Admixture: ASTM C 494/C 494M, Type B.
   3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
   4. Water-Reducing and Accelerating Admixture: ASTM C 494/C 494M, Type E.
   5. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
   6. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
   7. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017 M.
I. Grout:
   1. Non-shrink, non-metallic, minimum 10,000 psi, 28 day strength.
2.05 STEEL CONNECTION MATERIALS

A. Carbon-Steel Shapes and Plates: ASTM A 36/A 36M.
B. Carbon-Steel-Headed Studs: ASTM A 108, AISI 1018 through AISI 1020, cold finished, AWS D1.1/D1.1M, Type A or B, with arc shields and with minimum mechanical properties of PCI MNL 117, Table 3.2.3.
C. Carbon-Steel Plate: ASTM A 283/A 283M.
D. Malleable Iron Castings: ASTM A 47/A 47M.
F. High-Strength, Low-Alloy Structural Steel: ASTM A 572/A 572M.
G. Carbon-Steel Structural Tubing: ASTM A 500, Grade B.
H. Wrought Carbon-Steel Bars: ASTM A 675/A 675M, Grade 65.
I. Deformed-Steel Wire or Bar Anchors: ASTM A 496 or ASTM A 706/A 706M.
J. Carbon-Steel Bolts and Studs: ASTM A 307, Grade A; carbon-steel, hex-head bolts and studs; carbon-steel nuts, ASTM A 563; and flat, unhardened steel washers, ASTM F 844.
K. High-Strength Bolts and Nuts: ASTM A 325, Type 1, heavy hex steel structural bolts; heavy hex carbon-steel nuts, ASTM A 563; and hardened carbon-steel washers, ASTM F 436.
L. Stainless-Steel Plate: ASTM A 666, Type 304, of grade suitable for application.
M. Stainless-Steel Bolts and Studs: ASTM F 593, Alloy 304 or 316, hex-head bolts and studs; stainless-steel nuts; and flat, stainless-steel washers.
   1. Lubricate threaded parts of stainless-steel bolts with an antiseize thread lubricant during assembly.
N. Stainless-Steel-Headed Studs: ASTM A 276, with minimum mechanical properties of PCI MNL 117, Table 3.2.3.
O. Zinc-Coated Finish: For exterior steel items and items indicated for galvanizing, apply zinc coating by hot-dip process according to ASTM A 123/A 123M or ASTM A 153/A 153M.
   1. For steel shapes, plates, and tubing to be galvanized, limit silicon content of steel to less than 0.03 percent or to between 0.15 and 0.25 percent or limit sum of silicon and 2.5 times phosphorous content to 0.09 percent.
   2. Galvanizing Repair Paint: High-zinc-dust-content paint with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035A or SSPCPaint 20.
P. Shop-Primed Finish: Prepare surfaces of nongalvanized steel items, except those surfaces to be embedded in concrete, according to requirements in SSPC-SP 3 and shop-apply SSPC-Paint 25 according to SSPC-PA 1.
Q. Welding Electrodes: Comply with AWS standards.

2.06 SUPPORT DEVICES

A. Connecting and Support Devices; Anchors and Inserts: ASTM A36/A36M steel; hot-dip galvanized in accordance with ASTM A153/A153M.
   1. Clean surfaces of rust, scale, grease, and foreign matter.
B. Suspend reinforcement from back of mold or use bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place according to PCI MNL 117.
C. Bolts, Nuts, and Washers: ASTM F3125/F3125M heavy hex structural bolts, Type 1, plain, with matching ASTM A563 (ASTM A563M) nuts, and washers as follows:
2.07 BEARING PADS

A. Provide one of the following bearing pads for architectural precast concrete units when recommended by precast fabricator for application:

1. Elastomeric Pads: AASHTO M 251, plain, vulcanized, 100 percent polychloroprene (neoprene) elastomer, molded to size or cut from a molded sheet, Type A durometer hardness of 50 to 70, ASTM D 2240, minimum tensile strength 2250 psi, ASTM D 412.

2. Random-Oriented, Fiber-Reinforced Elastomeric Pads: Preformed, randomly oriented synthetic fibers set in elastomer. Type A durometer hardness of 70 to 90, ASTM D 2240; capable of supporting a compressive stress of 3000 psi with no cracking, splitting, or delaminating in the internal portions of pad. Test one specimen for every 200 pads used in Project.

3. Cotton-Duck-Fabric-Reinforced Elastomeric Pads: Preformed, horizontally layered cotton-duck fabric bonded to an elastomer; Type A durometer hardness of 80 to 100, ASTM D 2240; complying with AASHTO's "AASHTO Load and Resistance Factor Design (LRFD) Bridge Design Specifications, Division II, Section 18.10.2, or with MILC- 882E.

4. Frictionless Pads: Tetrafluoroethylene (Teflon), glass-fiber reinforced, bonded to stainless or mild-steel plate, of type required for in-service stress.


2.08 FABRICATION

A. Cast-in Anchors, Inserts, Plates, Angles, and Other Anchorage Hardware: Fabricate anchorage hardware with sufficient anchorage and embedment to comply with design requirements. Accurately position for attachment of loose hardware, and secure in place during casting operations. Locate anchorage hardware where it does not affect position of main reinforcement or concrete placement.

1. Weld-headed studs and deformed bar anchors used for anchorage according to AWS D1.1/D1.1M and AWS C5.4, "Recommended Practices for Stud Welding."

B. Furnish loose hardware items including steel plates, clip angles, seat angles, anchors, dowels, cramps, hangers, and other hardware shapes for securing architectural precast concrete units to supporting and adjacent construction.

C. Cast-in reglets, slots, holes, and other accessories in architectural precast concrete units as indicated on the Contract Drawings.

D. Cast-in openings larger than 10 inches in any dimension. Do not drill or cut openings or prestressing strand without Architect's approval.

E. Reinforcement: Comply with recommendations in PCI MNL 117 for fabricating, placing, and Supporting reinforcement.

1. Clean reinforcement of loose rust and mill scale, earth, and other materials that reduce or destroy the bond with concrete. When damage to epoxy-coated reinforcing exceeds limits specified in ASTM A 775/A 775M, repair with patching material compatible with coating material and epoxy coat bar ends after cutting.

2. Accurately position, support, and secure reinforcement against displacement during concrete-placement and consolidation operations. Completely conceal support devices to prevent exposure on finished surfaces.

3. Place reinforcement to maintain at least 3/4-inch minimum coverage. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position while placing concrete. Direct wire tie ends away from finished, exposed concrete surfaces.

4. Place reinforcing steel and prestressing strand to maintain at least 3/4-inch minimum concrete cover. Increase cover requirements for reinforcing steel to 1-1/2 inches when units are exposed to corrosive environment or severe exposure conditions. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position while placing concrete. Direct wire tie ends away from finished, exposed concrete surfaces.

5. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh spacing and wire tie laps, where required by design. Offset laps of adjoining widths to prevent continuous laps in either direction.
F. Reinforce the units as required by the drawings and for safe handling and structural stress.

G. Reinforcing Concrete Trim Units
   1. Minimum reinforcing shall be 0.25 percent of the cross section area with steel reinforcements for conventional precast and with 2.0 lbs per cu. yd. of Alkali Resistant Glass Fiber for Fiber Reinforced Concrete. (FRC)
   2. Steel Reinforcements shall be non corrosive where faces exposed to weather are covered with less than 1.5 in. of concrete material. All steel reinforcement shall have minimum coverage of twice the diameter of the bars.
   3. Panels, soffits and similar stones greater than 24 in. in one direction shall be conventionally reinforced with steel in that direction. Units less than 24 in. in both their length and width dimension shall require no conventional steel reinforcement unless otherwise specified.

H. Prestress tendons for architectural precast concrete units by either pretensioning or posttensioning methods. Comply with PCI MNL 117.

I. Comply with requirements in PCI MNL 117 and requirements in this Section for measuring, mixing, transporting, and placing concrete. After concrete batching, no additional water may be added.

J. Place face mixture to a minimum thickness after consolidation of the greater of 1 inch or 1.5 times the maximum aggregate size, but not less than the minimum reinforcing cover specified.

K. Place concrete in a continuous operation to prevent seams or planes of weakness from forming in precast concrete units.
   1. Place backup concrete mixture to ensure bond with face-mixture concrete.

L. Thoroughly consolidate placed concrete by internal and external vibration without dislocating or damaging reinforcement and built-in items, and minimize pour lines, honeycombing, or entrapped air on surfaces. Use equipment and procedures complying with PCI MNL 117.
   1. Place self-consolidating concrete without vibration according to PCI TR-6, "Interim Guidelines for the Use of Self-Consolidating Concrete in Precast/Prestressed Concrete Institute Member Plants."

M. Comply with PCI MNL 117 for hot- and cold-weather concrete placement.

N. Identify pickup points of architectural precast concrete units and orientation in structure with permanent markings, complying with markings indicated on Shop Drawings. Imprint or permanently mark casting date on each architectural precast concrete unit on a surface that will not show in finished structure.

O. Cure concrete, according to requirements in PCI MNL 117, by moisture retention without heat or by accelerated heat curing using low-pressure live steam or radiant heat and moisture. Cure units until compressive strength is high enough to ensure that stripping does not have an effect on performance or appearance of final product.

P. Discard and replace architectural precast concrete units that do not comply with requirements including structural, manufacturing tolerance, and appearance, unless repairs meet requirements in PCI MNL 117 and Architect's approval.

Q. Fabricate in compliance with PCI MNL-117 and PCI MNL-135.

R. Fabricate and handle epoxy-coated reinforcing bars in accordance with ASTM D3963/D3963M.

S. Place recessed flashing reglets continuous and straight.
2.09 FABRICATION TOLERANCES

A. Fabricate architectural precast concrete units straight and true to size and shape with exposed edges and corners precise and true so each finished panel.

B. Comply with PCI MNL-117 and PCI MNL-135, except as specifically amended below.
   1. Maximum Variation From Nominal Face Dimensions: Plus or minus 3/32 in.
   2. Maximum Variation From Square or Designated Skew: Plus or minus 1/8 inch in 10 feet.
   3. Maximum Variation from Thickness: Plus or minus 1/8 in.
   5. Maximum Bowing of Members: Plus or minus length/360.

2.10 ACCESSORIES

A. Reglets: Specified in Section 07 62 00.
   1. Stainless steel (when exposed to the elements in final installation), Type 302 or 304

B. Precast Accessories: Provide clips, hangers, plastic or steel shims, and other accessories required to install architectural precast concrete units.

2.11 GROUT

A. Sand-Cement Grout: Portland cement, ASTM C 150, Type I, and clean, natural sand, ASTM C 144 or ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.

B. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, plasticizing and water-reducing agents, complying with ASTM C 1107, Grade A for drypack and Grades B and C for flowable grout and of consistency suitable for application within a 30-minute working time.

2.12 FINISHES

A. Panel faces shall be free of joint marks, grain, and other obvious defects. Corners, including false joints shall be uniform, straight, and sharp. Finish exposed-face surfaces of architectural precast concrete units to match approved samples as follows:
   1. All finishes - exposed to view - shall match the concrete tilt-up panels.
   2. Exposed-Aggregate Finish: Use chemical retarding agents applied to concrete forms and washing and brushing procedures to expose aggregate and surrounding matrix surfaces after form removal.
   3. Abrasive-Blast Finish: Use abrasive grit, equipment, application techniques, and cleaning procedures to expose aggregate and surrounding matrix surfaces.
   4. Acid-Etched Finish: Use acid and hot-water solution, equipment, application techniques, and cleaning procedures to expose aggregate and surrounding matrix surfaces. Protect hardware, connections, and insulation from acid attach.

B. Finish exposed top & bottom surfaces of architectural precast concrete units to match face surface finish.

C. Finish exposed back surfaces of architectural precast concrete units by smooth, steel-trowel finish.

D. Finish unexposed surfaces of architectural precast concrete units by float or broom finish.

E. Block filler/primer and paint as required to match the Concrete Tilt-Up panels.

F. Color: As indicated on the drawings.

2.13 SOURCE QUALITY CONTROL

A. Provide testing and analysis of concrete mix.

B. Quality-Control Testing: Test and inspect precast concrete according to PCI MNL 117 requirements. If using self-consolidating concrete, also test and inspect according to PCI TR-6, "Interim Guidelines for the Use of Self-Consolidating Concrete in Precast/Prestressed Concrete Institute Member Plants."
C. Owner may employ an independent testing agency to evaluate architectural precast concrete fabricator's quality-control and testing methods.
   1. Allow Owner's testing agency access to material storage areas, concrete production equipment, concrete placement, and curing facilities. Cooperate with Owner's testing agency and provide samples of materials and concrete mixtures as may be requested for additional testing and evaluation.

D. Strength of precast concrete units will be considered deficient if units fail to comply with ACI 318 (ACI 318M) requirements for concrete strength.

E. Testing: If there is evidence that strength of precast concrete units may be deficient or may not comply with ACI 318 (ACI 318M) requirements, precaster will employ an independent testing agency to obtain, prepare, and test cores drilled from hardened concrete to determine compressive strength according to ASTM C 42/C 42M.
   1. A minimum of three representative cores will be taken from units of suspect strength, from locations directed by Architect.
   2. Cores will be tested in an air-dry condition.
   3. Strength of concrete for each series of 3 cores will be considered satisfactory if average compressive strength is equal to at least 85 percent of 28-day design compressive strength and no single core is less than 75 percent of 28-day design compressive strength.
   4. Test results will be made in writing on same day that tests are performed, with copies to Architect, Contractor, and precast concrete fabricator. Test reports will include the following:
      a. Project identification name and number.
      b. Date when tests were performed.
      c. Name of precast concrete fabricator.
      d. Name of concrete testing agency.
      e. Identification letter, name, and type of precast concrete unit(s) represented by core tests; design compressive strength; type of break; compressive strength at breaks, corrected for length-diameter ratio; and direction of applied load to core in relation to horizontal plane of concrete as placed.

F. Patching: If core test results are satisfactory and precast concrete units comply with requirements, clean and dampen core holes and solidly fill with precast concrete mixture that has no coarse aggregate, and finish to match adjacent precast concrete surfaces.

G. Take water absorption test in accordance with PCI MNL-117.

PART 3  EXECUTION

3.01  EXAMINATION

A. Verify that building structure, anchors, devices, and openings are ready to receive work of this section.

B. Examine supporting structural frame or foundation and conditions for compliance with requirements for installation tolerances, true and level bearing surfaces, and other conditions affecting performance.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

D. Do not install precast concrete units until supporting cast-in-place building structural framing has attained minimum allowable design compressive strength or supporting steel or other structure is complete.

3.02  ERECTION

A. Erect units without damage to shape or finish. Replace or repair damaged panels.

B. Erect units level and plumb within allowable tolerances.
C. Provide temporary supports and bracing as required to maintain position, stability, and alignment as units are being permanently connected.
   1. Install temporary steel or plastic spacing shims or bearing pads as precast concrete units are being erected. Tack weld steel shims to each other to prevent shims from separating.
   2. Maintain horizontal and vertical joint alignment and uniform joint width as erection progresses.
   3. Remove projecting lifting devices and grout fill voids within recessed lifting devices flush with surface of adjacent precast surfaces when recess is exposed.
   4. Unless otherwise indicated, maintain uniform joint widths of 3/8 inch.

3.03 INSTALLATION
A. Install clips, hangers, bearing pads, and other accessories required for connecting architectural precast concrete units to supporting members and backup materials.
B. Connect architectural precast concrete units in position by bolting, welding, grouting, or as otherwise indicated on Shop Drawings. Remove temporary shims, wedges, and spacers as soon as practical after connecting and grouting are completed.
   1. Do not permit connections to disrupt continuity of roof flashing.
C. Welding: Comply with applicable AWS D1.1/D1.1M and AWS D1.4 for welding, welding electrodes, appearance, quality of welds, and methods used in correcting welding work.
   1. Protect architectural precast concrete units and bearing pads from damage by field welding or cutting operations, and provide noncombustible shields as required.
   2. Welds not specified shall be continuous fillet welds, using no less than the minimum fillet as specified by AWS.
   3. Clean weld-affected metal surfaces with chipping hammer followed by brushing, and apply a minimum 4.0-mil-thick coat of galvanized repair paint to galvanized surfaces according to ASTM A 780.
   5. Remove, reweld, or repair incomplete and defective welds.
D. At bolted connections, use lock washers, tack welding, or other approved means to prevent loosening of nuts after final adjustment.
   1. Where slotted connections are used, verify bolt position and tightness. For sliding connections, properly secure bolt but allow bolt to move within connection slot. For friction connections, apply specified bolt torque and check 25 percent of bolts at random by calibrated torque wrench.
E. Grouting Connections: Grout connections where required or indicated. Retain grout in place until hard enough to support itself. Pack spaces with stiff grout material, tamping until voids are completely filled. Place grout to finish smooth, level, and plumb with adjacent concrete surfaces.
F. Keep grouted joints damp for not less than 24 hours after initial set. Promptly remove grout material from exposed surfaces before it affects finishes or hardens.

3.04 TOLERANCES
A. Erect members level and plumb within allowable tolerances. Comply with PCI MNL-135, except as specifically amended below.
   1. Plan Location from Building Grid Datum: Plus or minus 3/8 in.
   2. Top Elevation from Nominal Top Elevation: Plus or minus 3/8 inch.
   3. Maximum Plumb Variation Over Height of Structure or 100 ft (whichever is less): Plus or minus 1/2 inch.
   6. Differential Bowing or Camber as Erected Between Similar Adjacent Members: Plus or minus 3/16 inch.
3.05 FIELD QUALITY CONTROL
A. Testing Agency: Owner may engage a qualified testing agency to perform tests and inspections and prepare test reports.
B. Field welds will be subject to visual inspections and nondestructive testing according to ASTM E 165 or ASTM E 709. High-strength bolted connections will be subject to inspections.
C. Testing agency (when engaged) will report test results promptly and in writing to Contractor and Architect.
D. Repair or remove and replace work where tests and inspections indicate that it does not comply with specified requirements.
E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.06 REPAIRS
A. Repair architectural precast concrete units if permitted by Architect. The Architect reserves the right to reject repaired units that do not comply with requirements.
B. Mix patching materials and repair units so cured patches blend with color, texture, and uniformity of adjacent exposed surfaces and show no apparent line of demarcation between original and repaired work, when viewed in typical daylight illumination from a distance of 20 feet.
C. Prepare and repair damaged galvanized coatings with galvanizing repair paint according to ASTM A 780.
D. Wire brush, clean, and paint damaged prime-painted components with same type of shop primer.
E. Remove and replace damaged architectural precast concrete units when repairs do not comply with requirements.

3.07 CLEANING
A. Clean surfaces of precast concrete units exposed to view.
B. Clean mortar, plaster, fireproofing, weld slag, and other deleterious material from concrete surfaces and adjacent materials immediately.
C. Clean exposed surfaces of precast concrete units after erection and completion of joint treatment to remove weld marks, other markings, dirt, and stains.
   1. Perform cleaning procedures, if necessary, according to precast concrete fabricator's recommendations. Clean soiled precast concrete surfaces with detergent and water, using stiff fiber brushes and sponges, and rinse with clean water. Protect other work from staining or damage due to cleaning operations.
   2. Do not use cleaning materials or processes that could change the appearance of exposed concrete finishes or damage adjacent materials.

END OF SECTION
SECTION 03 47 13 - TILT-UP CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes load-bearing, tilt-up concrete, including the following:
   1. Monolithic panels.
   2. Insulated-sandwich panels.

B. Related Requirements:
   1. Section 03 30 00 "Cast-In-Place Concrete" for slab-on-grade closure strip and general concrete construction.
   2. Section 05 12 00 "Structural Steel" for embedded steel plates, headed studs and welding.
   3. Section 07 62 00 "Sheet Metal Flashing and Trim" for flashing receivers and reglets.
   4. Section 07 92 00 "Joint Sealants" for caulking of perimeter joint and backing.

1.3 DEFINITIONS

A. Face-down Surface: Concealed surface of as-cast, tilt-up panel formed against the casting slab.

B. Face-up Surface: Exposed upper surface of as-cast, tilt-up panel.

C. Reveal: Projection of the coarse aggregate from the matrix after exposure.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

   1. Before submitting design mixes, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with tilt-up concrete to attend, including the following:

      a. Contractor's superintendent.
      b. Independent testing agency responsible for concrete design mixtures.
      c. Ready-mix concrete manufacturer.
      d. Tilt-up concrete Subcontractor.
      e. Architect.
      f. Structural Engineer.

   2. Review special inspection procedures; testing and inspecting agency procedures for field quality control; tilt-up concrete finishes and finishing; cold- and hot-weather concreting
procedures; curing procedures; casting-slab construction, flatness and levelness, finish, and joint requirements; steel reinforcement installation; hoisting and erection plans; measurement of fabrication and erection tolerances; tilt-up concrete repair procedures; and tilt-up concrete protection.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

C. Shop Drawings: Detail fabrication and installation of tilt-up concrete units. Indicate panel locations, plans, elevations, dimensions, shapes, cross sections, and details of steel embedments. Match panel identification designations on Shop Drawings with those on Contract Drawings.

1. Include steel reinforcement, detailing fabrication, bending, and placing. Include material, grade, bar schedules, stirrup spacing, bent-bar diagrams, arrangement, and supports of concrete reinforcement.

2. Include additional steel reinforcement to resist hoisting and erection stresses.

3. Include locations and details of hoisting points and lifting devices for handling and erection.

4. Include engineering analysis data of additional steel reinforcement and hoisting and erection details, signed and sealed by the qualified professional engineer responsible for their preparation.

5. Indicate welded connections by AWS standard symbols. Detail cast-in inserts, connections, and joints, including accessories.

6. Include layout of wythe connectors for sandwich panels.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and testing agency.

B. Welding certificates.

C. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.

2. Admixtures.

3. Steel reinforcement and accessories.

4. Bond breakers.

5. Curing compounds.

6. Inserts and embedments.

7. Sandwich-panel insulation and wythe connectors.

D. Material Test Reports: For the following, from a qualified testing agency:

1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.

E. Field quality-control reports.
F. Minutes of preinstallation conference.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA’s “Certification of Ready Mixed Concrete Production Facilities.”

B. Installer Qualifications: A qualified installer who employs a supervisor on Project who is an ACI-certified Tilt-up Supervisor.

C. Testing Agency Qualifications: An independent agency, qualified according to ASTM C1077 and ASTM E329 for testing indicated.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade I, according to ACI CP-1 or an equivalent certification program.

D. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M.
2. AWS D1.4/D1.4M.

1.8 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with ACI 301 and ACI 306.1 and as follows.

1. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
2. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
3. Do not use frozen materials or materials containing ice or snow.
4. Do not place concrete in contact with surfaces less than 35 deg F, other than reinforcing steel.
5. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

B. Hot-Weather Placement: Comply with ACI 301 and ACI 305.1, and as follows:

1. Maintain concrete temperature at time of discharge to not exceed 95 deg F.
2. During periods of dry winds, low humidity and other conditions that cause rapid drying; protect fresh concrete with an evaporation retardant or fine fog spray of water applied immediately after screeding and floating.
3. Maintain protection until final finishing and curing compounds are applied.
2.1 TILT-UP CONCRETE

A. Comply with ACI 301, unless modified by requirements in the Contract Documents.

2.2 FORMS AND ACCESSORIES

A. Forms: Metal, dressed lumber, or other approved materials that are nonreactive with concrete and that will provide continuous, true, and smooth concrete surfaces.

B. Chamfer Strips: Wood, metal, PVC, or rubber strips.

C. Form Liners: Units of face design, texture, arrangement, and configuration indicated. Furnish with manufacturer’s recommended liquid-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent surface treatments of concrete.

D. Reveal Strips: Metal, PVC, rubber, straight dressed wood, or plywood; with sides kerfed.

E. Sealer: Penetrating, clear, polyurethane wood form sealer formulated to reduce absorption of bleedwater and prevent migration of set-retarding chemicals from wood or plywood.

2.3 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A615/A615M, Grade 60, deformed.

B. Low-Alloy-Steel Reinforcing Bars: ASTM A706/A706M, deformed.

C. Plain-Steel Wire: ASTM A82/A82M, as drawn.

D. Plain-Steel Welded-Wire Reinforcement: ASTM A185/A185M, fabricated from as-drawn steel wire into flat sheets.


F. Bar Supports: Manufactured according to CRSI’s “Manual of Standard Practice” of plastic or CRSI Class 1 plastic-protected steel wire or Class 2 stainless-steel wire.

2.4 CONCRETE MATERIALS

A. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer’s plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

B. Cementitious Material:

2. Fly Ash: ASTM C618, Class F or C.
C. Coarse Aggregate: ASTM C33/C33M, Class 4S coarse aggregate or better, graded. Provide aggregates from single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.

1. Maximum Coarse-Aggregate Size:
   a. 3/4 inch nominal for interior, structural panel.
   b. 1/2 inch nominal for exterior wythe of panel.

D. Fine Aggregate: ASTM C33/C33M, manufactured or natural sand, from same source for Project, free of materials with deleterious reactivity to alkali in cement.

E. Air-Entraining Admixture: ASTM C260/C260M.

F. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C494/C494M, Type A.
2. Retarding Admixture: ASTM C494/C494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C494/C494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C494/C494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C1017/C1017M, Type II.


2.5 BOND BREAKERS

A. Waterborne, Chemically Reactive Bond Breaker: Penetrating polymerized emulsion containing no oils, waxes, paraffins, or silicones, and compatible with casting-slab curing compound.

B. Ensure that bond breaker does not negatively affect the slab-on-grade curing and sealing compound.

2.6 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming; manufactured for application to fresh concrete.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

C. Moisture-Retaining Cover: ASTM C171, polyethylene film or white burlap-polyethylene sheet.

D. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C309, Type 1, Class B.

2.7 CONNECTION MATERIALS

A. Embedded Metal Items and Loose Hardware: Comply with Section 055000 "Metal Fabrications" for materials for securing tilt-up concrete panels together and to supporting and adjacent construction.
B. Loose Hardware: Comply with Section 055000 “Metal Fabrications” for materials for securing tilt-up concrete panels together and to supporting and adjacent construction.

C. Carbon-Steel Shapes and Plates: ASTM A36/A36M.

D. Carbon-Steel Bolts and Studs: ASTM A307, Grade A; carbon-steel, hex-head bolts and studs; carbon-steel nuts; and flat, unhardened steel washers.


F. Welded Headed Studs: AWS D1.1/D1.1M, Type B headed studs, and cold-finished, carbon-steel bars.

G. Low-Alloy-Steel Reinforcing Bars: ASTM A706/A706M, deformed.

H. Welding Electrodes: Comply with AWS standards.

2.8 LIFTING INSERTS AND ACCESSORIES

A. Furnish inserts, dowels, bolts, nuts, washers, and other items to be cast in panels for tilting and lifting.
   1. Manufacture inserts with feet of plastic, galvanized-steel wire, plastic-tipped steel wire, or stainless-steel-tipped steel wire.

B. Furnish brace anchors and other accessories to be cast in panels and in casting slab for attaching bracing.
   1. Manufacture wall brace anchors and accessories with feet of galvanized-steel wire, plastic-tipped steel wire, or stainless-steel-tipped steel wire.
   2. Manufacture floor brace anchors that do not penetrate vapor retarder under slab-on-grade.

2.9 BEARING PADS

A. High-Density Plastic Strips: Multimonomer, nonleaching plastic.

2.10 GROUT

A. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents; complying with ASTM C1107, of consistency suitable for application.

2.11 SANDWICH-PANEL INSULATION

A. Extruded-Polystyrene Board Insulation: ASTM C578, Type IV, square edged, with thickness of 2" inches - R-Value = 5 per inch.
2.12 SANDWICH-PANEL ACCESSORIES

A. Fiber-Polymer Composite Wythe Connectors: Manufactured composite glass-fiber and vinyl-ester polymer connector rods, notched, with polymer collars injection molded around shaft of connector rod; alkaline resistant; for noncomposite structural action.

B. Resin Wythe Connectors: Manufactured thermoplastic resin connector rods, notched, with integral flange around shaft of connector rod; alkaline resistant; for noncomposite structural action.

C. Polyethylene Sheet: ASTM D4397, 4 mils thick.

2.13 MISCELLANEOUS MATERIALS

A. Form Retarder: Chemical liquid set retarder, for application on hardened horizontal concrete and capable of temporarily delaying final hardening of newly placed concrete to depth of reveal specified.

1. Mold Release: Solution specially formulated by manufacturer for use under form retarder.

B. Flashing Reglets: Open type having continuous groove not less than 1-1/8 inches deep by 3/16 inch wide at opening and sloped upward to 45 degrees. Temporarily fill or cover face openings of reglets to prevent intrusion of concrete or debris.

1. Stainless Steel: ASTM A240/A240M, Type 304, soft annealed, not less than 0.0187 inch thick.

2.14 REPAIR MATERIALS

A. Bonding Agent: ASTM C1059, Type II, nonredispersible, acrylic emulsion or styrene butadiene.

B. Patching Mortar: Dry-pack mix consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing No. 16 sieve, using only enough water for handling and placing.

2.15 CONCRETE MIXTURES

A. Obtain each color, size, type, and variety of concrete mixture from single manufacturer with resources to provide concrete of consistent quality in appearance and physical properties.

B. Prepare design mixtures for each type and strength of concrete, proportioned on basis of laboratory trial mixture or field test data, or both, according to ACI 301.

1. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures based on laboratory trial mixtures.

C. Proportion concrete mixture as follows:

1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Maximum W/C Ratio: 0.45.
3. Slump Limit: 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range, water-reducing admixture or plasticizing admixture, plus or minus 1 inch.
4. **Air Content**: 6 percent plus or minus 1.5 percent for 3/4-inch nominal maximum aggregate size at point of delivery.

5. **Cementitious Materials**: Use fly ash or other pozzolans as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 15 percent.

D. **Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.**

E. **Admixtures**: Use admixtures according to manufacturer's written instructions.

   1. Use water-reducing or high-range, water-reducing or plasticizing admixture in concrete, as required, for placement and workability.

   2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

**2.16 CONCRETE MIXING**

A. **Ready-Mixed Concrete**: Measure, batch, mix, and deliver concrete according to ASTM C94/C94M, and furnish batch ticket information.

   1. When air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

   2. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time to 75 minutes.

**PART 3 - EXECUTION**

3.1 **FORMWORK INSTALLATION**

A. Construct and brace formwork so tilt-up concrete panels are of size, shape, alignment, elevation, and position indicated.

   1. Construct forms on slab-on-grade or on temporary casting slab, at Contractor's option.

   2. Provide for openings, offsets, recesses, reveals, rustications, reglets, and blockouts.

   3. Place form liners accurately to provide finished surface texture indicated. Provide solid backing and supports to maintain stability of liners during concreting. Coat form liner with form-release agent.

B. Construct forms for easy removal without hammering or prying against concrete surfaces. Use kerfed inserts, such as those forming reglets, rustications, and recesses, for easy removal.

C. Set edge forms for panels to achieve required panel thickness.

D. Chamfer exposed corners and edges, unless otherwise indicated, using chamfer strips fabricated to produce uniform, smooth lines and tight edge joints.

E. Coat contact surfaces of wood forms and chamfers with sealer before placing reinforcement.

3.2 **BOND BREAKER INSTALLATION**

A. Uniformly and continuously apply two coats of bond breaker to casting-slab surfaces by power spray or roller according to manufacturer's written instructions, before placing steel.
reinforcement. Reccoat areas subjected to moisture before drying. Maintain continuity of coating until concrete placement.

B. After placing steel reinforcement, touch up or recoat worn or damaged areas with bond breaker. Do not splash or coat steel reinforcement and inserts.

3.3 FORM RETARDER APPLICATION

A. Uniformly and continuously apply form retarder to slab surfaces by power spray, roller, or brush according to manufacturer's written instructions, before placing steel reinforcement. Reccoat areas subjected to moisture before drying. Maintain continuity of coating until concrete placement.

1. Uniformly apply mold release according to manufacturer's written instructions and allow it to dry before applying form retarder.

B. After placing steel reinforcement, touch up or recoat worn or damaged areas with form retarder. Do not splash or coat steel reinforcement and inserts.

3.4 REINFORCEMENT AND INSERT INSTALLATION

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating and placing reinforcement.

B. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover.

1. Field weld reinforcement according to AWS D1.4/D1.4M, where indicated.
2. Do not tack-weld crossing reinforcing bars.
3. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

C. Install welded-wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

D. Accurately place and securely support embedded items, anchorages, inserts, cramps, retainers, bar chords and sleeves, and other items to be built into panels. Coordinate with other trades for installing cast-in items.

E. Wythe Connectors: Accurately place and securely support stainless-steel anchors and connecting pins for sandwich panels.

3.5 PANEL CASTING, GENERAL

A. Comply with ACI 301 for handling, placing, and consolidating concrete.

B. Maintain position of steel reinforcement, inserts, and anchors during concrete placement, consolidation, and finishing.

C. Screed panel surfaces to correct level with a straightedge and strike off.
1. Begin initial floating before excess moisture or bleedwater appears on the surface. Use bull floats or darbies to form a uniform and open-textured surface plane free of humps or hollows. Do not disturb panel surfaces before beginning finishing operations.

D. Form chamfers at top edges of panel perimeters, openings, and similar locations not formed by chamfer strips unless otherwise indicated.

E. Surface Defects: Limit visible surface defects to those permitted by TCA’s “Tilt-up Concrete Association’s Guideline Specifications” for Grade A, Architectural panel surfaces.

3.6 SANDWICH-PANEL CASTING

A. Cast and screed supported wythe over casting slab.

B. Wythe Connectors:
   1. While concrete is still plastic, place polyethylene sheet over top surface, overlapping sheet edges 6 inches and extending beyond edges of panels.
   2. Immediately place insulation, abutting edges and ends between boards. Stagger end joints between rows. Stagger joints of insulation layers one-half of board apart. Insert wythe connectors through predrilled insulation, and consolidate concrete around connectors according to manufacturer’s written instructions.

C. Cast, screed, and apply initial float finish to structural wythe.

3.7 CASTING TOLERANCES

A. Cast tilt-up concrete panels without exceeding the following tolerances:
   1. Height and Width of Panels:
      a. For Panels up to 20 Feet Tall: 1/4 inch wide.
      b. For Panels 20 to 30 Feet Tall: 3/8 inch wide.
      c. Each Additional 10 Feet in Excess of 30 Feet Tall: 1/8 inch wide.
   2. Thickness: 3/16 inch.
   3. Skew of Panel or Opening: Difference in length of diagonals of 1/8 inch per 72 inches with a maximum difference of 1/2 inch.
   4. Openings Cast into Panel:
      a. Size of Opening: 1/4 inch.
      b. Location of Centerline of Opening: 1/4 inch.
   5. Location and Placement of Embedded Items:
      a. Inserts, Bolts, and Pipe Sleeves: 3/8 inch.
      b. Lifting and Bracing Inserts: As required by manufacturer.
      c. Lateral Placement of Weld Plate Embedments: 1 inch.
      d. Tipping and Flushness of Weld Plate Embedments: 1/4 inch.
   6. Deviation of Steel Reinforcement Cover: Maintain minimum cover required by ACI 301.
3.8 FACE-UP FINISHES

A. Trowel Finish: After applying float finish, apply first trowel finish and consolidate plastic concrete by hand trowel or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and is uniform in texture and appearance.

3.9 FACE-DOWN FINISHES

A. Smooth, As-Cast Finish: Cast panel to produce a surface free of pockets, sand streaks, and honeycombs. Produce a surface appearance of uniform color and texture.

B. Form-Liner Finish: Cast panel over form liners placed, secured, and sealed over casting slab to produce a textured surface free of pockets, streaks, and honeycombs. Produce a surface appearance of uniform color and texture.

3.10 CONCRETE PROTECTING AND CURING

A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures according to ACI 301.

1. Apply evaporation retarder in hot, dry, or windy weather to protect concrete from rapid moisture loss before and during finishing operations. Apply according to manufacturer's written instructions after screeding and bull floating concrete, but before float finishing.

B. Begin curing immediately after finishing concrete. Cure by one or a combination of the following methods according to ACI 308.1:

1. Moisture Curing: Keep surfaces continuously moist for no fewer than seven days with the following materials:
   a. Water.
   b. Continuous water-fog spray.
   c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for no fewer than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.11 ERECTION

A. Use erection equipment with care to prevent damage to floor slabs and panels.

B. Lift, support, and erect panels only at designated lifting or supporting points indicated on Shop Drawings.
C. Do not erect panels until verified compressive strength of concrete exceeds the concrete strength specified on the Shop Drawings for lifting, as determined by the Contractor's lifting engineer.

D. Install tilt-up concrete panels level, plumb, square, and true. Place panels on leveled grout-setting pads or shims in correct position. Maintain joint width indicated between panels.
   1. Install tilt-up concrete panels with face-down surfaces exposed to exterior of building.

E. Temporarily brace and support panels securely in position against loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to panels are secured.

F. Anchor panels in place and, if indicated, to one another.
   1. Weld steel connectors to steel supports and embedments indicated, complying with AWS D1.1/D1.1M.

G. Solidly grout-fill gaps between foundation system and bottom of panels.

3.12 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections and to submit reports.

B. Inspections:
   1. Steel reinforcement placement.
   2. Steel reinforcement welding.
   3. Headed bolts and studs.
   4. Verification of use of required design mixture.
   5. Concrete placement, including conveying and depositing.
   6. Curing procedures and maintenance of curing temperature.
   7. Verification of concrete strength before erection of tilt-up panels.

C. Testing Services: Tests shall be performed according to ACI 301.

D. Comply with the requirements of Section 033000 and provide the following additional sampling and testing of field cured specimens. Take a minimum of 3 cylinders and 4 beams for each day's pour plus additional sets for each 100 cu. yards over and above the first 50 cu. yards of concrete poured in one day and not less than once for every 5,000 sq. feet of panel area.
   1. Beams: According to ASTM C78, test 2 beams prior to panel erection and average results to determine flexural strength. Retain remaining beams for additional testing. Wall panels should not be lifted until concrete has reached 500 psi flexural strength.
   2. Cylinders: According to ASTM C31, test two field cured cylinders prior to panel erection and average results to determine compressive strength. Remaining specimens to be held in reserve.

E. Tilt-up concrete panels will be considered defective if they do not pass tests and inspections.

F. Prepare test and inspection reports.
3.13 ERECTION TOLERANCES

A. Install tilt-up concrete panels without exceeding the following erection tolerances:

1. Joint Width Variation (Exterior Face): Without decreasing or increasing more than 50 percent from specified joint width, maintain joint width as follows:

   a. For Panels up to 20 Feet Tall: 1/4 inch.
   b. Each Additional 10 Feet in Excess of 20 Feet Tall: 1/8 inch.

2. Joint Taper: Maximum 3/8 inch over length, but not greater than the following:

   a. For Panels up to 20 Feet Tall: 1/4 inch.
   b. Each Additional 10 Feet in Excess of 20 Feet Tall: 1/8 inch.

3. Panel Alignment:


3.14 FILLING AND REPAIR

A. Patch holes and voids left by erecting and bracing inserts on tilt-up panels and slabs-on-grade. Cut or chip edges of voids perpendicular to concrete surface. Fill blockouts where indicated.

   1. Clean, dampen with water, and brush-coat holes, voids, and blockouts with bonding agent. Fill and compact with patching mortar of a stiff consistency before bonding agent has dried.
   2. Finish surfaces of fills and repairs to Architect's approval, with materials of same colors and textures as finishes on surrounding surfaces.

B. Repair damage to tilt-up panels and slabs-on-grade resulting from tilt-up work, as directed by Architect.

C. Remove and replace tilt-up panels that do not comply with requirements in this Section.

D. Demolish and remove temporary concrete casting slabs.

END OF SECTION 03 47 13
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PART 1 GENERAL

1.01 SECTION INCLUDES
   A. Concrete block.
   B. Clay facing brick.
   C. Mortar and grout.
   D. Reinforcement and anchorage.
   E. Flashings.
   F. Accessories.

1.02 RELATED REQUIREMENTS
   A. Section 05 50 00 - Metal Fabrications: Loose steel lintels.
   B. Section 07 62 00 - Sheet Metal Flashing and Trim: Through-wall masonry flashings.
   C. Section 07 92 00 - Joint Sealants: Sealing control and expansion joints.
   D. Section 07 95 13 - Expansion Joint Cover Assemblies: Types of EJs at Masonry.

1.03 REFERENCE STANDARDS
   F. ASTM C62 - Standard Specification for Building Brick (Solid Masonry Units Made From Clay or Shale); 2017.
   J. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made From Clay or Shale); 2017a.
   P. BIA Technical Notes No. 28B - Brick Veneer/Steel Stud Walls; 2005.
1.04 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide data for masonry units, fabricated wire reinforcement, mortar, and masonry accessories.
C. Shop Drawings: Indicate pertinent dimensions, materials, anchorage, size and type of fasteners, and accessories for brickwork support system.
   1. Include calculations or selections from the manufacturer’s prescriptive design tables that indicate compliance with the applicable building code and project conditions.
D. Samples: Submit four samples of decorative block units to illustrate color, texture, and extremes of color range.
E. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.
F. Manufacturer's Certificate: Certify that water repellent admixture manufacturer has certified masonry unit manufacturer as an approved user of water repellent admixture in the manufacture of concrete block.

1.05 QUALITY ASSURANCE
A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section with minimum three years of documented experience.
B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.06 MOCK-UP
A. Construct a masonry wall as a mock-up panel sized 4 feet long by 4 feet high; include mortar, accessories, wall openings, and flashings (with lap joint, corner, and end dam) in mock-up.

1.07 DELIVERY, STORAGE, AND HANDLING
A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

1.08 JOB CONDITIONS
A. Protection of Work:
   1. Wall Covering:
      a. During erection, cover top of wall with strong waterproof membrane at end of each day or shutdown.
      b. Cover partially completed walls when work is not in progress.
      c. Extend cover minimum of 24 inches down both sides.
      d. Hold cover securely in place.
   2. Load Application:
      a. Do not apply uniform floor or roof loading for at least 12 hours after building masonry columns or walls.
      b. Do not apply concentrated loads for at least 3 days after building masonry columns or walls.
   3. Staining:
      a. Prevent grout or mortar from staining the face of masonry to be left exposed or painted:
         1) Remove immediately grout or mortar in contact with face of such masonry.
         2) Protect all sills, ledges and projections from droppings of mortar, protect door jambs and corners from damage during construction.
PART 2  PRODUCTS

2.01  CONCRETE MASONRY UNITS

A. Concrete Block: Comply with referenced standards and as follows:
   1. Size: Standard units with nominal face dimensions of 16 by 8 inches and nominal depth of 8 inches.
      a. Normal weight.

2.02  BRICK UNITS

A. Manufacturers:
      a. Brick Type: Summit Brick & Tile Company; 13th and Erie Streets, Pueblo, CO 81001. PH 719.542.8278.
   b. Color: As indicated on the drawings.
   2. Modular Brick Size (Actual Dimensions): 3-5/8" x 2-1/4" x 7-5/8".
   3. NO SUBSTITUTIONS.
   4. General: Provide shapes indicated and as follows:
      a. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
      b. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view, use obtuse corners.

2.03  MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C150/C150M, Type I; color as required to produce approved color sample.
   1. Not more than 0.60 percent alkali.

B. Hydrated Lime: ASTM C207, Type S.

C. Mortar Aggregate: ASTM C144.
   1. For joints less than 1/4" thick, use aggregate graded with 100 percent passing the No. 16 sieve.
   2. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.


E. Pigments for Colored Mortar: Pure, concentrated mineral pigments specifically intended for mixing into mortar and complying with ASTM C979/C979M.
   2. Manufacturers:
      d. Halcim
      e. Substitutions: See Section 01 60 00 - Product Requirements.

F. Water: Clean and potable.
G. Accelerating Admixture: Nonchloride type for use in cold weather.
   1. Manufacturers:
      a. Addiment Incorporated; Mortar Kick.
      b. Euclid Chemical Company (The); Accelguard 80.
      c. Grace Construction Products, a unit of W.R. Grace & Co. - Conn.; morset.
      d. Sonneborn, Div. of ChemRex; Trimix-NCA.

H. Integral Water Repellent Admixture for Mortar: Polymeric liquid admixture added to mortar at the time of manufacture.
   1. Use only in combination with masonry units manufactured with integral water repellent admixture.
   2. Use only water repellent admixture for mortar from the same manufacturer as water repellent admixture in masonry units.
   3. Meet or exceed performance specified for water repellent admixture used in masonry units.
   4. Manufacturers:
      a. Addiment Incorporated; Mortar Tite.
      b. Grace Construction Products, a unit of W.R. Grace & Co. - Conn.; Dry-Block Mortar Admixture.
      c. Master Builders, Inc.; Color Cure Mortar Admix or Rheomix Rheopel.

2.04 REINFORCEMENT AND ANCHORAGE

A. Use Extra-Heavy Weight Dur-O-Wal or Equal.

B. Manufacturers:
   4. Substitutions: See Section 01 60 00 - Product Requirements.

C. Reinforcing Steel: ASTM A615/A615M, Grade 40 (40,000 psi), deformed billet bars; galvanized.

D. Single Wythe Joint Reinforcement: ASTM A951/A951M.
   1. Type: Truss or ladder.
   3. Size: 0.1483 inch side rods with 0.1483 inch cross rods; width as required to provide not less than 5/8 inch of mortar coverage on each exposure.

E. Adjustable Multiple Wythe Joint Reinforcement: ASTM A951/A951M.
   1. Type: Truss, with adjustable ties or tabs spaced at 16 in on center.
   3. Size: 0.1875 inch side rods with 0.1483 inch cross rods and adjustable components of 0.1875 inch wire, width of components as required to provide not less than 5/8 inch of mortar coverage from each masonry face.
   4. Vertical adjustment: Not more than 2 inches.
   5. Seismic Feature: Provide lip, hook, or clip on extended leg of wall ties to engage or enclose not less than one continuous horizontal joint reinforcement wire of 0.1483 inch diameter.

F. Flexible Anchors: 2-piece anchors that permit differential movement between masonry and building frame, sized to provide not less than 5/8 inch of mortar coverage from masonry face.
   1. Concrete frame: Dovetail anchors of bent steel strap, nominal 1 inch width x 0.024 in thick, with trapezoidal wire ties 0.1875 inch thick, hot dip galvanized to ASTM A 153/A 153M, Class B.
   2. Steel frame: Crimped wire anchors for welding to frame, 0.25 inch thick, with trapezoidal wire ties 0.1875 inch thick, hot dip galvanized to ASTM A 153/A 153M, Class B.
G. Masonry Veneer Anchors: 2-piece anchors that permit differential movement between masonry veneer and structural backup, hot dip galvanized to ASTM A 153/A 153M, Class B.
   1. Anchor plates: Not less than 0.075 inch thick, designed for fastening to structural backup through sheathing by two fasteners; provide design with legs that penetrate sheathing and insulation to provide positive anchorage.
   2. Wire ties: Manufacturer's standard shape, 0.1875 inch thick.
   3. Vertical adjustment: Not less than 3-1/2 inches.
   4. Seismic Feature: Provide lip, hook, or clip on end of wire ties to engage or enclose not less than one continuous horizontal joint reinforcement wire of 0.1483 inch diameter.

H. Partition Top Anchors: 0.097-inch thick metal plate with 3/8"-inch diameter metal rod 6 inches long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Fabricate from steel, hot-dip galvanized after fabrication.

I. Rigid Anchors: Fabricate from steel bars 1-1/2 inches wide by 1/4 inch thick by 24 inches long, with ends turned up 2 inches or cross pins.
   1. Corrosion protection: Hot-dip galvanized to comply with ASTM A153/A 153M.

J. Metal-to-Metal Fasteners: Self-drilling, self-tapping screws; corrosion resistant finish or hot dip galvanized to ASTM A153/A153M.
   1. Manufacturers:

2.05 FLASHINGS

A. Metal Flashing Materials: pre-finished metal flashing, as specified in Section 07 62 00.

B. Combination Asphaltic Flashing Materials - Copper:
   1. Copper/Kraft Paper Flashings: 5 oz/sq ft sheet copper bonded between two sheets of fiber-reinforced asphalt treated Kraft paper.
      a. Manufacturers:
         1) Advanced Building Products Inc.; Copper Fabric Flashing.
         2) AFCO Products Inc.; Copper Fabric.
         4) Phoenix Building Products; Type FCC-Fabric Covered Copper.
         5) Polytite Manufacturing Corp.; Copper Fabric Flashing.
         6) Sandell Manufacturing Corp.; Copper Fabric Flashing.
         7) York Manufacturing, Inc.; York Copper Fabric Flashing.

C. Factory-Fabricated Flashing Corners and End Dams: Copper.

D. Flashing System:
   1. System is for all heads, sills, shelf angles, spandrels, lintels, thru-wall conditions and other locations indicated on the drawings. System shall consist of a self-adhered rubberized asphalt laminate flashing material, self-adhered pre-formed flashing corners and end dams, stainless steel drip edge, and termination bar. Lap joints a minimum of six inches were required.

E. Lap Sealant:
   1. Butyl type as specified in Section [07 92 00].

F. Termination Bars: Stainless steel; compatible with membrane and adhesives.
   1. Manufacturers:
G. Drip Edge: Pre-Finished Metal; angled drip with hemmed edge; compatible with membrane and adhesives.
   1. Manufacturers:

H. Lap Sealants and Tapes: As recommended by flashing manufacturer; compatible with membrane and adhesives.

2.06 ACCESSORIES

A. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, fused joints.
   1. Manufacturers:
      b. WIRE-BOND: www.wirebond.com/#sle.
      c. Substitutions: See Section 01 60 00 - Product Requirements.

B. Joint Filler: Closed cell neoprene urethane or PVC; oversized 50 percent to joint width; self expanding; 3 in. maximum lengths available.
   1. Manufacturers:
      c. WIRE-BOND: www.wirebond.com/#sle.
      d. Substitutions: See Section 01 60 00 - Product Requirements.

C. Bond-Breaker Strips: Asphalt-Saturated, organic roofing felt complying with ASTM D226, Type I (No. 15 lb asphalt felt).

D. Cavity Mortar Control: Semi-rigid polyethylene or polyester mesh panels, sized to thickness of wall cavity, and designed to prevent mortar droppings from clogging weeps and cavity vents and allow proper cavity drainage.
   1. Mortar Diverter: Semi-rigid mesh designed for installation at flashing locations.
      a. Manufacturers:
         1) Mortar Net Solutions; MortarNet: www.mortarnet.com/#sle.
         2) Substitutions: See Section 01 60 00 - Product Requirements.

E. Weeps:
   1. Type: Rectangular Plastic Weep/Vent Tubing. Clear butyrate, 3/8 inch x 1-1/2 inch x 3-1/2 inches long.
      Cellular Plastic Weep/Vent: One-Piece. flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth 1/8 inch less than depth of outer wythe.
   2. Color(s): Clear.
   3. Manufacturers:
      b. Dayton Superior Corporation, Dur-O-Wal Division; Cell Vents.
      c. Heckmann Building Products Inc.; No. 85 Cell Vent.
      d. Hohmann & Barnard, Inc; Quadro-Vent: www.h-b.com/#sle.
      e. WIRE-BOND; Cell Vent: www.wirebond.com/#sle. Basis of Design.
      f. Substitutions: See Section 01 60 00 - Product Requirements.
2.07 MASONRY CLEANERS:
A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains from new masonry without damaging masonry. Use product approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.
   1. Manufacturer's:
      a. Diedrich Technologies, Inc.
      b. EaCo Chem: www.eacochem.com
      c. Prosoco: www.prosoco.com
      d. Substitutions: See Section 01 60 00 - Product Requirements.

2.08 LINTELS
A. Miscellaneous steel lintels as indicated on structural steel drawings or section 05 50 00 - Metal Fabrications. Minimum bearing of 8 inches on each side of opening.

2.09 MORTAR AND GROUT MIXING
A. General: Do not use admixtures, unless otherwise indicated.
   1. Do not use calcium chloride in mortar or grout.
   2. Limit cementitious materials in mortar for exterior and reinforced masonry to portland cement and lime.
B. Mortar for Unit Masonry: ASTM C270, using the Proportion Specification.
   1. Masonry below grade and in contact with earth: Type S.
   2. Exterior, loadbearing masonry: Type N.
   3. Exterior, non-loadbearing masonry: Type N.
C. Colored Mortar: Proportion selected pigments and other ingredients to match Architect's sample, without exceeding manufacturer's recommended pigment-to-cement ratio.
D. Grout: ASTM C476; consistency required to fill completely volumes indicated for grouting; fine grout for spaces with smallest horizontal dimension of 2 inches or less; coarse grout for spaces with smallest horizontal dimension greater than 2 inches.
E. Admixtures: Add to mixture at manufacturer's recommended rate and in accordance with manufacturer's instructions; mix uniformly.
F. Mixing: Use mechanical batch mixer and comply with referenced standards.

PART 3 EXECUTION
3.01 EXAMINATION
A. Verify that field conditions are acceptable and are ready to receive masonry.
B. Verify that related items provided under other sections are properly sized and located.
C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.02 PREPARATION
A. Direct and coordinate placement of metal anchors supplied for installation under other sections.
B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.03 COLD AND HOT WEATHER REQUIREMENTS
A. Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.
3.04 COURSING
A. Establish lines, levels, and coursing indicated. Protect from displacement.
B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
C. Concrete Masonry Units:
   1. Bond: Running.
   2. Coursing: One unit and one mortar joint to equal 8 inches.
D. Brick Units:
   1. Bond: Running.
   2. Coursing: Three units and three mortar joints to equal 8 inches.

3.05 PLACING AND BONDING
A. Lay hollow masonry units with face shell bedding on head and bed joints.
B. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.
C. Remove excess mortar and mortar smears as work progresses.
D. Remove excess mortar with water repellent admixture promptly. Do not use acids, sandblasting or high pressure cleaning methods.
E. Interlock intersections and external corners.
F. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
G. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
H. Broken, chipped, or stained masonry units will not be acceptable.
I. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible joint filler.

3.06 WEEPS/CAVITY VENTS
A. Install weeps in veneer and cavity walls at 24 inches on center horizontally on top of through-wall flashing above shelf angles and lintels and at bottom of walls.

3.07 CAVITY MORTAR CONTROL
A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep/cavity vents.
B. Install cavity mortar diverter at base of cavity and at other flashing locations as recommended by manufacturer to prevent mortar droppings from blocking weep/cavity vents.

3.08 REINFORCEMENT AND ANCHORAGE - GENERAL AND SINGLE WYTHE MASONRY
A. Unless otherwise indicated on drawings or specified under specific wall type, install horizontal joint reinforcement 16 inches on center.
B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
C. Place continuous joint reinforcement in first and second joint below top of walls.
D. Lap joint reinforcement ends minimum 6 inches.
E. Fasten anchors to structural framing and embed in masonry joints as masonry is laid. Unless otherwise indicated on drawings or closer spacing is indicated under specific wall type, space anchors at maximum of 36 inches horizontally and 24 inches vertically.
3.09 REINFORCEMENT AND ANCHORAGE - MASONRY VENEER

A. Stud Back-Up: Secure veneer anchors to stud framed back-up and embed into masonry veneer at maximum 16 inches on center vertically and 32 inches on center horizontally. Place additional anchors at perimeter of openings and ends of panels, so maximum spacing of anchors is 8 inches on center.

B. Seismic Reinforcement: Connect veneer anchors with continuous horizontal wire reinforcement before embedding anchors in mortar.

3.10 MASONRY FLASHINGS

A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.
   1. Extend flashings full width at such interruptions and at least 6 inches, minimum, into adjacent masonry or turn up flashing ends at least 1 inch, minimum, to form watertight pan at non-masonry construction.
   2. Remove or cover protrusions or sharp edges that could puncture flashings.
   3. Seal lapped ends and penetrations of flashing before covering with mortar.

B. Extend metal flashings through exterior face of masonry and terminate in an angled drip with hemmed edge. Install joint sealer below drip edge to prevent moisture migration under flashing.

C. Lap end joints of flashings at least 6 inches, minimum, and seal watertight with flashing sealant/adhesive.

D. Provide end dams at all locations where flashing terminates into different materials or changes direction.

3.11 LINTELS

A. Install loose steel lintels over openings.

3.12 GROUTED COMPONENTS

A. Lap splices minimum 24 bar diameters.

B. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.

C. Place and consolidate grout fill without displacing reinforcing.

D. At bearing locations, fill masonry cores with grout for a minimum 12 inches either side of opening.

3.13 CONTROL AND EXPANSION JOINTS

A. Do not continue horizontal joint reinforcement through control or expansion joints.

B. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer’s instructions.

C. Size control joints as indicated on drawings; if not indicated, 3/4 inch wide and deep.

3.14 BUILT-IN WORK

A. As work progresses, install built-in prehung door frames and other items to be built into the work and furnished under other sections.

B. Install built-in items plumb, level, and true to line.

C. Do not build into masonry construction organic materials that are subject to deterioration.
3.15 TOLERANCES
   A. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.
   B. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.
   C. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.
   D. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.
   E. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/4 inch, plus 3/8 inch.
   F. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.

3.16 CUTTING AND FITTING
   A. Lay masonry or cut edges of masonry plumb, straight and true at locations of expansion joint seals.
   B. Cut and fit for pipes, conduit, and sleeves. Coordinate with other sections of work to provide correct size, shape, and location.
   C. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.17 CLEANING
   A. Remove excess mortar and mortar droppings.
   B. Replace defective mortar. Match adjacent work.
   C. Clean soiled surfaces with cleaning solution.
   D. Use non-metallic tools in cleaning operations.

3.18 PROTECTION
   A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

END OF SECTION
SECTION 05 12 00 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Structural steel.
2. Prefabricated building columns.
3. Shear stud connectors.
4. Shrinkage-resistant grout.

B. Related Requirements:
1. Section 05 31 00 "Steel Decking" for field installation of shear stud connectors through deck.
2. Section 05 50 00 "Metal Fabrications" for miscellaneous steel fabrications and other steel items not defined as structural steel.
3. Section 09 91 13 "Exterior Painting" and Section 099123 "Interior Painting" for painting requirements.

1.3 DEFINITIONS

A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in ANSI/AISC 303.

B. Seismic-Load-Resisting System: Elements of structural-steel frame designated as "SLRS" or along grid lines designated as "SLRS" on Drawings, including columns, beams, and braces and their connections.

C. Heavy Sections: Rolled and built-up sections as follows:

1. Shapes included in ASTM A6/A6M with flanges thicker than 1-1/2 inches.
2. Welded built-up members with plates thicker than 2 inches.
3. Column base plates thicker than 2 inches.

1.4 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

1.5 ACTION SUBMITTALS

A. Product Data:

2. High-strength, bolt-nut-washer assemblies.
3. Shear stud connectors.
4. Anchor rods.
5. Threaded rods.
8. Shrinkage-resistant grout.

B. Shop Drawings: Show fabrication of structural-steel components.

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
2. Include embedment Drawings.
3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections.
5. Identify members and connections of the seismic-load-resisting system.
6. Indicate locations and dimensions of protected zones.
7. Identify demand-critical welds.
8. Identify members not to be shop primed.

C. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide in accordance with AWS D1.1/D1.1M for each welded joint qualified by testing, including the following:

1. Power source (constant current or constant voltage).
2. Electrode manufacturer and trade name, for demand-critical welds.

D. Delegated-Design Submittal: For structural-steel connections indicated on Drawings to comply with design loads, include analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer, fabricator and testing agency.

B. Welding certificates.

C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

D. Mill test reports for structural-steel materials, including chemical and physical properties.
E. Product Test Reports: For the following:
   1. Bolts, nuts, and washers, including mechanical properties and chemical analysis.
   2. Direct-tension indicators.
   3. Tension-control, high-strength, bolt-nut-washer assemblies.
   4. Shear stud connectors.

F. Source quality-control reports.

G. Field quality-control reports.

1.7 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category BU or is accredited by the IAS Fabricator Inspection Program for Structural Steel (Acceptance Criteria 172).

B. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.1/D1.1M.
   1. Welders and welding operators performing work on bottom-flange, demand-critical welds shall pass the supplemental welder qualification testing, as required by AWS D1.8/D1.8M. FCAW-S and FCAW-G shall be considered separate processes for welding personnel qualification.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
   1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

B. Store fasteners in a protected place in sealed containers with manufacturer’s labels intact.
   1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
   2. Clean and relubricate bolts and nuts that become dry or rusty before use.
   3. Comply with manufacturers’ written recommendations for cleaning and lubricating ASTM F3125/F3125M, Grade F1852 bolt assemblies and for retesting bolt assemblies after lubrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with applicable provisions of the following specifications and documents:
   1. ANSI/AISC 303.
   2. ANSI/AISC 341.
3. ANSI/AISC 360.

B. Connection Design Information:
   1. Option 3 and 3B: Design connections and final configuration of member reinforcement at connections in accordance with ANSI/AISC 303 by fabricator's qualified professional engineer.
      a. Use Load and Resistance Factor Design; data are given at factored-load level.

C. Moment Connections: Type PR, partially restrained.

D. Construction: Combined system of braced frame and shear walls.

2.2 STRUCTURAL-STEEL MATERIALS

A. W-Shapes: ASTM A992/A992M.

B. Channels, Angles: ASTM A36/A36M.

C. Plate and Bar: ASTM A36/A36M.

D. Cold-Formed Hollow Structural Sections: ASTM A500/A500M, Grade B structural tubing.

E. Steel Pipe: ASTM A53/A53M, Type E or Type S, Grade B.
   1. Weight Class: Standard.
   2. Finish: Black except where indicated to be galvanized.

F. Steel Castings: ASTM A216/A216M, Grade WCB, with supplementary requirement S11.

G. Steel Forgings: ASTM A668/A668M.

H. Welding Electrodes: Comply with AWS requirements.

2.3 BOLTS AND CONNECTORS

A. High-Strength A325 Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A325, Type 1, heavy-hex steel structural bolts or Grade F1852 tension-control, bolt-nut-washer assemblies with splined ends; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers; all with plain finish.
   1. Direct-Tension Indicators: ASTM F959/F959M, Type 325-1, compressible-washer type with plain finish.

B. High-Strength A490 Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A490, Type 1, heavy-hex steel structural bolts or Grade F2280 tension-control, bolt-nut-washer assemblies with splined ends; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers; all with plain finish.
   1. Direct-Tension Indicators: ASTM F959/F959M, Type 490-1, compressible-washer type with plain finish.
C. Shear Stud Connectors: ASTM A108, AISI C-1015 through C-1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.

2.4 RODS

A. Unheaded Anchor Rods: ASTM F1554, Grade 36, unless noted otherwise.
   4. Washers: ASTM F436, Type 1, hardened carbon steel.
   5. Finish: Plain.

B. Headed Anchor Rods: ASTM F1554, Grade 36, unless noted otherwise.
   4. Washers: ASTM F436, Type 1, hardened carbon steel.
   5. Finish: Plain.

C. Threaded Rods: ASTM A36/A36M.
   2. Washers: ASTM F436, Type 1, hardened carbon steel.
   3. Finish: Plain.

2.5 PRIMER

A. Steel Primer:
   1. Comply with Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."
   2. Fabricator’s standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

2.6 SHRINKAGE-RESISTANT GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.7 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate in accordance with ANSI/AISC 303 and to ANSI/AISC 360.
   1. Camber structural-steel members where indicated.
   2. Fabricate beams with rolling camber up.
   3. Identify high-strength structural steel in accordance with ASTM A6/A6M and maintain markings until structural-steel framing has been erected.
   4. Mark and match-mark materials for field assembly.
5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
   1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.

C. Bolt Holes: Cut, drill, mechanically thermal cut, or punch standard bolt holes perpendicular to metal surfaces.

D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted in accordance with SSPC-SP 1.

F. Shear Stud Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Weld using automatic end welding of headed-stud shear connectors in accordance with AWS D1.1/D1.1M and manufacturer's written instructions.

G. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.
   1. Cut, drill, mechanically thermal cut or punch holes perpendicular to steel surfaces. Do not enlarge holes by burning.
   2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
   3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.8 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for type of bolt and type of joint specified.
   1. Joint Type: Snug tightened.

B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
   1. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in ANSI/AISC 303 for mill material.

2.9 GALVANIZING

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel in accordance with ASTM A123/A123M.
   1. Fill vent and drain holes that are exposed in the finished Work unless they function as weep holes, by plugging with zinc solder and filing off smooth.
   2. Galvanize lintels and shelf angles attached to structural-steel frame and located in exterior walls.
2.10 SHOP PRIMING

A. Shop prime steel surfaces, except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
2. Surfaces to be field welded.
4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
5. Galvanized surfaces.

B. Surface Preparation of Steel: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces in accordance with the following specifications and standards:

1. SSPC-SP 2.

C. Priming: Immediately after surface preparation, apply primer in accordance with manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

2.11 SOURCE QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform shop tests and inspections.

1. Allow testing agency access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
3. Welded Connections: Visually inspect shop-welded connections and test 15 percent of fillet shop-welded connections and 100 percent of complete and partial joint penetration shop-welded connections in accordance with AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
   a. Liquid Penetrant Inspection: ASTM E165/E165M.
   b. Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
   c. Ultrasonic Inspection: ASTM E164.
   d. Radiographic Inspection: ASTM E94/E94M.
4. In addition to visual inspection, test and inspect shop-welded shear stud connectors in accordance with requirements in AWS D1.1/D1.1M for stud welding and as follows:
   a. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear stud connector.
b. Conduct tests in accordance with requirements in AWS D1.1/D1.1M on additional shear stud connectors if weld fracture occurs on shear stud connectors already tested.

5. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

   1. Prepare a certified survey of existing conditions. Include bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated on Drawings.

3.3 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and in accordance with ANSI/AISC 303 and ANSI/AISC 360.


   1. Set plates for structural members on wedges, shims, or setting nuts as required.
   2. Weld plate washers to top of baseplate.
   3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
   4. Promptly pack shrinkage-resistant grout solidly between bearing surfaces and plates, so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for grouting.

C. Maintain erection tolerances of structural steel within ANSI/AISC 303.

D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
1. Level and plumb individual members of structure. Slope roof framing members to slopes indicated on Drawings.
2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.

E. Splice members only where indicated.

F. Do not use thermal cutting during erection unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M.

G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

3.4 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for bolt and joint type specified.

1. Joint Type: Snug tightened.

B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

2. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in ANSI/AISC 303 for mill material.

3.5 REPAIR

A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing, and repair galvanizing to comply with ASTM A780/A780M.

B. Touchup Painting:

1. Immediately after erection, clean exposed areas where primer is damaged or missing, and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

   a. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

2. Cleaning and touchup painting are specified in Section 099113 "Exterior Painting."

C. Touchup Priming: Cleaning and touchup priming are specified in Section 099600 "High-Performance Coatings."

3.6 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a special inspector to perform the following special inspections:
1. Verify structural-steel materials and inspect steel frame joint details.
2. Verify weld materials and inspect welds.
3. Verify connection materials and inspect high-strength bolted connections.

B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

2. Welded Connections: Visually inspect field welds in accordance with AWS D1.1/D1.1M.
   a. In addition to visual inspection, test and inspect 15 percent of fillet field-welded connections and 100 percent of complete and partial joint penetration field-welded connections in accordance with AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
      1) Liquid Penetrant Inspection: ASTM E165/E165M.
      2) Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
      3) Ultrasonic Inspection: ASTM E164.
      4) Radiographic Inspection: ASTM E94/E94M.
   b. In addition to visual inspection, field-welded shear connectors will be inspected and tested according to requirements of AWS D1.1 for stud welding and as follows:
      1) Bend tests will be performed when visual inspections reveal either less than a continuous 360-degree flash or welding repairs to any shear connector.
         a) If two or more shear connectors fail the visual inspection, then all shear connectors on that beam shall have bend tests performed.
      2) Tests will be conducted on additional shear connectors when weld fracture occurs on shear connectors already tested, according to requirements of AWS D1.1.
3. Correct deficiencies in or remove and replace Work that test reports and inspections indicate does not comply with the Contract Documents.
4. Additional testing, at Contractor's expense, will be performed to determine compliance of corrected Work with specified requirements

END OF SECTION 05 12 00
SECTION 05 21 00 - STEEL JOIST FRAMING

PART 1 - GENERAL

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

1.2 SUMMARY
   A. Section Includes:
      3. Steel joist girders.
      4. Steel joist accessories.
   B. Related Requirements:
      1. Section 03 30 00 "Cast-in-Place Concrete" for installing bearing plates in concrete.
      2. Section 05 12 00 "Structural Steel Framing" for field-welded shear connectors.

1.3 DEFINITIONS
   A. SJI's "Specifications": Steel Joist Institute's "Standard Specifications, Load Tables and Weight
      Tables for Steel Joists and Joist Girders."
   B. Special Joists: Steel joists or joist girders requiring modification by manufacturer to support
      nonuniform, unequal, or special loading conditions that invalidate load tables in SJI's
      "Specifications."

1.4 ACTION SUBMITTALS
   A. Product Data: For each type of joist, accessory, and product.
   B. Shop Drawings:
      1. Include layout, designation, number, type, location, and spacing of joists.
      2. Include joining and anchorage details; bracing, bridging, and joist accessories; splice and
         connection locations and details; and attachments to other construction.

1.5 INFORMATIONAL SUBMITTALS
   A. Qualification Data: For manufacturer.
   B. Welding certificates.
C. Manufacturer certificates.

D. Mill Certificates: For each type of bolt.

E. Comprehensive engineering analysis of special joists signed and sealed by the qualified professional engineer responsible for its preparation.

F. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer certified by SJI to manufacture joists complying with applicable standard specifications and load tables in SJI's "Specifications."

1. Manufacturer’s responsibilities include providing professional engineering services for designing special joists to comply with performance requirements.

B. Welding Qualifications: Qualify field-welding procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle joists as recommended in SJI's "Specifications."

B. Protect joists from corrosion, deformation, and other damage during delivery, storage, and handling.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide special joists and connections capable of withstanding design loads indicated on Drawings.

1. Use ASD; data are given at service-load level.
2. Design special joists to withstand design loads with live-load deflections no greater than the following:

   a. Floor Joists: Vertical deflection of 1/360 of the span.

2.2 STEEL JOISTS


3. Top-Chord Extensions: Extend top chords of joists with SJI's Type S top-chord extensions where indicated on Drawings, complying with SJI's "Specifications."

4. Extended Ends: Extend bearing ends of joists with SJI's Type R extended ends where indicated on Drawings, complying with SJI's "Specifications."

5. Camber joists according to SJI's "Specifications."

6. Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes if joist slope exceeds 1/4 inch per 12 inches.

2.3 STEEL JOIST GIRDERS

A. Manufactured joist girders according to "Standard Specification for Joist Girders" in SJI's "Specifications," with steel-angle top- and bottom-chord members; with end and top-chord arrangements as follows:

2. Top-Chord Arrangement: Parallel.
3. Camber joist girders according to SJI's "Specifications."
4. Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes if joist slope exceeds 1/4 inch per 12 inches.

2.4 PRIMERS

A. Primer:

1. Provide shop primer that complies with Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

2.5 STEEL JOIST ACCESSORIES

A. Bridging:

1. Schematically indicated. Detail and fabricate according to SJI's "Specifications." Furnish additional erection bridging if required for stability.

B. Furnish ceiling extensions, either extended bottom-chord elements or a separate extension unit of enough strength to support ceiling construction.

1. Extend ends to within 1/2 inch of finished wall surface unless otherwise indicated on Drawings.
2. Finish: Plain, uncoated.

C. High-Strength Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A325, Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers.

1. Finish: Plain.

D. Welding Electrodes: Comply with AWS standards.
E. Furnish miscellaneous accessories including splice plates and bolts required by joist manufacturer to complete joist assembly.

2.6 CLEANING AND SHOP PAINTING

A. Clean and remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories by hand-tool cleaning, SSPC-SP 2 or power-tool cleaning, SSPC-SP 3.

B. Shop priming of joists and joist accessories is specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting substrates, embedded bearing plates, and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Do not install joists until supporting construction is in place and secured.

B. Install joists and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Specifications," joist manufacturer's written instructions, and requirements in this Section.

1. Before installation, splice joists delivered to Project site in more than one piece.
2. Space, adjust, and align joists accurately in location before permanently fastening.
3. Install temporary bracing and erection bridging, connections, and anchors to ensure that joists are stabilized during construction.
4. Delay rigidly connecting bottom-chord extensions to columns or supports until dead loads are applied.

C. Field weld joists to supporting steel bearing plates and framework. Coordinate welding sequence and procedure with placement of joists. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

D. Bolt joists to supporting steel framework using carbon-steel bolts.

E. Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams.

3.3 REPAIRS

A. Touchup Painting:
1. Cleaning and touchup painting are specified in Section 099113 “Exterior Painting” and Section 099123 “Interior Painting.”

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Visually inspect field welds according to AWS D1.1/D1.1M.

1. In addition to visual inspection, test field welds according to AWS D1.1/D1.1M and the following procedures, at testing agency’s option:
   a. Liquid Penetrant Inspection: ASTM E165/E165M.
   b. Magnetic Particle Inspection: ASTM E709.

C. Visually inspect bolted connections.

D. Prepare test and inspection reports.

END OF SECTION 05 21 00
SECTION 05 31 00 - STEEL DECKING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Roof deck.
2. Acoustical roof deck.
3. Composite floor deck.

B. Related Requirements:

1. Section 03 30 00 "Cast-in-Place Concrete" for normal-weight and lightweight structural concrete fill over steel deck.
2. Section 05 12 00 "Structural Steel Framing" for shop- and field-welded shear connectors.
3. Section 05 50 00 "Metal Fabrications" for framing deck openings with miscellaneous steel shapes.
5. Section 09 91 23 "Interior Painting" for repair painting of primed deck and finish painting of deck.

1.3 ACTION SUBMITTALS

A. Product Data: For the following:

1. Roof deck.
2. Acoustical roof deck.
3. Composite floor deck.

B. Shop Drawings:

1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

1.4 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Product Certificates: For each type of steel deck.
C. Product Test Reports: For tests performed by a qualified testing agency, indicating that each of
the following complies with requirements:
   1. Power-actuated mechanical fasteners.
   2. Acoustical roof deck.

D. Research Reports: For steel deck, from ICC-ES.

E. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM E329 for testing indicated.

B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3/D1.3M,
"Structural Welding Code - Sheet Steel."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and
handling.

B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof
covering and ventilate to avoid condensation.
   1. Protect and ventilate acoustical cellular roof deck with factory-installed insulation to
      maintain insulation free of moisture.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to
AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

B. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency.
Identify products with appropriate markings of applicable testing agency.
   1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of
      another qualified testing agency.

2.2 ROOF DECK

A. Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI
Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the
following:

   1. Prime-Painted Steel Sheet: ASTM A1008/A1008M, Structural Steel (SS), Grade 33
      minimum, shop primed with manufacturer's standard baked-on, rust-inhibitive primer.
2.3 ACOUSTICAL ROOF DECK

A. Acoustical Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with “SDI Specifications and Commentary for Steel Roof Deck,” in SDI Publication No. 31, and with the following:

1. Prime-Painted Steel Sheet: ASTM A1008/A1008M, Structural Steel (SS), Grade 33 minimum, shop primed with manufacturer's standard baked-on, rust-inhibitive primer.

   b. Deck Profile: As indicated.
   c. Profile Depth: As indicated.
   d. Design Uncoated-Steel Thickness: As indicated.
   e. Span Condition: Triple span or more.
   f. Side Laps: Overlapped or interlocking seam at Contractor's option.
   g. Acoustical Perforations: Deck units with manufacturer's standard perforated vertical webs.
   h. Sound-Absorbing Insulation: Manufacturer's standard premolded roll or strip of glass or mineral fiber.
   i. Acoustical Performance: NRC 0.65, tested according to ASTM C423.

2.4 COMPOSITE FLOOR DECK

A. Composite Floor Deck: Fabricate panels, with integrally embossed or raised pattern ribs and interlocking side laps, to comply with “SDI Specifications and Commentary for Composite Steel Floor Deck,” in SDI Publication No. 31, with the minimum section properties indicated, and with the following:

1. Galvanized-Steel Sheet: ASTM A653/A653M, Structural Steel (SS), Grade 50, G30 zinc coating.

2. Profile Depth: As indicated.
3. Design Uncoated-Steel Thickness: As indicated.
4. Span Condition: Triple span or more.
5. Side Laps: Overlapped or interlocking seam at Contractor's option.

2.5 NONCOMPOSITE FORM DECK

A. Noncomposite Form Deck: Fabricate ribbed-steel sheet noncomposite form-deck panels to comply with “SDI Specifications and Commentary for Noncomposite Steel Form Deck,” in SDI Publication No. 31, with the minimum section properties indicated, and with the following:

1. Uncoated Steel Sheet: ASTM A1008/A1008M, Structural Steel (SS), Grade 60 minimum.
2. Profile Depth: As indicated.
3. Design Uncoated-Steel Thickness: As indicated.
4. Span Condition: Triple span or more.
5. Side Laps: Overlapped or interlocking seam at Contractor's option.

2.6 ACCESSORIES

A. Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.

B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.

C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.

D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.

E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.

F. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi, of same material and finish as deck, and of thickness and profile recommended by SDI Publication No. 31 for overhang and slab depth.

G. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck unless otherwise indicated.

H. Piercing Hanger Tabs: Piercing steel sheet hanger attachment devices for use with floor deck.

I. Weld Washers: Uncoated steel sheet, shaped to fit deck rib, 0.0598 inch thick, with factory-punched hole of 3/8-inch minimum diameter.

J. Flat Sump Plates: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck. For drains, cut holes in the field.

K. Galvanizing Repair Paint: ASTM A780/A780M.

L. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.
3.2 INSTALLATION, GENERAL

A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 31, manufacturer's written instructions, and requirements in this Section.

B. Install temporary shoring before placing deck panels if required to meet deflection limitations.

C. Locate deck bundles to prevent overloading of supporting members.

D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.
   1. Align cellular deck panels over full length of cell runs and align cells at ends of abutting panels.

E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.

F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.

G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.

H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

3.3 INSTALLATION OF ROOF DECK

A. Fasten roof-deck panels to steel supporting members by mechanical fasteners as indicated.

B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of one-half of the span or 18 inches, and as follows:
   1. Mechanically fasten with self-drilling, No. 10 diameter or larger, carbon-steel screws.
   2. Mechanically clinch.

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:
   1. End Joints: Lapped 2 inches minimum or butted at Contractor's option.

D. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and mechanically fasten flanges to top of deck. Space mechanical fasteners not more than 12 inches apart with at least one fastener at each corner.
   1. Install reinforcing channels or zees in ribs to span between supports and mechanically fasten.
E. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Mechanically fasten to substrate to provide a complete deck installation.

1. Weld cover plates at changes in direction of roof-deck panels unless otherwise indicated.

F. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.

G. Sound-Absorbing Insulation: Installation into topside ribs of deck.

3.4 INSTALLATION OF FLOOR DECK

A. Fasten floor-deck panels to steel supporting members by mechanical fasteners as indicated.

B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of one-half of the span or 36 inches, and as follows:

1. Mechanically fasten with self-drilling, No. 10 diameter or larger, carbon-steel screws.
2. Mechanically clinch.

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches for noncomposite deck and 2 inches for composite deck, with end joints as follows:

1. End Joints: Lapped or butted at Contractor's option.

D. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations unless otherwise indicated.

E. Floor-Deck Closures: Weld steel sheet column closures, cell closures, and Z-closures to deck, according to SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of deck.

3.5 REPAIR

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A780/A780M and manufacturer's written instructions.

B. Repair Painting:

1. Wire brushing, cleaning, and repair painting of rust spots, welds, and abraded areas of both deck surfaces are included in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

3.6 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Field welds will be subject to inspection.
C. Prepare test and inspection reports.

END OF SECTION 05 31 00
SECTION 05 40 00 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
1. Exterior non-load-bearing wall framing.
2. Interior non-load-bearing wall framing.
3. Roof rafter framing.
4. Soffit framing.

B. Related Requirements:
1. Section 05 50 00 "Metal Fabrications" for miscellaneous steel shapes, masonry shelf angles, and connections used with cold-formed metal framing.

1.3 ACTION SUBMITTALS

A. Product Data: For the following:
1. Cold-formed steel framing materials.
2. Exterior non-load-bearing wall framing.
3. Interior non-load-bearing wall framing.
4. Vertical deflection clips.
5. Single deflection track.
6. Double deflection track.
7. Drift clips.
8. Roof-rafter framing.
12. Sill sealer gasket.

B. Shop Drawings:
1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.
3. Shop Drawings shall be signed and sealed by a qualified professional engineer licensed in the state of Missouri.

C. Delegated-Design Submittal: For cold-formed steel framing.
1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Welding certificates.

C. Product Certificates: For each type of code-compliance certification for studs and tracks.

D. Product Test Reports: For each listed product, for tests performed by manufacturer and witnessed by a qualified testing agency.
   1. Steel sheet.
   2. Expansion anchors.
   4. Mechanical fasteners.
   5. Vertical deflection clips.
   6. Horizontal drift deflection clips
   7. Miscellaneous structural clips and accessories.

E. Research Reports:
   1. For nonstandard cold-formed steel framing post-installed anchors and power-actuated fasteners, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM E329 for testing indicated.

B. Product Tests: Mill certificates or data from a qualified independent testing agency, or in-house testing with calibrated test equipment, indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.

C. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Certified Steel Stud Association the Steel Framing Industry Association or the Steel Stud Manufacturers Association.

D. Welding Qualifications: Qualify procedures and personnel according to the following:
   1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design cold-formed steel framing.
B. Structural Performance: Provide cold-formed steel framing capable of withstanding design loads within limits and under conditions indicated.

1. Design Loads: As indicated on Drawings.
2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
   a. Exterior Non-Load-Bearing Wall Framing: Horizontal deflection of 1/240 of the wall height.
   b. Exterior Non-Load-Bearing Wall Framing with Brick Veneer: Horizontal deflection of 1/600 of the wall height.
   c. Interior Non-Load-Bearing Framing: Horizontal deflection of 1/240 of the wall height under a horizontal load of 5 lbf/sq. ft.
   d. Roof Rafter Framing: Vertical deflection of 1/240 1/360 of the horizontally projected span for live loads.
3. Design framing systems to provide for movement of framing members located outside the insulated building envelope without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F.
4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:
   a. Upward and downward movement of 1-1/2 inches.
5. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.

C. Cold-Formed Steel Framing Standards: Unless more stringent requirements are indicated, framing shall comply with AISI S100, AISI S200, and the following:

2. Wall Studs: AISI S211.
3. Headers: AISI S212.

D. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL’s "Fire Resistance Directory" or from the listings of another qualified testing agency acceptable to authorities having jurisdiction.

2.2 COLD-FORMED STEEL FRAMING MATERIALS

A. Steel Sheet: ASTM A1003/A1003M, Structural Grade, Type H, metallic coated, of grade and coating designation as follows:

1. Grade: As required by structural performance.
2. Coating: G60, A60, AZ50, or GF30.

B. Steel Sheet for Vertical Deflection and Drift Clips: ASTM A653/A653M, structural steel, zinc coated, of grade and coating as follows:
1. Grade: As required by structural performance.
2. Coating: G60.

2.3 EXTERIOR NON-LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
   1. Minimum Base-Metal Thickness: 0.0428 inch.
   2. Flange Width: As required.

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:
   1. Minimum Base-Metal Thickness: Matching steel studs.
   2. Flange Width: As required.

C. Vertical Deflection Clips: Manufacturer's standard bypass clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.

D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:
   1. Minimum Base-Metal Thickness: 0.0428 inch.
   2. Flange Width: As required.

E. Double Deflection Tracks: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.
   1. Outer Track: Of web depth to allow free vertical movement of inner track, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:
      a. Minimum Base-Metal Thickness: 0.0428 inch.
      b. Flange Width: As required.
   2. Inner Track: Of web depth indicated, and as follows:
      a. Minimum Base-Metal Thickness: 0.0428 inch.
      b. Flange Width: As required.

F. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure through positive mechanical attachment to stud web and structure.

2.4 INTERIOR NON-LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
1. Minimum Base-Metal Thickness: 0.0329 inch.
2. Flange Width: As required.

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:
   1. Minimum Base-Metal Thickness: Matching steel studs.
   2. Flange Width: As required.

C. Vertical Deflection Clips: Manufacturer's standard head clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.

D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:
   1. Minimum Base-Metal Thickness: 0.0428 inch.
   2. Flange Width: As required.

E. Double Deflection Tracks: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.
   1. Outer Track: Of web depth to allow free vertical movement of inner track, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:
      a. Minimum Base-Metal Thickness: 0.0329 inch.
      b. Flange Width: As required.
   2. Inner Track: Of web depth indicated, and as follows:
      a. Minimum Base-Metal Thickness: 0.0428 inch.
      b. Flange Width: As required.

F. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure through positive mechanical attachment to stud web and structure.

2.5 ROOF-RAFTER FRAMING

A. Steel Rafters: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:
   1. Minimum Base-Metal Thickness: 0.0428 inch.
   2. Flange Width: As required.

2.6 SOFFIT FRAMING

A. Exterior Soffit Frame: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:
1. Minimum Base-Metal Thickness: 0.0428 inch.
2. Flange Width: As required.

2.7 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from ASTM A1003/A1003M, Structural Grade, Type H, metallic coated steel sheet, of same grade and coating designation used for framing members.

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:

1. Supplementary framing.
2. Bracing, bridging, and solid blocking.
3. Web stiffeners.
4. Anchor clips.
5. End clips.
6. Foundation clips.
7. Gusset plates.
9. Joist hangers and end closures.

2.8 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A36/A36M, zinc coated by hot-dip process according to ASTM A123/A123M.

B. Anchor Bolts: ASTM F1554, Grade 36, threaded carbon-steel hex-headed bolts, carbon-steel nuts, and flat, hardened-steel washers; zinc coated by mechanically deposition according to ASTM B695, Class 50.

C. Post-Installed Anchors: Fastener systems with bolts of same basic metal as fastened metal, if visible, unless otherwise indicated; with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01, ICC-ES AC193, ICC-ES AC58 or ICC-ES AC308 as appropriate for the substrate.

1. Uses: Securing cold-formed steel framing to structure.
2. Type: Torque-controlled expansion anchor or adhesive anchor.
3. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941, Class Fe/Zn 5, unless otherwise indicated.

D. Power-Actuated Anchors: Fastener systems with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

E. Mechanical Fasteners: ASTM C1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.

1. Head Type: Low-profile head beneath sheathing; manufacturer's standard elsewhere.

F. Welding Electrodes: Comply with AWS standards.
2.9 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: ASTM A780/A780M, MIL-P-21035B or SSPC-Paint 20.

B. Cement Grout: Portland cement, ASTM C150/C150M, Type I; and clean, natural sand, ASTM C404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.

C. Nonmetallic, Nonshrink Grout: Factory-packaged, nonmetallic, noncorrosive, nonstaining grout, complying with ASTM C1107/C1107M, and with a fluid consistency and 30-minute working time.

D. Shims: Load-bearing, high-density, multimonomer, nonleaching plastic; or cold-formed steel of same grade and metallic coating as framing members supported by shims.

E. Sill Sealer Gasket: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members as required.

2.10 FABRICATION

A. Fabricate cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.

1. Fabricate framing assemblies using jigs or templates.
2. Cut framing members by sawing or shearing; do not torch cut.
3. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.
   a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
   b. Locate mechanical fasteners and install according to Shop Drawings, with screws penetrating joined members by no fewer than three exposed screw threads.
4. Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.

B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies by means that prevent damage or permanent distortion.

C. Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable variation of 1/8 inch in 10 feet and as follows:

1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8 inch.
3.1 EXAMINATION
A. Examine substrates, areas, conditions, and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION
A. Install sill sealer gasket at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

3.3 INSTALLATION, GENERAL
A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.
B. Install cold-formed steel framing according to AISI S200, AISI S202, and manufacturer's written instructions unless more stringent requirements are indicated.
C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.
   1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.
D. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.
   1. Cut framing members by sawing or shearing; do not torch cut.
   2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
      a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
      b. Locate mechanical fasteners, install according to Shop Drawings, and comply with requirements for spacing, edge distances, and screw penetration.
E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.
F. Install temporary bracing and supports to secure framing and support loads equal to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
G. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.
H. Install insulation, specified in Section 072100 "Thermal Insulation," in framing-assembly members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.

I. Fasten hole-reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.

### 3.4 INSTALLATION OF EXTERIOR NONLOADBEARING WALL FRAMING

A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure.

B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:

1. Stud Spacing: As indicated on Shop Drawings.

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.

D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.

1. Connect vertical deflection clips to bypassing studs and anchor to building structure.
2. Connect drift clips to cold-formed steel framing and anchor to building structure.

E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.

1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
2. Strap Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
3. Bar Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

F. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.

1. Install solid blocking at centers indicated on Shop Drawings.

G. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

### 3.5 INSTALLATION OF INTERIOR NONLOADBEARING WALL FRAMING

A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure.

B. Fasten both flanges of studs to bottom track unless otherwise indicated. Space studs as follows:
1. **Stud Spacing:** As indicated on Shop Drawings.

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.

D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.

1. Install single deep-leg deflection tracks and anchor to building structure.
2. Install double deep-leg deflection tracks and anchor outer track to building structure.

E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.

1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
2. Strap Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
3. Bar Bridging: Proprietary bridging bars installed according to manufacturer’s written instructions.

F. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 18 inches of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.

1. Install solid blocking at centers indicated on Shop Drawings.

G. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

### 3.6 INSTALLATION OF JOIST FRAMING

A. Install perimeter joist track sized to match joists. Align and securely anchor or fasten track to supporting structure at corners, ends, and spacings indicated on Shop Drawings.

B. Install joists bearing on supporting frame, level, straight, and plumb; adjust to final position, brace, and reinforce. Fasten joists to both flanges of joist track.

1. Install joists over supporting frame with a minimum end bearing of 1-1/2 inches.
2. Reinforce ends and bearing points of joists with web stiffeners, end clips, joist hangers, steel clip angles, or steel-stud sections.

C. Space joists not more than 2 inches from abutting walls, and as follows:

1. **Joist Spacing:** As indicated on Shop Drawings.

D. Frame openings with built-up joist headers, consisting of joist and joist track or another combination of connected joists if indicated.

E. Install joist reinforcement at interior supports with single, short length of joist section located directly over interior support, with lapped joists of equal length to joist reinforcement.
1. Install web stiffeners to transfer axial loads of walls above.

F. Install bridging at intervals indicated on Shop Drawings. Fasten bridging at each joist intersection as follows:
   1. Combination Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and joist-track solid blocking of width and thickness indicated. Fasten flat straps to bottom flange of joists and secure solid blocking to joist webs.

G. Secure joists to load-bearing interior walls to prevent lateral movement of bottom flange.

H. Install miscellaneous joist framing and connections, including web stiffeners, closure pieces, clip angles, continuous angles, hold-down angles, anchors, and fasteners, to provide a complete and stable joist-framing assembly.

3.7 INSTALLATION TOLERANCES

A. Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

   1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.8 REPAIR

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A780/A780M and manufacturer's written instructions.

3.9 FIELD QUALITY CONTROL

A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Field and shop welds will be subject to testing and inspecting.

C. Testing agency will report test results promptly and in writing to Contractor and Architect.

D. Cold-formed steel framing will be considered defective if it does not pass tests and inspections.

E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.10 PROTECTION

A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 05 40 00
SECTION 05 50 00
METAL FABRICATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Shop fabricated steel items, including:
   1. Lintels.
   2. Bollards.
B. Downspout boots.

1.02 RELATED REQUIREMENTS
A. Section 03 45 00 - Precast Architectural Concrete: Placement of metal fabrication in precast architectural concrete.
B. Section 04 20 00 - Unit Masonry: Placement of metal fabrications in masonry.
C. Section 05 12 00 - Structural Steel Framing: Structural steel column anchor bolts.
D. Section 05 21 00 - Steel Joist Framing: Structural joist bearing plates, including anchorage.
E. Section 05 31 00 - Steel Decking: Bearing plates for metal deck bearing, including anchorage.
F. Section 05 51 00 - Metal Stairs.
G. Section 05 52 14 - Handrails and Railings.
H. Section 09 91 13 - Exterior Painting: Paint finish.
I. Section 09 91 23 - Interior Painting: Paint finish.

1.03 REFERENCE STANDARDS
G. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2013.
I. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 1999 (Ed. 2004).

1.04 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
C. Welders’ Certificates: Submit certification for welders employed on the project, verifying AWS qualification within the previous 12 months.
PART 2 PRODUCTS

2.01 MATERIALS - STEEL
A. Steel Sections: ASTM A 36/A 36M.
B. Steel Tubing: ASTM A 500, Grade B cold-formed structural tubing.
C. Plates: ASTM A 283.
E. Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, galvanized to ASTM A 153/A 153M where connecting galvanized components.
F. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
G. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
H. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.02 FABRICATION
A. Fit and shop assemble items in largest practical sections, for delivery to site.
B. Fabricate items with joints tightly fitted and secured.
C. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
D. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.03 FABRICATED ITEMS
A. Bollards: Steel pipe, concrete filled, crowned cap, as detailed; prime paint finish.
B. Lintels: As detailed; galvanized finish.

2.04 DOWNSPOUT BOOTS
A. Downspout Boots: Smooth interior without boxed corners or choke points; include integral lug slots, integral cleanout, cleanout cover, and tamper proof fasteners.
   2. Material: Cast iron; ASTM A48/A48M; casting thickness 3/8 inch (9.5 mm), minimum.
   3. Finish: Manufacturer's standard factory applied powder coat finish.
   4. Color: To be selected by Architect from manufacturer's custom range.
   5. Accessories: Manufacturer's standard stainless steel fasteners, stainless steel building wall anchors, integral neoprene gaskets, and rubber coupling.
   6. Manufacturers:
      b. Substitutions: See Section 01 60 00 - Product Requirements.

2.05 FINISHES - STEEL
A. Prime paint all steel items.
   1. Exceptions: Galvanize items to be embedded in concrete or masonry.
B. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
C. Prime Painting: One coat.
D. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A123/A123M requirements.
2.06 FABRICATION TOLERANCES
   A. Squareness: 1/8 inch maximum difference in diagonal measurements.
   B. Maximum Offset Between Faces: 1/16 inch.
   C. Maximum Misalignment of Adjacent Members: 1/16 inch.
   D. Maximum Bow: 1/8 inch in 48 inches.
   E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION

3.01 EXAMINATION
   A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION
   A. Clean and strip primed steel items to bare metal where site welding is required.
   B. Supply setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.03 INSTALLATION
   A. Install items plumb and level, accurately fitted, free from distortion or defects.
   B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
   C. Field weld components indicated on drawings.
   D. Perform field welding in accordance with AWS D1.1/D1.1M.
   E. Obtain approval prior to site cutting or making adjustments not scheduled.
   F. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized.

3.04 TOLERANCES
   A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
   B. Maximum Offset From True Alignment: 1/4 inch.

END OF SECTION
SECTION 05 51 00
METAL STAIRS

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Stairs with concrete treads.
B. Stairs with precast concrete treads.
C. Structural steel stair framing and supports.
D. Handrails and guards.

1.02 RELATED REQUIREMENTS
A. Section 03 30 00 - Cast-in-Place Concrete: Concrete fill in stair pans; mesh reinforcement for landings.
B. Section 03 45 00 - Precast Architectural Concrete: Placement of metal fabrications in concrete.
C. Section 05 50 00 - Metal Fabrications.
D. Section 05 73 00 - Decorative Railings: Glass guardrails other than specified in this section.
E. Section 09 91 23 - Interior Painting: Paint finish.

1.03 REFERENCE STANDARDS
G. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2013.
L. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2012.
1.04 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories.
   1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
C. Welders’ Certificates.
D. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is certified under AISC 201.

1.05 QUALITY ASSURANCE
A. Welder Qualifications: Show certification of welders employed on the Work, verifying AWS qualification within the previous 12 months.
B. Fabricator Qualifications:
   1. A qualified steel fabricator that is certified by the American Institute for Steel Construction (AISC) under AISC 201.
   2. A company specializing in manufacturing products specified in this section, with not less than ten years of documented experience.

PART 2 PRODUCTS
2.01 METAL STAIRS - GENERAL
A. Their are two separate types of stair systems:
   1. One decorative stair with Precast Architectural Concrete treads, Glass Guardrail system with the structure wrapped with gypsum board.
   2. One egress stair with concrete filled pan treads with steel picket type gurdrails.
   3. Specifications below may pertain to one or both types of stairs. See details indicated on the drawings to clarify design intent.
B. Metal Stairs: Provide stairs of the design specified, complete with landing platforms, vertical and horizontal supports, railings, and guards, fabricated accurately for anchorage to each other and to building structure.
   1. Regulatory Requirements: Provide stairs and railings complying with the most stringent requirements of local, state, and federal regulations; where requirements of the contract documents exceed those of regulations, comply with the contract documents.
   2. Handrails: Comply with applicable accessibility requirements of ADA Standards.
   3. Dimensions: As indicated on drawings.
   4. Shop assemble components; disassemble into largest practical sections suitable for transport and access to site.
   5. No sharp or rough areas on exposed travel surfaces and surfaces accessible to touch.
   6. Separate dissimilar metals using paint or permanent tape.
C. Metal Jointing and Finish Quality Levels: Where exposed.
   1. Architectural: All joints as inconspicuous as possible, whether welded or mechanical.
      a. Welded Joints: Continuously welded and ground smooth and flush.
      b. Mechanical Joints: Butted tight, flush, and hairline; concealed fastenings only.
      c. Exposed Edges and Corners: Eased to small uniform radius.
      d. Metal Surfaces to be Painted: Sanded or ground smooth, suitable for highest quality gloss finish.
D. Fasteners: Same material or compatible with materials being fastened; type consistent with design and specified quality level.
E. Anchors and Related Components: Same material and finish as item to be anchored, except where specifically indicated otherwise; provide all anchors and fasteners required.
2.02 METAL STAIRS WITH CONCRETE TREADS

A. Jointing and Finish Quality Level: Architectural, as defined above.

B. Risers: Closed.

C. Treads: Metal pan with field-installed concrete fill.
   1. Tread shape configuration to match the drawings.
   2. Concrete Depth: 3 inches, minimum over 1 1/2 inches concrete filled tread.
   3. Precast Concrete Treads:
      a. Concrete Strength: 5,000 psi at 28 days, minimum.
      b. Air Content: 4 to 6 percent.
      c. Cement Color: As indicated on the drawings.
      d. Aggregate Color: As required to make finished product match Architect's sample.
      e. Abrasive Strip: Contrasting color, embedded into surface 1/2 inch back of point of nosing.
      f. Anchorage to Tread Pan: Epoxy adhesive.
   5. Tread Pan Thickness: As required by design; 14 gage, 0.075 inch minimum.
   6. Pan Anchorage to Stringers: Welded to carrier angles welded to stringers.
   7. Concrete Reinforcement: Welded wire mesh.
   8. Concrete Finish: Sealed Concrete.

D. Treads: Metal pan with field-installed concrete fill.
   1. Tread shape configuration to match the drawings.
   2. Concrete Depth: 1 1/2 inches, minimum.
   3. Tread Pan Material: Steel sheet.
   4. Tread Pan Thickness: As required by design; 14 gage, 0.075 inch minimum.
   5. Pan Anchorage to Stringers: Welded or bolted to carrier angles welded or bolted to stringers.
   6. Concrete Reinforcement: None.
   7. Concrete Finish: Sealed Concrete.

E. Risers: Same material and thickness as tread pans.
   1. Riser configuration will be different for the two separate types of stair.
   2. Nosing Depth: Not more than 1-1/2 inch overhang.
   3. Riser shape configuration to match the drawings.
   4. Nosing Return: Flush with top of concrete fill, not more than 1/2 inch wide at concrete filled stair.

F. Stringers: Rolled Steel Channel or Tube Steel.
   1. Stringer Depth: As indicated on drawings.
   2. End Closure - where exposed to view: Steel plate of same thickness as stringer welded across ends. Grind corners to match appearance of steel stringer edges.

G. Landings: Similar construction, using corrugated steel decking, supported and reinforced as required to achieve design load capacity. Provide precast architectural concrete over on decorative stair - match treads.

H. Railings: Steel pipe railings.

I. Finish: Shop- or factory-prime painted. Field paint exposed areas as indicated on the finish schedule.

J. Under Side of Stair: Exposed to view, to be finished same as specified for other exposed to view surfaces.

2.03 HANDRAILS AND GUARDS

A. Wall-Mounted Rails: Round pipe or tube rails unless otherwise indicated.
   1. Outside Diameter: 1-1/4 inch, minimum, to 1-1/2 inches, maximum.

B. Glass Guardrails: Glass guards as specified in Section 05 73 00.
C. Guards:
1. Top Rails: Round pipe or tube rails unless otherwise indicated.
   a. Outside Diameter: 1-1/4 inch, minimum, to 1-1/2 inches, maximum.
2. Infill at Picket Railings: Vertical pickets.
   a. Horizontal Spacing: Maximum 4 inches on center.
   b. Material: Solid steel bar.
   c. Shape: Round.
   d. Size: 1/2 inch diameter.
   e. Top Mounting: Welded to underside of top rail.
   f. Bottom Mounting: Welded to top of bottom rail.
3. Railings: Railings as detailed.
4. Bottom Rails: Round pipe or tube rails unless otherwise indicated.
   a. Outside Diameter: 1 inch, minimum, to 1 1/4 inches, maximum.
5. End and Intermediate Posts: As detailed.
   a. Horizontal Spacing: As indicated on drawings.
   b. Mounting: Welded to top surface of stringer.
6. Finish:
   a. Interior locations - Prime and Paint.
   b. Exterior locations - Galvanized - Prime and Paint.

2.04 MATERIALS
A. Steel Sections: ASTM A36/A36M.
B. Steel Tubing: ASTM A500/A500M or ASTM A501/A501M structural tubing, round and shapes as indicated.
C. Steel Plates: ASTM A6/A6M or ASTM A283/A283M.
E. Ungalvanized Steel Sheet: Hot- or cold-rolled, except use cold-rolled where finished work will be exposed to view.
   1. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, Designation CS (commercial steel).
   2. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Designation CS (commercial steel).
F. Concrete Fill: Type specified in Section 03 30 00.
G. Precast Architectural Concrete: Type specified in Section 03 45 00.
H. Concrete Reinforcement: Mesh type as detailed, galvanized at precast architectural concrete.
I. Concrete Reinforcement: None required at concrete filled pans.

2.05 ACCESSORIES
A. Steel Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, and galvanized to ASTM A153/A153M where connecting galvanized components.
B. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
C. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
D. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.06 SHOP FINISHING
A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
B. Do not prime surfaces in direct contact with concrete or where field welding is required.
C. Prime Painting: Use specified shop- and touch-up primer.
   1. Preparation of Steel: In accordance with SSPC-SP 2, Hand Tool Cleaning.
   2. Number of Coats: One.
D. Galvanizing: Hot-dip galvanize to minimum requirements of ASTM A123/A123M.
   1. Touch up abraded areas after fabrication using specified touch-up primer for galvanized surfaces.

PART 3 EXECUTION

3.01 EXAMINATION
   A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION
   A. When field welding is required, clean and strip primed steel items to bare metal.

3.03 INSTALLATION
   A. Install components plumb and level, accurately fitted, free from distortion or defects.
   B. Provide anchors, plates, angles, hangers, and struts required for connecting stairs to structure.
   C. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
   D. Provide welded field joints where specifically indicated on drawings. Perform field welding in accordance with AWS D1.1/D1.1M.
   E. Other field joints may be either welded or bolted provided the result complies with the limitations specified for jointing quality levels.
   F. Obtain approval prior to site cutting or creating adjustments not scheduled.
   G. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

3.04 TOLERANCES
   A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
   B. Maximum Offset From True Alignment: 1/4 inch.

3.05 SCHEDULES
   A. Stair 1: Precast Concrete Concrete treads and landings over Concrete-filled pans and deck.
      1. Decorative Glass guardrails.
   B. Stairs 2, 3 and 4: Concrete-filled pan treads and landings, primed finish - field painted.
      1. Metal picket guardrails - prime and paint.
   C. Stair 5: Concrete stair treads, risers and landings - See Structural drawings.
      1. Galvanized metal picket guardrails - prime and paint.

END OF SECTION
SECTION 05 51 33
METAL LADDERS

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Shop-fabricated metal ladders.
B. Prefabricated ladders.
C. Prefabricated ship ladders.

1.02 REFERENCE STANDARDS
K. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2012.
M. AWS D1.2/D1.2M - Structural Welding Code - Aluminum; 2014, with Errata.
N. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel; 2017.
O. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 1999 (Ed. 2004).

1.03 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide manufacturer's data sheets on each ladder safety system product to be used, including installation instructions.
C. Shop Drawings:
   1. Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
   2. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
D. Welders’ Certificates: Submit certification for welders employed on the project, verifying AWS qualification within the previous 12 months.

E. Fabricator’s Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.

1.04 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified steel fabricator that is accredited by IAS AC172.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

A. Steel Sections: ASTM A36/A36M.
B. Steel Tubing: ASTM A501/A501M hot-formed structural tubing.
C. Plates: ASTM A283/A283M.
F. Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, plain.
G. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
H. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
I. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.02 MATERIALS - ALUMINUM

A. Extruded Aluminum: ASTM B211/B211M, 6063 alloy, T6 temper.
B. Aluminum-Alloy Drawn Seamless Tubes: ASTM B210/B210M, 6063 alloy, T6 temper.
C. Aluminum-Alloy Bars: ASTM B211/B211M, 6061 alloy, T6 temper.
D. Bolts, Nuts, and Washers: Stainless steel.
E. Welding Materials: AWS D1.2/D1.2M; type required for materials being welded.

2.03 FABRICATION

A. Fit and shop assemble items in largest practical sections, for delivery to site.
B. Fabricate items with joints tightly fitted and secured.
C. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
D. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.04 FABRICATED LADDERS

A. Ladders: Steel; in compliance with ANSI A14.3; with mounting brackets and attachments; galvanized finish.
   1. Side Rails: 3/8 by 2 2 1/2 inches members spaced at 20 inches.
   2. Rungs: One inch diameter solid round bar spaced 12 inches on center.
   3. Space rungs 7 inches from wall surface.
   4. See drawings for ladder at elevator.

2.05 PREFABRICATED LADDERS

A. Prefabricated Ladder: Welded metal unit complying with ANSI A14.3; factory fabricated to greatest degree practical and in the largest components possible.
   1. Components: Manufacturer’s standard rails, rungs, handrails and returns complying with the requirements of the MATERIALS article of this section.
4. Manufacturers:
   c. or equal.
   d. See drawings for ladder on the roof.

B. Prefabricated Ship Ladder: Welded metal unit complying with ANSI A14.3; factory fabricated to greatest degree practical and in the largest components possible.
1. Components: Manufacturer's standard rails, rungs, treads, handrails, returns, platforms and safety devices complying with the requirements of the MATERIALS article of this section.
3. Incline: 60 degrees.
5. Manufacturers:
   a. O'Keeffe's Inc; Model 523 at roof hatch: www.okeeffes.com/#sle.
   b. or equal.
   c. Ships Ladder to include railings both sides. Coordinate the attachment of the construction of the ladder to the structural angle at the roof opening.

2.06 FINISHES - STEEL
A. Prepare surfaces to be primed in accordance with SSPC-SP2.
B. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
C. Prime Painting: One coat.
D. Galvanizing of Structural Steel Members: Galvanize after fabrication to ASTM A123/A123M requirements. Provide minimum 1.7 oz/sq ft galvanized coating.
E. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A123/A123M requirements.

2.07 FABRICATION TOLERANCES
A. Squareness: 1/8 inch maximum difference in diagonal measurements.
B. Maximum Offset Between Faces: 1/16 inch.
C. Maximum Misalignment of Adjacent Members: 1/16 inch.
D. Maximum Bow: 1/8 inch in 48 inches.
E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION

3.01 EXAMINATION
A. Verify that field conditions are acceptable and are ready to receive work.
B. Field verify all critical dimensions needed for a proper fabricated fit.

3.02 INSTALLATION
A. Install items plumb and level, accurately fitted, free from distortion or defects.
B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
C. Obtain approval prior to site cutting or making adjustments not scheduled.

3.03 TOLERANCES
A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
B. Maximum Offset From True Alignment: 1/4 inch.
3.04 SCHEDULE

A. Steel Ladder: Located in Elevator Pit - prime.
B. Steel Ladder: Located on roof - Galvanized steel.
C. Alum. Ships Ladder: Located on Mezzanine - Aluminum - Clear anodized finish.
SECTION 05 73 00
DECORATIVE RAILINGS

PART 1  GENERAL

1.01  SECTION INCLUDES
A.  Railing and guardrail assemblies.
B.  Wall-mounted handrails.
C.  Free-standing railings at steps.

1.02  REFERENCE STANDARDS
A.  ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
K.  AWS D1.6 - Structural Welding Code - Stainless Steel; 1999.

1.03  SUBMITTALS
A.  See Section 01 3000 - Administrative Requirements, for submittal procedures.
B.  Product Data: Submit manufacturer's product data including description of materials, components, finishes, fabrication details, glass, anchors, and accessories.
C.  Shop Drawings: Indicate railing system elevations and sections, details of profile, dimensions, sizes, connection attachments, anchorage, size and type of fasteners, and accessories. Indicate anchor and joint locations, brazed connections, transitions, and terminations.
D.  Test Reports: Submit test reports from an independent testing agency showing compliance with specified design and performance requirements.
E.  Manufacturer's Installation Instructions.
F.  Maintenance Data: Manufacturer's instructions for care and cleaning.

1.04  DELIVERY, STORAGE, AND HANDLING
A.  Deliver railing materials in factory provided protective coverings and packaging.
B.  Protect railing materials against damage during transit, delivery, storage, and installation at site.
C.  Inspect railing materials upon delivery for damage. Repair damage to be indistinguishable from undamaged areas; if damage cannot be repaired to be indistinguishable from undamaged parts and finishes, replace damaged items.
D.  Prior to installation, store materials and components under cover, in a dry location.
1.05 FIELD CONDITIONS
A. Do not install railings until project is enclosed and ambient temperature of space is minimum 65 degrees F and maximum 95 degrees F.
B. Maintain ambient temperature of space at minimum 65 degrees F and maximum 95 degrees F for 24 hours before, during, and after railing installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS
A. Decorative Metal Railings:
   1. Architectural Railings & Grilles; Tivoli (Stainless Steel / Glass System).
   2. York Metal Fabricators; www.yorkmetal.com
   3. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 RAILING SYSTEMS
A. Railings - General: Factory- or shop-fabricated in design indicated, to suit specific project conditions, and for proper connection to building structure, and in largest practical sizes for delivery to site.
   1. Design Criteria: Design and fabricate railings and anchorages to resist the following loads without failure, damage, or permanent set; loads do not need to be applied simultaneously.
      a. Lateral Force: 75 lb minimum, at any point, when tested in accordance with ASTM E935.
      b. Distributed Load: 50 pounds per foot minimum, applied in any direction at the top of the handrail, when tested in accordance with ASTM E935.
      c. Concentrated Loads on Intermediate Rails: 50 pounds per square ft, minimum.
      d. Concentrated Load: 200 pounds minimum, applied in any direction at any point along the handrail system, when tested in accordance with ASTM E935.
   2. Assembly: Join lengths, seal open ends, and conceal exposed mounting bolts and nuts using slip-on non-weld mechanical fittings, flanges, escutcheons, and wall brackets.
   4. Field Connections: Provide sleeves to accommodate site assembly and installation.
   5. Welded and Brazed Joints: Make exposed joints butt tight, flush, and hairline; use methods that avoid discoloration and damage of finish; grind smooth, polish, and restore to required finish.
      a. Ease exposed edges to small uniform radius.
      b. Welded Joints:
         1) Carbon Steel: Perform welding in accordance with AWS D 1.1/D1.1M.
         2) Stainless Steel: Perform welding in accordance with AWS D 1.6.
      c. Brass/Bronze Brazed Joints:
         1) Perform torch brazing in accordance with AWS C3.4/3.4M.
         2) Perform induction brazing in accordance with AWS C3.5/3.5M.
         3) Perform resistance brazing in accordance with AWS C3.9/3.9M.
B. Base Mount Railing System: Engineered, base supported railing system with structural glass.
   1. Base Shoe, Aluminum: ASTM B221, 6063 T5 alloy; 2-1/2 inch wide by 4 inch high, rectangular profile, mill finish.
   2. Base Cladding:
      a. Material: 18 gage, (0.05 inch) stainless steel; No. 4 satin finish.
      3. Glass: As specified in this section.
4. Fasteners:
   a. Attachment to Concrete:
      1) Provide anchors capable of sustaining, without failure, a load equal to four times
         the load imposed when installed in concrete, tested in accordance with ASTM
         E488.
      2) Provide 12 inch center-to-center hole spacing; 1/2 by 4 inch concrete anchors.
   b. Attachment to Steel: Provide 24 inch center-to-center hole spacing; 1/2 inch, stainless
      steel, socket head cap screws for drilled and tapped or drilled and bolted attachment.

C. Guardrail-Mounted Handrail:
   1. 1-1/2 inch square stainless steel; No. 4 satin finish.
   2. Handrail Brackets: Manufacturer's standard stainless steel brackets.
      a. Mounting: Glass.
      b. Finish: No. 4 satin finish.

2.03 MATERIALS

A. Stainless Steel Components:
   1. ASTM A666, Type 304.
   2. Stainless Steel Finish: No. 4 Satin.

B. Glass: Fully tempered, ASTM C1048, Condition A, Type 1, transparent, Class 1, Quality Q3,
   unless otherwise indicated.
   1. Thickness: 1/2 inch.
   2. Configuration: As indicated on drawings.
   3. Edges: Ground smooth and polished.

2.04 ACCESSORIES

A. Non-Weld Mechanical Fittings: Slip-on, galvanized malleable iron castings, for Schedule 40
   pipe, with flush setscrews for tightening by standard hex wrench, no bolts or screw fasteners.

B. Welding Fittings: Factory- or shop-welded from matching pipe or tube; joints and seams ground
   smooth.

C. Anchors and Fasteners: Provide anchors and other materials as required to attach to structure,
   made of same materials as railing components unless otherwise indicated; where exposed
   fasteners are unavoidable provide flush countersunk fasteners.
   1. For anchorage to concrete, provide inserts to be cast into concrete for bolting anchors.
   2. For anchorage to masonry, provide brackets to be embedded in masonry for bolting
      anchors.
   3. For anchorage to stud walls, provide backing plates for bolting anchors.
   4. Exposed Fasteners: No exposed bolts or screws.

D. Sealant: Silicone; clear.

E. Finish Touch-Up Materials: As recommended by manufacturer for field application.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate and site conditions are acceptable and ready to receive work.

B. Verify field dimensions of locations and areas to receive work.

C. Notify Architect immediately of conditions that would prevent satisfactory installation.

D. Do not proceed with work until detrimental conditions have been corrected.

E. Furnish components to be installed in other work to installer of that other work, including but not
   limited to blocking, sleeves, inserts, anchor bolts, embedded plates and supports for attachment
   of anchors.
3.02 PREPARATION
   A. Protect existing work.
   B. Review installation drawings before beginning installation. Coordinate diagrams, templates, instructions and directions for installation of anchorages and fasteners.
   C. Clean surfaces to receive units. Remove materials and substances detrimental to the installation.

3.03 INSTALLATION
   A. Comply with manufacturer's drawings and written instructions.
   B. Install components plumb and level, accurately fitted, free from distortion or defects and with tight joints, except where necessary for expansion.
   C. Anchor securely to structure.
   D. Conceal anchor bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.
   E. Isolate dissimilar materials with bituminous coating, bushings, grommets or washers to prevent electrolytic corrosion.

3.04 TOLERANCES
   A. Maximum Variation From Plumb: 1/4 inch per floor level, non-cumulative.
   B. Maximum Offset From True Alignment: 1/4 inch.

3.05 CLEANING
   A. Remove protective film from exposed metal surfaces.
   B. Metal: Clean exposed metal finishes with potable water and mild detergent, in accordance with manufacturer recommendations; do not use abrasive materials or chemicals, detergents or other substances that may damage the material or finish.
   C. Glass and Glazing: Clean glazing surfaces; remove excess glazing sealant compounds, dirt, and other substances.

3.06 PROTECTION
   A. Protect installed components and finishes from damage after installation.
   B. Repair damage to exposed finishes to be indistinguishable from undamaged areas.
      1. If damage to finishes and components cannot be repaired to be indistinguishable from undamaged finishes and components, replace damaged items.

END OF SECTION
SECTION 06 10 00
ROUGH CARPENTRY

PART 1  GENERAL

1.01  SECTION INCLUDES
A. Structural dimension lumber framing.
B. Non-structural dimension lumber framing.
C. Rough opening framing for doors, windows, and roof openings.
D. Preservative treated wood materials.
E. Fire retardant treated wood materials.
F. Miscellaneous framing and sheathing.
G. Communications and electrical room mounting boards.
H. Concealed wood blocking, nailers, and supports.

1.02  RELATED REQUIREMENTS
A. Section 09 21 16 - Gypsum Board Assemblies: Gypsum-based sheathing.

1.03  REFERENCE STANDARDS
F. PS 1 - Structural Plywood; 2009.
G. PS 2 - Performance Standard for Wood-Based Structural-Use Panels; 2010.
I. SPIB (GR) - Grading Rules; 2014.

1.04  DELIVERY, STORAGE, AND HANDLING
A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.
B. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, or installation.

PART 2  PRODUCTS

2.01  GENERAL REQUIREMENTS
A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
   1. Species: Southern Pine, unless otherwise indicated.
   2. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.
   3. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.
   4. Lumber of other species or grades is acceptable provided structural and appearance characteristics are equivalent to or better than products specified.
2.02 DIMENSION LUMBER
   A. Grading Agency: Southern Pine Inspection Bureau, Inc; SPIB (GR).
   B. Sizes: Nominal sizes as indicated on drawings, S4S.
   C. Moisture Content: S-dry or MC19.
   D. Stud Framing (2 by 2 through 2 by 6):
      1. Species: Any allowed under referenced grading rules.
      2. Grade: No. 2.
   E. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
      1. Lumber: S4S, No. 2 or Standard Grade.
      2. Boards: Standard or No. 3.
2.03 CONSTRUCTION PANELS
   A. Wall Sheathing, For support of metal composite material wall panels: Plywood, PS 1, Grade C-C, Exterior Exposure.
   C. Communications and Electrical Room Mounting Boards: PS 1 A-D plywood, or medium density fiberboard; 3/4 inch thick; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.
2.04 ACCESSORIES
   A. Fasteners and Anchors:
      2. Drywall Screws: Bugle head, hardened steel, power driven type, length three times thickness of sheathing.
      3. Anchors: Toggle bolt type for anchorage to hollow masonry.
2.05 FACTORY WOOD TREATMENT
   A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
      1. Fire-Retardant Treated Wood: Mark each piece of wood with producer's stamp indicating compliance with specified requirements.
      2. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.
   B. Fire Retardant Treatment:
      1. Exterior Type: AWPA U1, Category UCFB, Commodity Specification H, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes both before and after accelerated weathering test performed in accordance with ASTM D2898.
         a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
         b. Do not use treated wood in direct contact with the ground.
2. Interior Type A: AWPA U1, Use Category UCFA, Commodity Specification H, low temperature (low hygroscopic) type, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes.
   a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
   b. Treat rough carpentry items as indicated.
   c. Do not use treated wood in applications exposed to weather or where the wood may become wet.

C. Preservative Treatment:
   1. Preservative Pressure Treatment of Lumber Above Grade: AWPA U1, Use Category UC3B, Commodity Specification A using waterborne preservative to 0.25 lb/cu ft retention.
      a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
      b. Treat lumber exposed to weather.
      c. Treat lumber in contact with roofing, flashing, or waterproofing.
      d. Treat lumber in contact with masonry or concrete.
      e. Treat lumber less than 18 inches above grade.
      f. Treat lumber in other locations as indicated.
   2. Preservative Pressure Treatment of Plywood Above Grade: AWPA U1, Use Category UC2 and UC3B, Commodity Specification F using waterborne preservative to 0.25 lb/cu ft retention.
      a. Kiln dry plywood after treatment to maximum moisture content of 19 percent.
      b. Treat plywood in contact with roofing, flashing, or waterproofing.
      c. Treat plywood in contact with masonry or concrete.
      d. Treat plywood less than 18 inches above grade.
      e. Treat plywood in other locations as indicated.

PART 3 EXECUTION

3.01 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.

3.02 FRAMING INSTALLATION
   A. 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.
   B. 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.
   C. Install structural members full length without splices unless otherwise specifically detailed.
   D. Comply with member sizes, spacing, and configurations indicated, and fastener size and spacing indicated, but not less than required by applicable codes and AFPA (WFCM) Wood Frame Construction Manual.
   E. 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.
   F. Frame wall openings with two or more studs at each jamb; support headers on cripple studs.
3.03 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 fireblocking 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 non-structural 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.
   10. Steel ladders.
   11. Other items detailed.

3.04 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 all roof openings except where prefabricated curbs are specified and where specifically indicated otherwise. Form corners by alternating lapping side members.

3.05 INSTALLATION OF CONSTRUCTION PANELS

A. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using nails, screws, or staples.

B. 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 and Location: As indicated on drawings.
3.06 CLEANING

A. Waste Disposal: Comply with the requirements of Section 01 74 19 - Construction Waste Management and Disposal.
   1. Comply with applicable regulations.
   2. Do not burn scrap on project site.
   3. Do not burn scraps that have been pressure treated.
   4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or “waste-to-energy” facilities.

B. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.

C. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION
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SECTION 06 41 00
ARCHITECTURAL WOOD CASEWORK

PART 1 GENERAL

1.01 SECTION INCLUDES
   A. Specially fabricated cabinet units.
   B. Cabinet hardware.

1.02 RELATED REQUIREMENTS
   A. Section 06 10 00 - Rough Carpentry: Support framing, grounds, and concealed blocking.
   B. Section 12 36 00 - Countertops.

1.03 REFERENCE STANDARDS

1.04 SUBMITTALS
   A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
   B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
      1. Minimum Scale of Detail Drawings: 1-1/2 inch to 1 foot.
      2. Provide the information required by AWI/AWMAC/WI (AWS).
   C. Product Data: Provide data for hardware accessories.
   D. Samples: Submit actual sample items of proposed pulls, hinges, shelf standards, and locksets, demonstrating hardware design, quality, and finish.

1.05 QUALITY ASSURANCE
   A. 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 in the past 5 years with value of woodwork within 20 percent of cost of woodwork for this Project.

1.06 DELIVERY, STORAGE, AND HANDLING
   A. Protect units from moisture damage.

1.07 FIELD CONDITIONS
   A. During and after installation of custom cabinets, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy.

PART 2 PRODUCTS

2.01 CABINETS
   A. Quality Grade: Unless otherwise indicated provide products of quality specified by AWI/AWMAC/WI (AWS) for Premium Grade.
   B. Plastic Laminate Faced Cabinets: Custom grade.
   C. Cabinets:
      2. Finish - Exposed Interior Surfaces: Decorative laminate.
      3. Finish - Concealed Surfaces: Manufacturer's option.
      4. Door and Drawer Front Edge Profiles: Square edge with thin applied band.
      5. Door and Drawer Front Retention Profiles: Removable stop.
      6. Casework Construction Type: Type B - Face-frame.
      7. Interface Style for Cabinet and Door: Style 1 - Overlay; flush overlay.
      8. Grained Face Layout for Cabinet and Door Fronts: Flush panel.
         a. Custom Grade: Doors, drawer fronts and false fronts wood grain to run and match vertically within each cabinet unit.
9. **Adjustable Shelf Loading:** 50 lbs. per sq. ft..
10. **Drawer Side Construction:** Manufacturer's option.

### 2.02 WOOD-BASED COMPONENTS

A. **Wood fabricated from old growth timber is not permitted.**

B. **Use wood type as indicated on the Finish Schedule, finish per Section 09 90 00 - Painting and Coating.**

### 2.03 LAMINATE MATERIALS

A. **Manufacturers:**
   1. Use manufacturers listed on the finish schedule.
   2. Substitutions: See Section 01 60 00 - Product Requirements.

B. **Provide specific types as scheduled.**
   1. **Horizontal Surfaces:** HGS, 0.048 inch nominal thickness, through color, colors as scheduled, finish as scheduled.
   2. **Vertical Surfaces:** VGS, 0.028 inch nominal thickness, through color, colors as scheduled, finish as scheduled.

### 2.04 ACCESSORIES

A. **Plastic Edge Banding:** Extruded PVC, flat shaped; smooth finish; self locking serrated tongue; of width to match component thickness.
   1. **Color:** As selected by Architect from manufacturer's standard range.
   2. **Use at all exposed plywood edges.**
   3. **Use at all exposed shelf edges.**

B. **Fasteners:** Size and type to suit application.

C. **Bolts, Nuts, Washers, Lags, Pins, and Screws:** Of size and type to suit application; galvanized or chrome-plated finish in concealed locations and stainless steel or chrome-plated finish in exposed locations.

D. **Concealed Joint Fasteners:** Threaded steel.

E. **Grommets:** Standard plastic grommets for cut-outs, in color to match adjacent surface.

### 2.05 HARDWARE

A. **Adjustable Shelf Supports:** Standard side-mounted system using multiple holes for pin supports and coordinated self rests, satin chrome finish, for nominal 1 inch spacing adjustments.

B. **Drawer and Door Pulls:** Bow pull 4 inch at regular cabinets and bow pull 8.82 inches at full height and wardrobe cabinets.
   1. **Product:** P0256A manufactured by Liberty.

C. **Cabinet Locks:** Keyed cylinder, two keys per lock, master keyed, steel with satin finish.

D. **Catches:** Magnetic.

E. **Drawer Slides:**
   1. **Type:** Full extension with overtravel.
   2. **Static Load Capacity:** Commercial grade.
   3. **Mounting:** Side mounted.
   4. **Stops:** Integral type.
   5. **Features:** Provide self closing/stay closed type.

F. **Hinges:** European style concealed self-closing type, steel with satin finish.
   1. **Products:**
2.06 FABRICATION

A. Assembly: Shop assemble cabinets for delivery to site in units easily handled and to permit passage through building openings.

B. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.

C. Fitting: When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide matching trim for scribing and site cutting.

D. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet from sink cut-outs.
   1. Apply laminate backing sheet to reverse side of plastic laminate finished surfaces.
   2. Cap exposed plastic laminate finish edges with plastic trim.

E. Matching Wood Grain: Comply with requirements of quality standard for specified Grade exclusively.

F. Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes, and fixtures and fittings. Verify locations of cutouts from on-site dimensions. Seal cut edges.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify adequacy of backing and support framing.

B. Verify location and sizes of utility rough-in associated with work of this section.

3.02 INSTALLATION

A. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.

B. Use fixture attachments in concealed locations for wall mounted components.

C. Use concealed joint fasteners to align and secure adjoining cabinet units.

D. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.

E. Secure cabinets to floor using appropriate angles and anchorages.

F. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.

3.03 ADJUSTING

A. 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
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SECTION 06 83 16
FIBERGLASS REINFORCED PANELING

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Fiberglass reinforced plastic panels.
B. Trim.

1.02 REFERENCE STANDARDS
D. FM 4880 - Approval Standard for Class 1 Fire Rating of Building Panels or Interior Finish Materials; 2015.

1.03 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
C. Samples: Submit two samples 6 x 6 inch in size illustrating material and surface design of panels.

1.04 DELIVERY, STORAGE, AND HANDLING
A. Store panels flat, indoors, on a clean, dry surface. Remove packaging and allow panels to acclimate to room temperature for 48 hours prior to installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS
A. Fiberglass Reinforced Plastic Panels:
   4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 PANEL SYSTEMS
A. Wall Panels:
   1. Panel Size: 4 by 9 feet.
   2. Panel Thickness: 0.09 inch.
   5. Attachment Method: Adhesive only, sealant joints, with trim.

2.03 MATERIALS
A. Panels: Fiberglass reinforced plastic (FRP), complying with ASTM D5319.
   1. Surface Burning Characteristics: Maximum flame spread index of 25 and smoke developed index of 450; when system tested in accordance with ASTM E84.
   2. Class 1 fire rated when tested in accordance with FM 4880.
   3. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
B. Trim: Vinyl; color coordinating with panel.
C. Sealant: Type recommended by panel manufacturer; white.
PART 3 EXECUTION

3.01 EXAMINATION
   A. Verify existing conditions and substrate flatness before starting work.
   B. Verify that substrate conditions are ready to receive the work of this section.

3.02 INSTALLATION - WALLS
   A. Install panels in accordance with manufacturer's instructions.
   B. Cut and drill panels with carbide tipped saw blades, drill bits, or snips.
   C. Apply adhesive to the back side of the panel using trowel as recommended by adhesive manufacturer.
   D. Apply panels to wall with seams plumb and pattern aligned with adjoining panels.
   E. Install panels with manufacturer's recommended gap for panel field and corner joints.
   F. Place trim on panel before fastening edges, as required.
   G. Fill channels in trim with sealant before attaching to panel.
   H. Install trim with adhesive and screws or nails, as required.
   I. Seal gaps at floor, ceiling, and between panels with applicable sealant to prevent moisture intrusion.
   J. Remove excess sealant after paneling is installed and prior to curing.

END OF SECTION
SECTION 07 14 00
FLUID-APPLIED WATERPROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fluid-Applied Waterproofing:
   1. Cold-applied modified-polymer elastomeric waterproofing.
   2. Mat and drain board
   3. PVC Foundation drainage system

1.02 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete: Concrete substrate.

B. Section 07 21 00 - THERMAL INSULATION:

1.03 ABBREVIATIONS

A. HDPE - High-Density Polyethylene.

1.04 REFERENCE STANDARDS


1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data for membrane, surface conditioner, flexible flashings, joint cover sheet, and joint and crack sealants.

C. Certificate: Certify that products meet or exceed specified requirements.

D. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention, and acceptable installation temperatures.

E. Manufacturer's Qualification Statement.

F. Installer's Qualification Statement.

G. Warranty:
   1. Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
   2. Submit installer's certification that installation complies with warranty conditions for the waterproofing membrane.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.
1.07 FIELD CONDITIONS
   A. Maintain ambient temperatures above 40 degrees F for 24 hours before and during application and until cured.

1.08 WARRANTY
   A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
   B. Provide five year manufacturer warranty for waterproofing failing to resist penetration of water, except where such failures are the result of structural failures of building. Hairline cracking of concrete due to temperature change or shrinkage is not considered a structural failure.

PART 2 PRODUCTS
2.01 MANUFACTURERS
   A. Cold-Applied Modified-Polymer Elastomeric Waterproofing:
      2. Tremco Waterproofing: Tremproof 250GC - Basis of Design
      5. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 WATERPROOFING APPLICATIONS
   A. Cold-Applied Modified-Polymer Elastomeric Waterproofing:
      1. Location: below grade foundation walls.
      2. Cover with drainage panel.

2.03 MEMBRANE AND FLASHING MATERIALS
   A. Cold-Applied Modified-Polymer Elastomeric Waterproofing:
      1. Cured Thickness: 55 mils (0.055 inches), minimum.
      2. Suitable for installation over concrete substrates.

2.04 ACCESSORIES
   A. Surface Conditioner: Roll-on or Spray-on type, compatible with membrane compound; as recommended by membrane manufacturer.
   B. Sealant for Joints and Cracks in Substrate: Type compatible with waterproofing material and as recommended by waterproofing manufacturer.
   C. Drainage Panel: 3/8 inch thick formed plastic, hollowed sandwich.
   D. Cant Strips: Premolded composition material.
   E. Counterflashings: As recommended by membrane and protection board manufacturer.
   F. 4 inch diameter perforated PVC drain tile, installed around the perimeter of the exterior foundation walls.

PART 3 EXECUTION
3.01 EXAMINATION
   A. Verify existing conditions before starting work.
   B. Verify substrate surfaces are free of frozen matter, dampness, loose particles, cracks, pits, projections, penetrations, or foreign matter detrimental to adhesion or application of waterproofing system.
   C. Verify that substrate surfaces are smooth, free of honeycomb or pitting, and not detrimental to full contact bond of waterproofing materials.
   D. Verify items that penetrate surfaces to receive waterproofing are securely installed.
3.02 PREPARATION
   A. Protect adjacent surfaces from damage not designated to receive waterproofing.
   B. Clean and prepare surfaces to receive waterproofing in accordance with manufacturer's instructions.
   C. Do not apply waterproofing to surfaces unacceptable to waterproofing manufacturer.
   D. Fill non-moving joints and cracks with a filler compatible with waterproofing materials.
   E. Seal moving cracks with sealant and non-rigid filler, using procedures recommended by sealant and waterproofing manufacturers.
   F. Prepare building expansion joints at locations as indicated on drawings.
   G. Install cant strips at inside corners.

3.03 INSTALLATION
   A. Install waterproofing to specified minimum thickness in accordance with manufacturers instructions and NRCA (WM) applicable requirements.
   B. Seal membrane and flashings to adjoining surfaces.
      1. Install termination bar along edges.

3.04 INSTALLATION - DRAINAGE PANEL AND PROTECTION BOARD
   A. Place drainage panel directly against membrane, butt joints, place to encourage drainage downward, and scribe and cut boards around projections, penetrations, and interruptions.

END OF SECTION
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SECTION 07 19 00
WATER REPELLENTS

PART 1 GENERAL
1.01 SECTION INCLUDES
   A. Water repellents applied to exterior masonry and precast architectural concrete surfaces.

1.02 RELATED REQUIREMENTS
   A. Section 03 45 00 - Precast Architectural Concrete.
   B. Section 04 20 00 - Unit Masonry
   C. Section 07 92 00 - Joint Sealants.

1.03 ADMINISTRATIVE REQUIREMENTS
   A. Preinstallation Meeting: Convene a meeting at least one week prior to starting work; require attendance of affected installers; invite Architect and Owner.

1.04 SUBMITTALS
   A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
   B. Product Data: Provide product description, details of tests performed, limitations, and chemical composition.
   C. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention; cautionary procedures required during application.
   D. Manufacturer's Field Reports: Report whether manufacturer's "best practices" are being followed; if not, state corrective recommendations. Email report to Architect the same day as inspection occurs; mail report on manufacturer's letterhead to Architect within 2 days after inspection.
   E. Manufacturer's Qualification Statement.
   F. Installer's Qualification Statement.

1.05 QUALITY ASSURANCE
   A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years documented experience.
   B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

1.06 MOCK-UP
   A. Prepare a representative surface 36 inch by 36 inch in size using specified materials and preparation and application methods on surfaces identical to those to be coated; approved mock-up constitutes standard for workmanship.
   B. For proposed substitutions, prepare side-by-side mock-ups of specified and substitute products.
   C. Locate where directed.
   D. Mock-up may remain as part of the Work.

1.07 FIELD CONDITIONS
   A. Protect liquid materials from freezing.
   B. Do not apply water repellent when ambient temperature is lower than 45 degrees F or higher than 95 degrees F.
   C. Do not apply water repellents when wind velocity is higher than 5 mph.

1.08 WARRANTY
   A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
PART 2  PRODUCTS

2.01  MANUFACTURERS
A. Acrylic Water Repellents:
B. Water Repellents (basis of design):
      a. RTV silicone rubber water repellent and graffiti protectant.
   2. Substitutions: See Section 01 60 00 - Product Requirements.

2.02  MATERIALS
A. Specific product to be used will be determined by side-by-side mock-up testing of at least three products meeting specified requirements; prepare mock ups as specified above; submit cost breakdown for each product used in mock-up, including both unit and total costs.
B. Water Repellent: Non-glossy, colorless, penetrating, water-vapor-permeable, non-yellowing sealer, that dries invisibly leaving appearance of substrate unchanged.
   1. Applications: Vertical surfaces and non-traffic horizontal surfaces.
   2. Number of Coats: Two.
   3. Maintains dry appearance when wetted.
   4. Silane, siloxane, silane-siloxane blend, or silicone that reacts chemically with concrete and masonry.
   5. Water-based siloxane, silane, or blend that reacts chemically with concrete and masonry.
   6. Water-based acrylic that reacts chemically with concrete and masonry.
C. Water Repellent: Modified Siloxane/Silane with diffused quartz carbide; colorless.
   1. VOC Content: Less than 600 g/L, when tested in accordance with ASTM D 3690 or D 5095.

PART 3  EXECUTION

3.01  EXAMINATION
A. Verify existing conditions before starting work.
B. Verify joint sealants are installed and cured.
C. Verify surfaces to be coated are dry, clean, and free of efflorescence, oil, or other matter detrimental to application of water repellent.

3.02  PREPARATION
A. Protection of Adjacent Work:
   1. Protect adjacent landscaping, property, and vehicles from drips and overspray.
   2. Protect adjacent surfaces not intended to receive water repellent.
B. Prepare surfaces to be coated as recommended by water repellent manufacturer for best results.
C. Do not start work until masonry mortar substrate is cured a minimum of 28 days.
D. Remove loose particles and foreign matter.
E. Remove oil and foreign substances with a chemical solvent that will not affect water repellent.
F. Scrub and rinse surfaces with water and let dry.
G. Allow surfaces to dry completely to degree recommended by water repellent manufacturer before starting coating work.

3.03  APPLICATION
A. Apply water repellent in accordance with manufacturer's instructions, using procedures and application methods recommended as producing the best results.
B. Apply at rate recommended by manufacturer, continuously over entire surface.
C. Apply two coats, minimum.
D. Remove water repellent from unintended surfaces immediately by a method instructed by water repellent manufacturer.

E. Provide manufacturer’s field service representative to inspect preparation and application work for at least 3 hours on first day to ensure that manufacturer’s "best practices" for preparation and application are being followed. Contact Mike Cerutti at Coating Solutions, LLS (636)-938-9292 for representative in the area.

END OF SECTION
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SECTION 07 21 00
THERMAL INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Board insulation and integral vapor retarder at cavity wall construction, perimeter foundation wall, underside of floor slabs, and exterior wall behind MCM wall finish.
B. Batt insulation and vapor retarder in exterior wall, ceiling, and roof construction.
C. Batt insulation for filling perimeter window and door shim spaces and crevices in exterior wall and roof.
D. Acoustical Batt Insulation, below RTU.

1.02 RELATED REQUIREMENTS
A. Section 03 47 13 - Tilt-Up Concrete: Insulation inside formed panels.
B. Section 07 26 50 - Fluid Applied Vapor Permeable Air Barrier: Water-resistive barrier over sheathing.
C. Section 07 84 00 - Firestopping: Insulation as part of fire-rated through-penetration assemblies.
D. Section 09 21 16 - Gypsum Board Assemblies: Acoustic insulation inside walls and partitions.

1.03 REFERENCE STANDARDS

1.04 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
C. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.

1.05 FIELD CONDITIONS
A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

PART 2 PRODUCTS

2.01 APPLICATIONS
A. Insulation Under Concrete Slabs: Expanded polystyrene board.
B. Insulation at Perimeter of Foundation: Expanded polystyrene board.
C. Insulation Inside Masonry Cavity Walls: Extruded polystyrene board.
D. Insulation Inside Cavity Walls behind MCM panels: Mineral Fiberboard Insulation board.
E. Insulation in Metal Framed Walls: Batt insulation with integral vapor retarder.
F. Insulation Above Lay-In Acoustical Ceilings: Batt insulation with no vapor retarder.

2.02 FOAM BOARD INSULATION MATERIALS

A. Expanded Polystyrene (EPS) Board Insulation: ASTM C578, Type XI; with the following characteristics:
   1. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
   2. Board Size: 48 x 96 inch.
   3. Board Thickness: 2 inches.
   5. Water Absorption: 4 percent by volume, maximum.
   7. Compressive Resistance: 5 psi.
   8. Manufacturers:
      a. Atlas EPS; Thermal Star X-Grade 15
      b. Insulfoam; Insulfoam Type VIII
      c. ACH Foam Technologies; Type II
   9. Substitutions: See Section 01 60 00 - Product Requirements.

B. Termite-Resistant Expanded Polystyrene (EPS) Board Insulation: Complies with ASTM C578 with the following characteristics:
   1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
   2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
   4. Board Thickness: 2-1/2 inches.
   5. Thermal Resistance: R-value of 11, for overall thickness indicated.
   7. Manufacturers:
   8. Substitutions: See Section 01 60 00 - Product Requirements.

C. Extruded Polystyrene Board Insulation: Extruded polystyrene board; ASTM C578; with either natural skin or cut cell surfaces, and the following characteristics:
   1. Flame Spread Index: 75 or less, when tested in accordance with ASTM E84.
   2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
   3. R-value: 1 inch of material at 72 degrees F: 5, minimum.
   4. Board Thickness: 2 inches.
   7. Board Density: 1.3 lb/cu ft.
   8. Water Absorption, Maximum: 0.3 percent, by volume.
   9. Manufacturers:
      c. Kingspan Insulation LLC; GreenGuard XPS TYPE IV 25 PSI: www.trustgreenguard.com/#sle.

2.03 FIBERBOARD INSULATION MATERIALS

A. Mineral Fiber Board Insulation: Rigid or semi-rigid mineral fiber, ASTM C612 or ASTM C553; unfaced flame spread index of 0 (zero) when tested in accordance with ASTM E84.
   1. Smoke Developed Index: 0 (zero), when tested in accordance with ASTM E84.
   2. Board Size: 16 by 48 inches.
   3. Board Thickness: 2 inches.
   4. Thermal Resistance: R-value of 6 per inch - minimum.
   5. Maximum Density: 8.0 lb/cu ft.
2.04 BATT INSULATION MATERIALS

A. Glass Fiber Batt Insulation: Flexible preformed batt or blanket, complying with ASTM C665; friction fit.
   1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
   2. Smoke Developed Index: 450 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.
   7. Manufacturers:
      c. Knauf Insulation GmbH: www.knaufinsulation.us.

B. Mineral Fiber Batt Insulation: Flexible or semi-rigid preformed batt or blanket, complying with ASTM C665; friction fit; unfaced flame spread index of 0 (zero) when tested in accordance with ASTM E84.
   1. Smoke Developed Index: 0 (zero), when tested in accordance with ASTM E84.
   3. Manufacturers:

C. Sound Attenuation and Acoustical Ceiling Batts: (To be used under the RTU and return air duct).
   1. Manufacturer: CertainTeed Corporation
   2. Product Name: NoiseReducer
   3. Thermal Resistance: R-11, un-faced
   4. Size: 3 1/2" deep x 24" wide
   5. Fire Resistance: ASTM E84; Unfaced insulation; Max. flame spread index: 25; Max Smoke Developed index: 50

2.05 ACCESSORIES

A. Tape: Reinforced polyethylene film with acrylic pressure sensitive adhesive.
   1. Application: Sealing of interior circular penetrations, such as pipes or cables.
   2. Width: Are required for application.

B. Wire Mesh: Galvanized steel, hexagonal wire mesh.

C. Adhesive: Type recommended by insulation manufacturer for application.

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. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

3.02 BOARD INSTALLATION AT FOUNDATION PERIMETER

A. Install boards horizontally on foundation perimeter.
   1. Place boards to maximize adhesive contact.
   2. Install in running bond pattern.
   3. Butt edges and ends tightly to adjacent boards and to protrusions.
B. Extend boards over expansion joints, unbonded to foundation on one side of joint.
C. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.03 BOARD INSTALLATION AT SPANDREL GLASS
A. Secure impale fasteners to substrate at a frequency as follows:
   1.  8 per insulation board.
B. Install boards to fit snugly between framing members.

3.04 BOARD INSTALLATION AT EXTERIOR WALLS
A. Install boards horizontally on walls.
B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.05 BOARD INSTALLATION AT CAVITY WALLS
A. Install boards to fit snugly between wall ties.
B. Install boards horizontally on walls.
   1. Place boards to maximize adhesive contact.
   2. Install in running bond pattern.
   3. Butt edges and ends tightly to adjacent boards and to protrusions.
C. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.06 BOARD INSTALLATION UNDER CONCRETE SLABS
A. Place insulation under slabs on grade after base for slab has been compacted.
B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.
C. Prevent insulation from being displaced or damaged while placing vapor retarder and placing slab.

3.07 BATT INSTALLATION
A. Install insulation and vapor retarder in accordance with manufacturer’s instructions.
B. Install in exterior wall spaces without gaps or voids. Do not compress insulation.
C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.
E. Retain insulation batts in place with spindle fasteners at 12 inches on center.
F. At metal framing, place vapor retarder on warm side of insulation; lap and seal sheet retarder joints over member face.
G. Tape seal tears or cuts in vapor retarder.
H. Coordinate work of this section with construction of air barrier seal specified in Section 07 26 50.

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

END OF SECTION
SECTION 07 26 50
FLUID-APPLIED VAPOR PERMEABLE AIR BARRIER

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This Section specifies a water-resistant fluid-applied vapor permeable air barrier in exterior wall assemblies.

B. Related Work in other Sections include the following:
   1. Section 01 40 00 - Quality Requirements; coordination with Owner’s independent testing and inspection agency.
   2. Section 01 50 00 - Temporary Facilities and Controls; requirement to schedule work to prevent sunlight and weather exposure of materials beyond limits established by manufacturer; requirement to protect materials from damage after installation and prior to installation of enclosing work.
   3. Section 04 20 00 – Unit Masonry; requirement that backup masonry joints are flush and completely filled with mortar, and that excess mortar on brick ties will be removed; requirement for gap at deflection joints and fillers; coordination with sequencing of through-wall flashing.
   4. Section 09 21 16 – Gypsum Board Assemblies; requirement that backup gypsum sheathing has been installed with damaged corners repaired, joints filled and surface flush with compatible material as acceptable to the fluid-applied vapor permeable air barrier manufacturer; requirement for gap at deflection joints and fillers.

1.02 PERFORMANCE REQUIREMENTS

A. Material Performance: Provide materials which have an air permeance not to exceed 0.004 cubic feet per minute per square foot under a pressure differential of 0.3 in. water (1.57 psf) (0.02 L/m2 @ 75 Pa.) when tested according to ASTM E 2178.

B. Connections to Adjacent Materials: Provide connections to prevent air leakage at the following locations:
   1. Foundation and walls, including penetrations, ties and anchors.
      a. Walls, windows, curtain walls, storefronts, louvers or doors.
      b. Different wall assemblies, and fixed openings within those assemblies.
      c. Wall and roof connections and penetrations.
      d. Floors over unconditioned space.
      e. Walls, floor and roof across construction, control and expansion joints.
      f. Walls, floors and roof to utility, pipe and duct penetrations.
      g. Seismic and expansion joints.
      h. All other leakage pathways in the building envelope.

1.03 SUBMITTALS

A. Submittals: Submit in accordance with Division 1 requirements.

B. Product Data: Submit manufacturer's product data, installation instructions, and manufacturer's printed instructions for evaluating, preparing, and treating substrate, temperature and other limitations of installation conditions, technical data, and tested physical and performance properties.
   1. Submit letter from primary materials manufacturer indicating approval of products not manufactured by primary manufacturer.
   2. Include statement that materials are compatible with adjacent materials proposed for use.
   3. Submit reports indicating that field peel-adhesion test on all materials to which sealants are adhered have been performed and the changes made, if required, to other approved materials, in order to achieve successful adhesion.

C. Samples: Submit clearly labeled samples, 3 by 4 inch minimum size of each material specified.
D. Shop Drawings: Submit shop drawings showing locations and extent of vapor permeable air barrier assemblies and details of all typical conditions, intersections with other envelope assemblies and materials, membrane counter-flashings, and details showing how gaps in the construction will be bridged, how inside and outside corners are negotiated, how materials that cover the vapor permeable air barrier are secured with air-tight condition maintained, and how miscellaneous penetrations such as conduits, pipes, electric boxes and similar items are sealed.

E. Compatibility: Submit letter from manufacturer stating that materials proposed for use are permanently chemically compatible and adhesively compatible with adjacent materials proposed for use. Submit letter from manufacturer stating that cleaning materials used during installation are chemically compatible with each of the adjacent materials proposed for use.

1.04 QUALITY ASSURANCE

A. Manufacturer: Obtain primary materials from a single manufacturer regularly engaged in manufacturing vapor permeable air barrier materials. Obtain secondary materials from a source acceptable to the primary materials manufacturer.

B. Preconstruction Meeting: Convene a minimum of two weeks prior to commencing Work of this Section. Agenda shall include, at a minimum, sequence of construction, coordination with substrate preparation, materials approved for use, compatibility of materials, coordination with installation of adjacent and covering materials, and details of construction. Attendance is required by representatives of related trades including covering materials, substrate materials and adjacent materials.

C. Mock-Up: Provide as required for installation on mock-up being provided in Section 04 20 00 - Unit Masonry.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in original packages with seals unbroken, labeled with manufacturer's name, product, date of manufacture, and directions for storage.

B. Store materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by the manufacturer. Protect stored materials from direct sunlight.

C. Handle materials in accordance with manufacturer's recommendations.

1.06 PROJECT CONDITIONS

A. Temperature: Install vapor permeable air barrier within range of ambient and substrate temperatures recommended by vapor permeable air barrier manufacturer.

B. Field Conditions: Do not install vapor permeable air barrier in snow, rain, fog, or mist without temporary protection and supplemental heat as required. Do not install vapor permeable air barrier when the temperature of substrate surfaces and surrounding air temperatures are below those recommended by the vapor permeable air barrier manufacturer. Apply vapor permeable air barrier to a surface dry substrate, or in accordance with manufacturer's recommendations.

1.07 WARRANTY

A. Material Warranty: Provide manufacturer's standard product warranty, for a minimum 3 years from date of Substantial Completion.

B. Installation Warranty: Provide air barrier subcontractor's 2 year warranty from date of Substantial Completion, including all components of the air barrier assembly, against failures including loss of air tight seal, loss of watertight seal, loss of adhesion, loss of cohesion, failure to cure properly.
PART 2 PRODUCTS

2.01 MATERIALS

A. Fluid-Applied Vapor Permeable Air Barrier: Fluid-applied proprietary materials as specified. Use regular or low-temperature formulation depending on site conditions, within temperature ranges specified by manufacturer. Provide related accessories including primer, seam tape, mastic, fluid and sealant recommended by manufacturer. Subject to compliance with requirements, provide complete system by one of the following:

1. DuPont Building Innovations:
   b. Solvent Based Primer for Flashing, Transition Strip and Detail Membranes: 3M High Strength 90; Denso Butyl (used with self-adhered membranes only)
   c. Through-Wall Flashings or Shelf Angle Flashings: DuPont recommended through-wall flashing
   d. Sealants, Mastics, Adhesives and Tapes: DuPont™ Sealant for Tyvek® Fluid Applied System; DuPont™ Tyvek® Flashing and Joint Compound; fiberglass mesh tape.
   e. Transition, Termination, and Detailing Membrane: DuPont™ StraightFlash™, or DuPont™ Tyvek® Flashing and Joint Compound (60mil)
   f. Penetrations & Termination Sealant: DuPont™ Sealant for Tyvek® Fluid Applied System
   g. Window Flashing Membrane: DuPont™ Tyvek® Fluid Applied Flashing and Joint Compound, or DuPont™ Tyvek® Fluid Applied Flashing – Brush Formulation, or DuPont™ StraightFlash™ with DuPont™ FlexWrap™
   h. Joint Treatment: None (= 1/16” gaps); (DuPont™ Tyvek® Flashing and Joint Compound(= 1/4” gaps); DuPont™ Tyvek® Flashing and Joint Compound w/ fiberglass mesh tape (= 1/2” gaps); DuPont™ StraightFlash™ (= 1” gaps)
   i. Website: <http://www.Weatherization.Tyvek.com>

2. Grace Construction Products:
   a. Perm-A-Barrier VP acrylic fluid applied vapor permeable air barrier membrane
   b. Perm-A-Barrier VP LT two component acrylic fluid-applied vapor permeable air barrier for low temperature application
   c. Membrane for details and Terminations: Bituthene Liquid Membrane
   d. Transition Membrane: Perm-A-Barrier Detail Membrane or Perm-A-Barrier Aluminum Flashing
   e. Through-Wall Flashing: Perm-A-Barrier Wall Flashing
   f. Water-based Primer: Perm-A-Barrier Primer Plus or WB Primer
   g. Solvent-based Primer: Bituthene Primer B2 LVC or Bituthene Primer B2
   h. Penetrations & Termination Sealant: Bituthene Liquid Membrane
   i. Joint Sealant: Refer to Technical Letter 1 for details on compatible waterproofing sealants

3. Henry Company Inc:
   a. Air Bloc 31 one component elastomeric vapor permeable membrane
   b. Sealant: HE 925 BES Sealant
   c. Reinforcing Tape: HE 183 Yellow Glass Fabric
   d. Self Adhered Membrane: Blueskin VP 160 or Blueskin SA, SALT
   e. Primer: Blueskin Adhesive or Blueskin LVC Adhesive

4. PROSOCO, Inc:
   a. PROSOCO R-GUARD Cat 5 Assembly consisting of:
   b. PROSOCO R-GUARD Cat fluid applied vapor permeable air barrier membrane
   c. Joints and Flashings: PROSOCO R-GUARD Cat 5 Joint & Seam Filler, FastFlash and AirDam where required.
5. TK-AirMax 2104 Vapor permeable
7. GE Elemax 2600 AWB.
8. W. R. Meadows, Inc:
   a. Air-Shield™ LM (All Season) fluid applied vapor permeable air barrier membrane
   b. Detailing Strips: Air-Shield Self-Adhering Air Barrier
   c. Water-Based Primer: Mel-Prime WB
   d. Solvent-Based Primer: Mel-Prime VOC and Mel-Prime NE
   e. Counterflashing for Masonry Through-Wall Flashings: Air-Shield Thru-Wall Flashing
   f. Mastics, Adhesives and Tapes: Pointing Mastic
   g. Detail Sealant: Air Shield Joint Filler
   h. Joint Tape: Air Shield Mesh Tape
   a. Sopraseal LM 204 VP fluid applied vapor pearmenable air barrier membrane
   b. Sopraseal liquid flashing
   c. All accessories and products to provide a complete weather barrier system to match the other systems noted above.

2.02 AUXILIARY MATERIALS

A. Sealant at Transitions in Substrate and Connections to Adjacent Elements: Low-modulus pre-cured silicone extrusion and sealant for bonding extrusions to substrates; Tremco Silicone Extruded Sheet by Tremco, Proglaze ETA by Tremco, or Bondaflex Silbridge 300 by May National Associates.

B. Transition Membrane Between Air Barrier Membrane and Roofing and Other Adjacent Materials: Comply with both vapor permeable air barrier barrier manufacturer’s recommendations and roofing material manufacturer’s recommendations.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions under which air barrier assemblies will be applied, with Installer present, for compliance with requirements.
   1. Verify that surfaces and conditions are suitable prior to commencing work of this section. Do not proceed with installation until unsatisfactory conditions have been corrected.
   2. Do not proceed with installation until after minimum concrete curing period recommended by air barrier manufacturer.
   3. Ensure that the following conditions are met:
      a. Surfaces are sound, dry, even, and free of oil, grease, dirt, excess mortar or other contaminants
      b. Concrete surfaces are cured and dry, smooth without large voids, spalled areas or sharp protrusions.
      c. Masonry joints are flush and completely filled with mortar, and all excess mortar sitting on masonry ties has been removed.
   4. Verify substrate is surface dry. Test for capillary moisture by plastic sheet method according to ASTM D 4263 and take suitable measures until substrate passes moisture test. Surface dry is an acceptable substrate condition if acceptable to the manufacturer.
   5. Verify sealants used in sheathing are compatible with membrane proposed for use. Perform field peel-adhesion test on materials to which sealants are adhered.
3.02 SURFACE PREPARATION

A. Clean, prepare, and treat substrate according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for air barrier application. Mask off adjoining surfaces to prevent overspray and spillage.

B. Prime substrate for application of sheet membrane transition strips as recommended by manufacturer and as follows:
   1. Prime masonry, concrete substrates with conditioning primer.
   2. Prime glass-fiber surfaced gypsum sheathing an adequate number of coats to achieve required bond, with adequate drying time between coats.
   3. Prime wood, metal, and painted substrates with primer.
   4. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through air barrier and at protrusions.

C. Prime substrate for application of fluid-applied vapor permeable air barrier if recommended by manufacturer based on project conditions and as follows.

3.03 INSTALLATION

A. Vapor Permeable Air Barrier Installation: Install transition strip materials and fluid-applied vapor permeable air barrier to provide continuity throughout the building envelope. Install materials in accordance with manufacturer's recommendations and as follows, unless manufacturer recommends other procedures in writing based on project conditions or particular requirements of their recommended materials:
   1. Apply primer for transition strips at rate recommended by manufacturer. Allow primer to dry completely before transition strip application. Apply as many coats as necessary for proper adhesion.
   2. Apply primer for fluid-applied vapor permeable air barrier as recommended by fluid-applied vapor permeable air barrier manufacturer. Based on manufacturer's recommendation, no primer may be required for the fluid-applied materials.
   3. Apply fluid-applied vapor permeable air barrier using equipment and methods recommended by manufacturer, to achieve a dry film thickness as recommended by the manufacturer.
   4. Apply fluid-applied vapor permeable air barrier and transition strips to shed water naturally without interception by a sheet edge, unless that edge is sealed with permanently flexible termination mastic.
   5. Position subsequent sheets of transition strips applied above so that membrane overlaps the membrane sheet below by a minimum of 2 inches, unless greater overlap is recommended by manufacturer. Roll into place with roller.
   6. Overlap horizontally adjacent pieces of transition strips a minimum of 2 inches, unless greater overlap is recommended by manufacturer. Roll seams with roller.
   7. Seal around all penetrations with termination mastic, extruded silicone sealant, membrane counterflushing or other procedure in accordance with manufacturer’s recommendations.
   8. Connect vapor permeable air barrier in exterior wall assembly continuously to the air barrier of the roof, to concrete below-grade structures, to windows, curtain wall, storefront, louvers, exterior doors and other intersection conditions and perform sealing of penetrations, using accessory materials and in accordance with the manufacturer’s recommendations.
   9. At changes in substrate plane, provide transition material (bead of sealant, mastic, extruded silicone sealant, membrane counterflushing or other material recommended by manufacturer) under membrane to eliminate all sharp 90 degree inside corners and to make a smooth transition from one plane to another.
   10. Provide mechanically fastened non-corrosive metal sheet to span gaps in substrate plane and to make a smooth transition from one plane to the other. Membrane shall be continuously supported by substrate or as recommended by the manufacturer.
11. At through-wall flashings, provide an additional 6 inch wide strip of manufacturer’s recommended membrane counterflashing to seal top of through-wall flashing to membrane or as recommended by manufacturer. Seal exposed top edge of strip with bead of mastic or as recommended by manufacturer.

12. At deflection and control joints, provide backup for the membrane to accommodate anticipated movement.

13. At expansion and seismic joints provide transition to the joint assemblies.

14. Apply a bead or trowel coat of mastic along membrane seams at reverse lapped seams, rough cuts, and as recommended by the manufacturer.

15. At end of each working day, seal top edge of the self-adhered membrane to substrate with termination mastic.

16. Do not allow materials to come in contact with chemically incompatible materials.

17. Do not expose membrane to sunlight longer than as recommended by the manufacturer.

18. Inspect installation prior to enclosing assembly and repair punctures, damaged areas and inadequately lapped seams with a patch of membrane lapped as recommended by manufacturer.

3.04 PROTECTING AND CLEANING

A. Protect vapor permeable air barrier assemblies from damage during application and remainder of construction period, according to manufacturer’s written instructions.
   1. Coordinate with installation of materials which cover vapor permeable air barrier, to ensure exposure period does not exceed that recommended by the vapor permeable air barrier manufacturer.

B. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction and acceptable to the primary material manufacturer.

END OF SECTION
SECTION 07 42 13.23
METAL COMPOSITE MATERIAL WALL PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Exterior cladding consisting of formed metal composite material (MCM) sheet, secondary supports, and anchors to structure, attached to solid backup.

B. Brow support framing.
   1. All engineering and manufacturing of the items listed below are to be supplied by a single manufacturer.
      a. Aluminum face and liner, composite factory formed wall panel units with integral reveals and integral joinery.
      b. ASM Gusset Support System (GSS)
      c. Extruded aluminum trim related to the wall system and its intersection with adjacent materials.
      d. Adjustable supports for the wall system specified in 2.04,B or final inspection and alignment of adjustable secondary supports supplied by others for conformance to tolerances specified in 2.04,C.1.

C. Matching flashing and trim.

1.02 RELATED REQUIREMENTS

A. Section 05 40 00 - Cold-Formed Metal Framing: Panel support framing.

B. Section 07 43 42 - Rainscreen Attachment System: Panel support system.

C. Section 07 62 50 - Fluid Applied Vapor Permeable Air Barrier: Weather barrier behind wall panel system.

D. Section 07 62 00 - Sheet Metal Flashing and Trim: Metal flashing components integrated with this wall system.

E. Section 07 92 00 - Joint Sealants: Sealing joints between siding and adjacent construction and fixtures.

1.03 REFERENCE STANDARDS


F. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2018.

G. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.


1.04 ADMINISTRATIVE REQUIREMENTS
A. Pre-Installation Meeting: Convene one week before starting work of this section to verify project requirements, co-ordinate with installers of other work, establish condition and completeness of building substrate, and review manufacturers' installation instructions and warranty requirements.
   1. Require attendance by the installer and relevant sub-contractors.
   2. Include MCM sheet manufacturer's representative and wall system manufacturer's representative to review storage and handling procedures.
   3. Review procedures for protection of work and other construction.

1.05 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data - MCM Sheets: Manufacturer's data sheets on each product to be used, including thickness, physical characteristics, and finish, and:
   1. Finish manufacturer's data sheet showing physical and performance characteristics.
   2. Storage and handling requirements and recommendations.
   3. Fabrication instructions and recommendations.
   4. Specimen warranty for finish, as specified herein.
C. Product Data - Wall System: Manufacturer's data sheets on each product to be used, including:
   1. Physical characteristics of components shown on shop drawings.
   2. Storage and handling requirements and recommendations.
   3. Installation instructions and recommendations.
   4. Specimen warranty for wall system, as specified herein.
D. Shop Drawings: Show layout and elevations, dimensions and thickness of panels, connections, details and location of joints, sealants and gaskets, method of anchorage, number of anchors, supports, reinforcement, trim, flashings, and accessories.
   1. Indicate panel numbering system.
   2. Differentiate between shop and field fabrication.
   3. Indicate substrates and adjacent work with which the wall system must be coordinated.
   4. Include large-scale details of anchorages and connecting elements.
   5. Include large-scale details or schematic, exploded or isometric diagrams to fully explain flashing at a scale of not less than 1-1/2 inches per 12 inches.
E. Verification Samples: For each finish product specified, submit at least three samples, minimum size 12 inch square, and representing actual product in color and texture.
F. Manufacturer's Field Reports: Provide within 48 hours of field review. State what was observed and what changes, if any, were requested or required.

G. Manufacturer's Qualification Statement.

H. Installer's Qualification Statement.

I. Maintenance Data: Care of finishes and warranty requirements.

J. Executed Warranty: Submit warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

A. Field Measurements: Verify actual dimensions by field measurement before fabrication; show recorded measurements on shop drawings.

B. Installer Qualifications: Company specializing in performing work of the type specified in this section.
   1. With minimum three years of documented experience.
   2. Approved by wall panel system manufacturer.

C. Brow:
   1. ASM, Inc; St. Louis MO, products and services shall establish the minimum level of quality, performance, dimension and appearance required.
   2. Manufacturer and wall systems contractor shall demonstrate a minimum of ten years of experience in the successful completion of projects utilizing similar systems, applications and performance requirements.
   3. Manufacturer and wall systems contractor shall provide a list of five similar completed projects with addresses of the location, architect and owner.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver products in manufacturer's original, unopened, undamaged containers with identification labels intact.
   1. Protect finishes by applying heavy duty removable plastic film during production.
   2. Package for protection against transportation damage.
   3. Provide markings to identify components consistently with drawings.
   4. Exercise care in unloading, storing and installing panels to prevent bending, warping, twisting and surface damage.

B. Store products protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.
   1. Store in well ventilated space out of direct sunlight.
   2. Protect from moisture and condensation with tarpaulins or other suitable weather tight covering installed to provide ventilation.
   3. Store at a slope to ensure positive drainage of any accumulated water.
   4. Do not store in any enclosed space where ambient temperature can exceed 120 degrees F.
   5. Avoid contact with any other materials that might cause staining, denting, or other surface damage.

1.08 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Installation Warranty for Building Rainscreen Assembly: Installer of exterior rainscreen assembly (including air/vapor barrier and attachments, framing, and exterior panels) to provide 10-year warranty that includes coverage for defective materials and/or workmanship. This warranty will also clearly include materials, labor, necessary activity to access these areas, and removal of any materials to effect repairs and restore to watertight conditions.

www.edacontractors.com/#sle
C. Wall System Warranty: Provide joint written warranty by manufacturer and installer, agreeing to correct defects in manufacturing or installation within a two year period after Date of Substantial Completion.

D. MCM Sheet Manufacturer's Finish Warranty: Provide manufacturer's written warranty stating that the finish will perform as follows for minimum of 5 years:
1. Chalking: No more than that represented by a No.8 rating based on ASTM D4214.
2. Color Retention: No fading or color change in excess of 5 Hunter color difference units, calculated in accordance with ASTM D2244.
3. Gloss Retention: Minimum of 30 percent gloss retention, when tested in accordance with ASTM D523.

E. Brow:
1. The manufacturer shall warrant for a period of one year that the wall system materials will be free from defects. The wall systems contractor shall warrant for a period of one year that the installation workmanship will be free from defects.
2. Finish warranties shall be the paint manufacturer’s standard for wall panels and finished extrusions. For Kynar 500 or Hylar 5000 the warranty period is thirty (30) years against chalk, fade and delamination.

1.09 BROW - SUBSTITUTIONS:

A. Materials, accessories and testing specified shall establish the minimum level of quality, performance, dimension and appearance required of any substitution.

B. No substitution will be considered unless written request for approval has been received by the specifying architect at least ten (10) days prior to the established bid date. Evidence shall be submitted to demonstrate equivalency to the products and performance levels specified. ACM panel systems featuring exposed silicone seals are not acceptable substitutes.
1. A complete description of the substitution including details referenced to the wall and Gusset Support System shown on the contract drawings.
2. Independent test reports verifying compliance with specified performance requirements.
3. A detailed listing of each specification item when the substitution does not fully comply.

C. The manufacturer or wall systems contractor proposing the substitute shall pay the costs of any other subcontractor affected by the proposed substitute.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Metal Composite Material (MCM) Sheet Manufacturers:
   a. Two sheets of .020” aluminum skins bonded to both surfaces of a REYNOBOND FR polyethylene-based core containing inorganic fillers with a total composite thickness of 4mm.
   b. Material to be a minimum 4mm thick. Fire Retardant Core is required.
2. 3A Composites USA; Alucobond: www.alucobondusa.com/#sle.
5. ALUCOBOND; www.alucobondusa.com.
6. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 WALL PANEL SYSTEM

A. Wall Panel System: Metal panels, fasteners, and anchors designed to be supported by framing or other substrate provided by others; provide installed panel system capable of maintaining specified performance without defects, damage or failure.
1. Provide structural design by or under direct supervision of a Structural Engineer licensed in Missouri.
2. Provide panel jointing and weatherseal using reveal joints and gaskets but no sealant.
3. Anchor panels to supporting framing without exposed fasteners.
4. System shall allow individual removal and replacement of panels without disturbing adjacent panels and shall be re-installed in the same way as the original panel.
5. Use of double stick tape is prohibited.

B. Performance Requirements:
1. Panel systems shall be in compliance with the required standards listed. The listing of a product name, system, or fabricator does not constitute approval unless all performance criteria are met.
2. Provide a composite building panel system which has been pretested by an independent testing laboratory to provide specified resistance to air and water infiltration and structural deflection when installed. Systems that are not pretested and certified by an independent laboratory prior to bid are unacceptable. Generic test results are not acceptable, tests must be for the specific system submitted by the panel system engineer and fabricator.
3. Structural Deflection: Deflection of perimeter framing members shall not exceed L/175 of span or 3/4 inches, whichever is less. No permanent deflection in excess of 0.10 inches.
4. Thermal Movement: Provide for free and noiseless vertical and horizontal thermal movement due to expansion and contraction under material temperature range of minus 20 degrees F to 180 degrees F without buckling, opening of joints, undue stress on fasteners, or other detrimental effects; allow for ambient temperature at time of fabrication, assembly, and erection procedures.

C. Panels: 2 1/4 inch deep pans formed of metal composite material sheet by routing back edges of sheet, removing corners, and folding edges.
1. Panel Thickness: R4CW5BRFR (Reynobond).
2. Reinforce corners with riveted aluminum angles.
3. Provide concealed attachment to supporting structure by adhering attachment members to back of panel; attachment members may also function as stiffeners.
4. Maintain maximum panel bow of 0.8 percent of panel dimension in width and length; provide stiffeners of sufficient size and strength to maintain panel flatness without showing local stresses or read-through on panel face.
5. Secure members to back face of panels using structural silicone sealant approved by MCM sheet manufacturer.
6. Metallic Finished Panels: Maintain consistent grain of MCM sheet; specifically, do not rotate sheet purely to avoid waste.
7. Fabricate panels under controlled shop conditions.
8. Where final dimensions cannot be established by field measurement before commencement of manufacturing, make allowance for field adjustments without requiring field fabrication of panels.
9. Fabricate as indicated on drawings and as recommended by MCM sheet manufacturer.
   a. Make panel lines, breaks, curves and angles sharp and true.
   b. Keep plane surfaces free from warp or buckle.
   c. Keep panel surfaces free of scratches or marks caused during fabrication.
10. Provide joint details providing a watertight and structurally sound wall panel system that allows

D. Brow:
1. Horizontal joint to be factory formed and be back ventilated. Vertical joint to have formed returns as shown on the drawings with aluminum extrusion “Gusset” receptors.
2. Extruded aluminum sections shall be secured to the horizontal joint and bonded to the rear face of the panels with silicone. Size and location are the manufacturers responsibility to maintain flatness within the specified tolerances and deflection.
3. Extrusion material shall be 6063, T-5 aluminum. Minimum thickness is 1/16” for trim pieces and 3/32” for structural units.
4. All fabrication used in the manufacture of the finished ACM product shall be 100% complete by local union labor and shall bear the union label seal for quality assurance. Certification will be required as part of the submittal Section, Ref. 3.1.
5. Certified ASM approved installers that are trained and qualified to bid the project include:
   a. Architectural Sheet Metal, Inc
   b. Blakley Sheet Metal
   c. DH&A Sheet Metal
   d. Hyde Sheet Metal
   e. Kuenz Heating & Sheet Metal
   f. Vogel Sheet Metal

6. Trim: The manufacturer shall furnish extruded trim if detailed. Installation shall be by the certified wall systems contractor except for those that require completion of work by other trades.

2.03 PERFORMANCE REQUIREMENTS

A. Provide tests on full-size mock-ups; tests performed previously for other projects are acceptable provided tested assemblies are truly equivalent to those to be used on this project, unless otherwise indicated.

B. Thermal Movement: Provide for free and noiseless vertical and horizontal thermal movement due to expansion and contraction under material temperature range of minus 20 degrees F to 180 degrees F without buckling, opening of joints, undue stress on fasteners, or other detrimental effects; allow for ambient temperature at time of fabrication, assembly, and erection procedures.
   1. Wind Performance: Provide system tested in accordance with ASTM E330/E330M without permanent deformation or failures of structural members under the following conditions:
   2. Maximum deflection of perimeter framing member of L/175 normal to plane of the wall; maximum deflection of individual panels of L/60.
   3. Maximum anchor deflection in any direction of 1/16 inch at connection points of framing members to anchors.

C. Air Infiltration: 0.06 cfm/sq ft of wall area, maximum, when tested at 1.57 psf in accordance with ASTM E283.

D. Water Penetration: No water penetration under static pressure when tested in accordance with ASTM E331 at a differential of 10 percent of inward acting design load, 6.24 psf minimum, after 15 minutes.
   1. Water penetration is defined as the appearance of uncontrolled water on the interior face of the wall.
   2. Design to drain leakage and condensation to the exterior face of the wall.

E. Fire Performance: Tested in accordance with, and complying with the acceptance criteria of, NFPA 285; testing must be performed specifically for this project.

2.04 BROW - PERFORMANCE REQUIREMENTS:

A. Panels and Gusset Support Systems shall be designed for component and cladding wind loads determined in accordance with the more stringent of either the local building code or ASCE 7-98, or IBC 2000 for the parameters specified.
   1. Importance Factor
   2. Exposure Category
   3. Basic Wind Speed

B. Supports for the wall system shall be designed in accordance with AISC, AISI or the Aluminum Association design procedures.

C. The wall Gusset Support System shall be designed to allow differential movement of the buildings roof and floor structures and shall be capable of performing within the following limitations:
   1. Normal to the plane of the wall: the maximum allowable deflection of the panel perimeter shall be limited to L/175. The maximum allowable deflection of the Panel Stiffeners and the aluminum composite panel material shall be limited to L/60. Compliance to these Deflection Limitations shall be provided as part of the submittals; reference Section 3.1.
2. Provide allowances for vertical and horizontal movements due to thermal expansion and contraction.

D. Panel Flatness Criteria shall be a maximum of 1/32" or 2'-0 in any direction (non-accumulative).

E. Water Penetration is defined as the appearance of uncontrolled water within the wall construction. Provision shall be made in the design to drain to the exterior face of the wall any leakage of water occurring at joints and/or condensation taking place within the wall construction. Tested in accordance with AAMA 501.1 Dynamic Water Test, no water infiltration at static pressure differential of 15 psf.

F. Fire Performance Characteristics – wall panel system shall comply with requirements for finished panel performance as established by Section 1407 of the International Building Code (IBC) for use where non-load bearing, non-combustible wall construction is required. Laboratory and full-scale testing including, but not limited to the following shall be available.

1. Finish panel system shall demonstrate compliance with the following criteria for surface burning characteristics per ASTM E-84:
   a. Flame Spread – 25* or less
   b. Smoke Developed – 450 or less
   c. *Numerical flame spread ratings are not intended to reflect hazards presented by these materials under actual fire conditions

2. As building units for interior building construction per UL standard 1715
3. As a component of fire rate, non-load bearing wall assemblies per ASTM E-119
4. Reports of Flammability testing in accordance with NFPA 285 for FR MCM panels

2.05 MATERIALS

A. Metal Composite Material (MCM) Sheet: Two sheets of aluminum sandwiching a core of extruded thermoplastic material; no foamed insulation material content.

1. Overall Sheet Thickness: 0.157 inch, minimum.
2. Face Sheet Thickness: 0.019 inches, minimum.
3. Bond and Peel Strength: No adhesive failure of the bond between the core and the skin nor cohesive failure of the core itself below 22.4 inch-pound/inch with no degradation in bond performance, when tested in accordance with ASTM D1781, simulating resistance to panel delamination, after 8 hours of submersion in boiling water and after 21 days of immersion in water at 70 degrees F.
4. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
5. Flammability: Self-ignition temperature of 650 degrees F or greater, when tested in accordance with ASTM D1929.
6. Factory Finish: Three coat fluoropolymer resin coating, approved by the coating manufacturer for the length of warranty specified for the project, and applied by coil manufacturing facility that specializes in coil applied finishes.
   b. Long-Term Performance: Not less than that specified under WARRANTY in PART 1, no uncontrolled water penetration on inside face of panel system.

B. Metal Framing Members: Include sub-girts, zee-clips, base and sill angles and channels, hat-shaped and rigid channels, and furring channels required for complete installation.

1. Provide material strength, dimensions, configuration as required to meet the applied loads applied and in compliance with applicable building code.
2. Sheet Steel Components: ASTM A653/A653M galvanized to G90/Z275 or zinc-iron alloy-coated to A60/ZF180; or ASTM A792/A792M aluminum-zinc coated to AZ60/AZM180.
3. Stainless Steel Sheet Components: ASTM A480/A480M.
C. Metal Composite Material Wall Panels
   1. Provide material strength, dimensions, configuration as required to meet the applied loads applied and in compliance with applicable building code.
   2. Sheet Steel Components: ASTM A653/A653M galvanized to G90/Z275 or zinc-iron alloy-coated to A60/ZF180; or ASTM A792/A792M aluminum-zinc coated to AZ60/AZM180.
   3. Stainless Steel Sheet Components: ASTM A480/A480M.
   4. Aluminum Components: ASTM B209 (B209M); or ASTM B221.

2.06 FINISHES
   A. Factory Finish: Two coat fluoropolymer resin coating, approved by coating manufacturer for length of warranty specified for project, and applied by coil manufacturing facility that specializes in coil applied finishes.
      1. Coating Flexibility: Pass ASTM D4145 minimum 1T Bend, at time of manufacturing.
      2. Long-Term Performance: Not less than that specified under WARRANTY in PART 1.
   B. Interior surface to be manufacturer’s standard primer.
   C. Paint System: Colorweld 500 (Reynobond).
   D. Color: as indicated on the drawings.

2.07 ACCESSORIES
   A. Provide panel system manufacturer’s and installer’s standard corrosion resistant accessories, including fasteners, clips, anchorage devices and attachments.
   B. Trim
      1. All exposed areas shall be finished with the same finish as the ACM panels.

2.08 GUSSET STRUCTURAL SUPPORT SYSTEM (GSS)
   A. Provide the GSS attachment to the structural studs, steel tubes, girts and/or miscellaneous structural steel as shown on the drawings as part of the wall panel support system. Additional secondary supports, other than the horizontal gusset rail, shall not be required with the GSS.
   B. Openings for doors, windows, louvers, etc. shall be framed out with hot rolled shapes or cold formed light gauge framing, as is appropriate for the type of wall construction.

PART 3 EXECUTION

3.01 SUBMITTALS
   A. Submit test reports and certifications to demonstrate compliance with performance requirements and building code acceptance specified.
      1. Shop and erection drawings shall clearly illustrate the details required to comply with the performance requirements specified including interface of the wall and window systems with adjoining construction.
   B. Materials and finish for each component shall be defined.
   C. Erection procedures will be included where required to clearly explain proper installation of fasteners, trim, and sealants.
   D. Calculations supporting structural performance shall be prepared and drawings stamped by a Professional Engineer in the state of Missouri.
   E. Samples shall be submitted to illustrate the panel design, texture, color and other features specified.
   F. Published Deflection Data to be used as evidence that the deflection limitations listed in Section 2.04.C.1 for the panel perimeter, stiffeners and ACM material are met.

3.02 EXAMINATION
   A. If the wall system contractor is not supplying the primary wall support steel, the final alignment of the primary steel supports for the wall shall be checked by the wall systems contractor in accordance with Section 2.04.B.
B. All materials shall be inspected for damage and conformance to the specifications and shop drawings prior to installation.

C. Examine dimensions, tolerances, and interfaces with other work.
   1. Verify that weather barrier system is properly installed, refer to Section 07 26 50 for requirements.

D. Examine substrate on-site to determine that conditions are acceptable for product installation in accordance with manufacturers written instructions.

E. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

F. Notify Architect in writing of conditions detrimental to proper and timely completion of work, and do not proceed with erection until unsatisfactory conditions have been corrected.

3.03 PREPARATION
   A. Protect adjacent work areas and finish surfaces from damage during installation.

3.04 INSTALLATION
   A. Do not install products that are defective, including warped, bowed, dented, and broken members, and members with damaged finishes.

   B. Comply with instructions and recommendations of MCM sheet manufacturer and wall system manufacturer, as well as with approved shop drawings.

   C. Install the wall, fasteners, trim and related items in accordance with dimensions and procedures shown on the approved shop and erection drawings.

   D. Install wall system securely allowing for necessary thermal and structural movement; comply with wall system manufacturer's instructions for installation of concealed fasteners.

   E. Do not handle or tool products during erection in manner that damages finish, decreases strength, or results in visual imperfection or failure in performance. Return component parts that require alteration to shop for refabrication, if possible, or for replacement with new parts.

   F. Manufacturer shall provide detailed instructions covering the tools, fasteners, sealants, gaskets, and procedures required to assure performance of the wall and window assembly as specified.

   G. Do not form panels in field unless required by wall system manufacturer and approved by the Architect; comply with MCM sheet manufacturer's instructions and recommendations for field forming.

   H. Separate dissimilar metals; use gasket fasteners, isolation shims, or isolation tape where needed to eliminate possibility of electrolytic action between metals.

   I. Where joints are designed for field applied sealant, seal joints completely with specified sealant.

   J. Sealants and gaskets shall be installed where shown and in accordance with the approved shop and erection drawings to assure air and water infiltration performance specified. Install flashings as indicated on shop drawings.

   K. At flashing butt joints, provide a lap strap under flashing and seal lapped surfaces with a full bed of non-hardening sealant.

   L. Paint, bituminous coating, or sealant as recommended by the manufacturer shall separate dissimilar metals.

   M. Install square, plumb, straight, and true, accurately fitted, with tight joints and intersections maintaining the following installation tolerances:
      1. Variation From Plane or Location: 1/2 inch in 30 feet of length and up to 3/4 inch in 300 feet, maximum.
      2. Deviation of Vertical Member From True Line: 0.1 inch in 25 feet run, maximum.
      3. Deviation of Horizontal Member From True Line: 0.1 inch in 25 feet run, maximum.
      4. Offset From True Alignment Between Two Adjacent Members Abutting End To End, In Line: 0.03 inch, maximum.
N. Replace damaged products.
   1. Exception: Field repairs of minor damage to finishes are permitted only when approved in writing by Architect, panel manufacturer, and fabricator.
   2. Field Repairs to Finishes: Using materials and methods sufficient that repairs are not discernible when viewed at distance of 10 feet under all typical light conditions experienced at the project.

O. Damage caused by the manufacturer or wall systems contractor shall be replaced or repaired to as new condition. Replacement panels must be manufactured and ready for pick up or delivery within 2 working days of written notice to the manufacture, if damage occurs during the construction schedule and prior to owner occupancy.

P. The construction manager for the project shall inspect and approve each completed wall area and be responsible for protection of completed work from damage by other trades.

Q. Work shall be coordinated with other trades as required to insure proper flashing and seals to intersecting construction.

3.05 FIELD QUALITY CONTROL
   A. Wall System Manufacturer's Field Services: Provide field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with instructions.
   B. Site Visits: Schedule two site visits during execution of installation.

3.06 CLEANING
   A. Ensure weep holes and drainage channels are unobstructed and free of dirt and sealants.
   B. Remove protective film after installation of joint sealers, after cleaning of adjacent materials, and immediately prior to completion of work.
   C. Remove temporary coverings and protection of adjacent work areas.
   D. Clean installed products in accordance with manufacturer's instructions.

3.07 PROTECTION
   A. Protect installed panel system from damage until Date of Substantial Completion.

END OF SECTION
SECTION 07 43 42
RAINSCREEN ATTACHMENT SYSTEM

GENERAL

1.01 SUMMARY
A. Provide a thermally broken, rainscreen attachment system for attachment of exterior rainscreen cladding installed over exterior sheathing.

B. Related Sections:
   1. Refer to Division 05 Section “Cold-Formed Metal Framing”.
   2. Refer to Division 06 Section “Rough Carpentry” for wood framing.
   3. Refer to Division 07 Section “Fluid-Applied Vapor Permeable Air Barrier”
   4. Refer to Division 07 Section “Thermal Insulation” for exterior insulation.
   5. Refer to Division 07 Section “Metal Composite Material Wall Panels”

1.02 SYSTEM DESCRIPTION
A. System assembly shall include the following components from the substrate out:
   2. Weather Resistant/Fluid-Applied Vapor Permeable Air Barrier over substrate.
   3. Thermal insulation.
   4. Thermally broken rainscreen attachment system.
   5. Exterior cladding.

B. Design Requirements:
   1. Manufacturer is responsible for designing system, including anchorage to structural system and necessary modifications to meet specified requirements and maintain visual design concepts.
   2. Employ registered professional engineer, licensed to practice engineering in jurisdiction where Project is located, to engineer each component of attachment system.
   3. Structural Design: Exterior-insulated rainscreen wall assembly capable of withstanding effects of load and stresses from dead loads, wind loads, ice loads (if applicable) as indicated on Structural General Notes on Structural Drawings, and normal thermal movement without evidence of permanent defects of assemblies or components.
      a. Thermal Movements: Provide assemblies that allow for thermal movements resulting from the following maximum ambient temperatures by preventing overstressing of components and other detrimental effects:
         1) Temperature Change (range): 120 degrees Fahrenheit (67 degrees C), ambient:
   4. Support Framing/Attachment System:
      a. Frequency and spacing of brackets as indicated by manufacture in project specific engineering package.

C. Performance Requirements:
   1. Rainscreen Attachment System Performance: Comply with ANSI/ASHRAE 90.1-2010 maximum U-Value for walls.
   2. Thermal Performance:
      b. Full constructed exterior assembly must have a minimum 90% EFFECTIVE R-value when compared to the exterior insulation’s rated R-Value.
      c. Continuous framing profiles (including C- or Z-shaped sections or furring) penetrating insulation not allowed.
      d. Perform effective R-Value calculation or modeling in accordance with ASHRAE guidelines.
   3. Structural Performance:
      a. Framing Members:
         1) Test framing components to AAMA TIR- A8-[04] – Section 7.2 to determine structural performance and effective moment of inertia for each perforated component. Minimum Effective Moment of Inertia for Primary Rail: 0.0134 in4.
2) Localized bending stress for eccentrically loaded framing members must be evaluated with the maximum effective length of resisting element not more than 12 inches.

b. Fasteners:
   1) Tension shall be taken as sum of direct tension plus tension due to prying for eccentrically loaded connections. Prying may be reduced or eliminated if proven via engineering analysis or testing.
   2) Minimum Safety Factor of 3 for both tension and shear values.
   3) Combined tension and shear shall be evaluated according to an interaction formula. Sum of terms shall not exceed 1.0.

1.03 SUBMITTALS

A. Product Data: Submit manufacturer’s product literature and descriptions of testing performed on system components to indicate meeting or exceeding specified performance.

B. Shop Drawings:
   1. Submit connection details to the cladding manufacturer, showing interface of rainscreen attachment system to substrate and panels with adjacent construction, signed and sealed by Professional Engineer.
   2. Show system installation and attachment, including fastener size and spacing.

C. Structural Calculations:
   1. Submit rainscreen attachment manufacturer’s comprehensive Structural Design analysis signed and sealed by a Professional Engineer.

D. Samples: Submit following material samples for verification:
   1. Wall Brackets: Two (2) samples.
   2. Horizontal Rails: Two (2) 12-inch long samples.

E. Test Reports:
   1. Test to the following standards and provide written test reports by a third party:
      a. AAMA TIR-A8-[04]; Structural Performance of Composite Thermal Barrier Framing Systems – Section 7.2.
      2. Comprehensive three-dimensional thermal modeling report indicating framing systems impact on exterior insulation rated R-value.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications:
   1. Minimum 5 years’ experience specializing in the manufacturing of façade attachment/support framing similar to those specified.
   2. Ability to demonstrate conformance to testing requirements.

B. Installer Qualifications:
   1. Minimum of 3 years’ documented experience or minimum of 5 completed projects of equivalent scope and quality and recommended by manufacturer to perform work of this Section.
   2. Onsite superintendent or foreman overseeing installation on site during entire work of this Section with experience equivalent to installer and in good standing with the manufacturer.

C. Engineer Qualifications: Registered professional engineer experienced in the design of curtain wall systems, anchors, fasteners and licensed to practice engineering in the jurisdiction where Project is located.

D. Pre-Installation Meeting:
   1. Discuss sequence and scheduling of work and interface with other trades.
   2. Review metal wall framing assemblies for potential interference and conflicts and coordinate layout and support provisions for interfacing work.
   3. Review and document methods, procedures and manufacturer’s installation guidelines and safety procedures for exterior wall assembly.
E. Mock-Ups: Coordinate mock-up materials and requirements with mock-up specified in Division 01 [and exterior cladding specification].

1.05 QUALITY CONTROL
A. Single source responsibility:
   1. Furnish engineered rainscreen attachment system components under direct responsibility of single manufacturer.
B. Field Measurements: Verify actual supporting and adjoining construction before fabrication.
C. Record field measurements on project record shop drawings.
D. Established Dimensions: Where field measurements cannot be made without delaying work, guarantee dimensions and proceed with fabrication of rainscreen attachment system corresponding to established dimensions.

1.06 DELIVERY, STORAGE AND HANDLING
A. Delivery: Deliver materials and components in manufacturers' original, unopened and undamaged containers or bundles, fully identified. Exercise care to avoid damage during unloading, storing and installation.
B. Store, protect and handle materials and components in accordance with manufacturer recommendations to prevent damage, contamination and deterioration. Keep materials clean, dry, and free of dirt and other foreign matter, and protect from damage due to weather or construction activities.

1.07 SEQUENCING
A. Ordering: Comply with manufacturers’ ordering instructions and lead time requirements to avoid construction delays.
B. Coordinate construction to ensure that assemblies fit properly to supporting and adjoining construction; coordinate schedule with construction in progress to avoid delaying work.

1.08 WARRANTY
A. Manufacturer Warranties:
      a. Covers components of the attachment system, including structural failure of components when all the materials and components are supplied and installed per manufacturer’s requirements.
      b. Includes labor and material for removal and replacement of defective material.
      c. Includes labor to remove and reinstall façade finish panels, finish closures and façade finish accessories necessary to access defective material.
B. Contractor’s Warranties: 2-year labor warranty, starting from [date of Owner acceptance of completed work] [Substantial Completion], to cover repair of materials found to be defective as a result of installation errors.
C. Limitation of Warranties: Exclude repairs, replacement, and corrective work to the substrate, primary structure, finish panels, and/or property – unless otherwise noted above. Warranties exclude mechanical damage due to abuse, neglect, primary structure failure, or forces of nature greater than normal weather conditions.

1.09 MAINTENANCE
A. Extra Materials: For use by Owner in building maintenance and repair, provide [a recommended percentage of] [3 percent] additional rainscreen attachment components in new, unopened cartons, packaged with protective covering for storage and identified with appropriate labels.

PRODUCTS
2.01 RAINSCREEN ATTACHMENT/SUPPORT FRAMING SYSTEM
A. Comply with ANSI/ASHRAE 90.1-2010.
   1. ASTM A653 Galvanized steel is not acceptable.
C. Steel Classification: Structural Steel (SS), Grade 50, 50 ksi Yield.
D. Spacing: Comply with manufacturer’s Professional Engineer’s project specific calculations.
E. Wall Brackets:
   1. Minimum 0.074 inch thick (14 gauge) sheet steel.
   2. Dimensions:
      b. Offset Brackets: 2- [3-] [3.5-] inch depth.
         1) Align offsets to differing wall planes as shown on Drawings.
   3. Pre-Punched Holes: Two wall anchors per bracket.
   4. Recommended Product: ThermaBracket-S by Knight Wall Systems or approved equal.
F. Primary Horizontal [Vertical] Rail, Static S-Series.
   1. Minimum 0.046-inch thick (18 gauge) [0.054-inch thick (16 gauge)] cold-formed steel.
   2. Profile: C channel, two flanges of equal length and one web.
   3. Nominal Dimensions: Minimum 1.0 inch flange for attaching to wall bracket and 1.625 inch at web.
   4. Pre-Punched Attachment Holes: 1.0 inch on center along length of track and oversized allowing for thermal contraction and expansion of rail without placing stress on brackets.
   5. Recommended Product: S-Rail by Knight Wall Systems or approved equivalent.
G. Secondary Vertical [Horizontal] Rail: Nominal 0.046 inch thick (18 gauge) [0.054-inch thick (16 gauge)] cold-formed steel.
   1. Profile: Hat channel with stiffening lips.
   2. Profile Depth: 0.75 inches.
   3. Girt Fastening Face: 2.0 inches [3.0 inches] [4.0 inches] [5.0 inches] [Manufacturer’s recommendation as Engineered].
   4. Weep Drains: 0.75 inches diameter at 4 inches on center along flanges to allow for free air flow laterally.
   5. Attachment Holes: Locate at 2 inch on center along back to facilitate number 14 self-drilling self-tapping screw attachment to primary rail.
      a. Oversize holes to allow for thermal contraction and expansion of rail.
   7. Or approved equal.
H. Reveal Rail: Nominal 0.046 inch thick (18 gauge) [0.054-inch thick (16 gauge)] cold-formed steel.
   1. Profile: Square hat channel with stiffening lips.
   2. Depth: 0.75 inches.
   3. Dimensions: 2.0 inches at web, 1.625 inches at each flange with 0.25 stiffening lips.
   4. Basis of Design: RevealRail™ by Knight Wall Systems or approved equivalent.
I. Thermal Isolation:
   1. Material: Injection molded Polyoxymethylene copolymer (POM), non-fiber reinforced.
   2. Tensile Yield Strength: 9.57 ksi per ISO 527.
   4. Components:
      a. Wall Anchor Isolation Washer: minimum 0.125 inch thick.
      b. Support Wall Substrate Isolation: Minimum 0.375-inch thick at each wall bracket.
      c. Rail to Bracket Isolation: Minimum 0.125 inch thick at each connection.
      d. Bracket Shim: Match support wall substrate isolator profile; available in 0.125-inch thickness and does not decrease thermal or structural performance of system.
   6. Or approved equal.
J. Fasteners:
1. Sufficient length to provide solid attachment to structure as required by manufacturer.
2. Thermally isolated.
3. Framed substrate with sheathing: Self-drill hex-washer-head stainless steel with 1,000 hour salt-spray rated thermoset polyester coating.
   a. Embedment depth: 0.625 inches or three full threads minimum, whichever is greater.
   b. Minimum ultimate pull-out capacity from 18 gauge steel: 450 pounds.
4. Concrete and concrete masonry units substrate:
   a. Embedment depth: 1.25 inches minimum.
   b. Minimum ultimate pull-out capacity from substrate material: 450 pounds.
   c. 1/4 inch Kwik-Con II+ by Hilti
   d. 1/4 inch Tapcon by Buildex
   e. 1/4 inch UltraCon by Elco Industries
   f. Or approved equal.
5. For primary to secondary rail connection: Self-drill hex-washer-head stainless steel with 1,000 hour salt-spray rated thermoset polyester coating.
   a. Embedment depth: 0.625 inches or three full threads minimum, whichever is greater.
   b. Minimum ultimate pull-out capacity from 18 gauge steel: 450 pounds.

K. Accessories:
1. Bracing, Furring, Bridging, Plates, Gussets, and Clips: Formed sheet steel, thickness as necessary to meet structural requirements for special conditions encountered.
2. Galvanic Protection: Utilize tapes and other methods as necessary to separate and prevent contact between dissimilar metals.

2.02 MINERAL FIBER INSULATION
A. Refer to Section 07 21 00 – Thermal Insulation.

2.03 SIDING/CLADDING PANEL
A. Refer to Division 07 Section 07 42 13.23.

EXECUTION

3.01 EXAMINATION
A. Examine substrates and conditions for compliance with manufacturer requirements for installation conditions affecting performance of the work.
   1. Do not proceed with installation until unsatisfactory conditions have been corrected.
   2. Ensure weather-resistant barrier (WRB) is installed prior to installing rainscreen attachment system.
   3. Ensure fenestration, transitions, discontinuities, sills, and ledgers are flashed and sealed to move moisture to the exterior of the building.
B. Field verify architectural details and mechanical and electrical requirements prior to commencing installation.
C. Commencement of installation constitutes acceptance of existing conditions and acceptance of responsibility for satisfactory performance.

3.02 RAINSCREEN ATTACHMENT SYSTEM INSTALLATION
A. Preparation: Review areas of potential interference and conflicts and coordinate layout and support provisions for interfacing work.
B. Installation: Install in strict accordance with manufacturer’s installation instructions.
C. Wall Brackets and Primary Rail:
   1. Mount wall brackets at 16 inch on center horizontally [vertically] on support wall (at each stud location).
      a. Brackets must be laid out at 0.5 inch increments vertically or horizontally.
      b. Tighten screws to substructure to a snug tight condition and not stripped. Do not over-torque beyond manufacturer’s recommendation. If installed using hand tools, verify for each installer at beginning of project using snug-tight criteria. Do not use stripped holes.
   2. Thermally isolate wall bracket attachments by sandwiching thermal break material between metal bracket and support wall substrate.
   3. Thermally isolate screw fastener washers using material to thermally isolate fastener heads from metal bracket.
   4. Mineral Fiber Insulation: Install to expand into and friction fit between wall brackets as specified by Section 072100 prior to installing horizontal rails.
   5. Attach horizontal rail to wall bracket stem by use of a self-tapping screw fastener through the pre-punched holes in the rail and into the pre-punched pilot holes on the bracket.
   6. Isolate horizontal rail from bracket by sandwiching a thermal break material between rail and bracket stem.
   7. Attach horizontal rail at proper pre-punched pilot holes on bracket stem to align plumb and true. Account for irregularities in support wall.
   8. Establish and re-establish and restart vertical bracket locations using laser or chalk-line at fenestrations and other obstructions to establish horizontal alignments.

D. Secondary Rail: (See drawing for location)
   1. Space to make suitable bearing surfaces for each cladding system as instructed by manufacturer and as shown on Architect accepted shop drawings.
   2. Begin at bottom and mount to horizontal rails using No. 14 self-drilling self-tapping stainless steel screws.
   3. Tighten screws to snug tight. Verify equivalent snug tight condition for installers using hand tools.
   4. Install successive vertical rails as required for panel type and engineering.
   5. When encountering fenestrations and other openings, mount vertical rails so that fastening points are as close to the lower and upper edges as possible.

E. Touch-up shop-applied protective coatings damaged during handling and installation.

F. Use shearing instruments (i.e. snips, nibbler, etc.) for cutting metal framing components. Saws are not recommended, as the sparks produced during cutting will damage the anti-corrosion coating. If sparks are generated during cutting, be sure the portion of the component to be installed on the building is protected from sparks and that any stockpile near the cutting station is also protected.

G. The systems components should not be cut while installed on the building, unless using a shearing instrument.

H. Replace thermal isolator pieces that break during installation.

I. Provide a 3/8” – 1/2” gap between girts for expansion when multiple lengths of rail are installed.

J. Minimum length of installed cut primary rail is 12” and must be attached to at least two separate wall brackets to prevent rotation of rail. Unsupported cantilever must not exceed 6” unless specified differently by manufacturer’s engineer.

K. Minimum length of installed cut secondary rail is 12” and must be mechanically attached to at least two separate primary rails.
3.03 ERECTION TOLERANCES
   A. Maximum Framing Member Variation from True Position: 1/4 inch.
   B. Maximum Framing Member Variation from Plane:
      1. Individual Framing Members: Do not exceed 1/4 inch in 10 foot.
      2. Accumulative Over-all Variation for Wall and Floor System: Do not exceed 1/4 inch.

3.04 FIELD QUALITY CONTROL
   A. Manufacturer’s Field Technical Service: Make intermittent and final inspection to verify
      installation in conformance to manufacturer instructions and suitable as framing assembly for
      subsequent metal panels, acrylic plastering, and other cladding installations.
      1. Confirm snug tight and fastener sizing.
      2. Confirm framing members installed in correct orientation.

3.05 ADJUSTING
   A. Inspect and adjust after installation. Replace or repair defective work.
   B. Adjust, and reconfigure as necessary to accommodate cladding systems for installations over
      work of this Section. Do not reuse pre-drilled holes unless fastener size is increased.

3.06 SIDING/CLADDING PANEL INSTALLATION – REFER TO SECTION 07 42 13.23.
   A. The cavity must be clear and free from air flow and drainage obstructions.

END OF SECTION
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PART 1 GENERAL

1.01 SECTION INCLUDES

A. Thermoplastic membrane roofing system, including all components specified.
B. Insulation, flat and tapered.
C. Roofing cant strips, stack boots, roofing expansion joints, and walkway pads.
E. Commencement of work by Contractor shall constitute acknowledgement by Contractor that this specification can be satisfactorily executed, under the project conditions and with all necessary prerequisites for warranty acceptance by roofing membrane manufacturer. No modification of the Contract Sum will be made for failure to adequately examine the Contract Documents or the project conditions.

1.02 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry: Wood nailers associated with roofing and roof insulation.
B. Section 07 62 00 - Sheet Metal Flashing and Trim: Formed metal flashing and trim items associated with roofing.
C. Section 07 71 00 - Roof Specialties: Manufactured copings, fascias, gravel stops, and other flashing-related items.
D. Section 07 72 00 - Roof Accessories: Roof hatches, vents, and manufactured curbs.

1.03 REFERENCE STANDARDS

L. FM DS 1-29 - Roof Deck Securement and Above-Deck Roof Components; Factory Mutual System; 2016.
1.04 ADMINISTRATIVE REQUIREMENTS
   A. Pre-Installation Conference: Before start of roofing work, Contractor shall hold a meeting to
discuss the proper installation of materials and requirements to achieve the warranty.
   1. Require attendance with all parties directly influencing the quality of roofing work or
affected by the performance of roofing work.
   2. Notify Architect well in advance of meeting.

1.05 SUBMITTALS
   A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
   B. Product Data:
      1. Provide membrane manufacturer's printed data sufficient to show that all components of
roofing system, including insulation and fasteners, comply with the specified requirements
and with the membrane manufacturer's requirements and recommendations for the
system type specified; include data for each product used in conjunction with roofing
membrane.
   C. Samples: Submit samples of each product to be used.
   D. Shop Drawings: Provide:
      1. The roof membrane manufacturer's standard details customized for this project for all
relevant conditions, including flashings, base tie-ins, roof edges, terminations, expansion
joints, penetrations, and drains.
   E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
   F. Manufacturer's Installation Instructions: Indicate membrane seaming precautions and perimeter
conditions requiring special attention.
   G. Manufacturer's Field Reports: Indicate procedures followed, ambient temperatures, and
supplementary instructions given.
   H. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's
name and registered with manufacturer.
   I. Executed Warranty.

1.06 QUALITY ASSURANCE
   A. Installer Qualifications: Roofing installer shall have the following:
      1. Company specializing in performing the work of this section:
      2. Approved by membrane manufacturer.

1.07 DELIVERY, STORAGE AND HANDLING
   A. Deliver products in manufacturer's original containers, dry and undamaged, with seals and
labels intact and legible.
   B. Store materials clear of ground and moisture with weather protective covering.
   C. Keep combustible materials away from ignition sources.
   D. Protect foam insulation from direct exposure to sunlight.

1.08 FIELD CONDITIONS
   A. Do not apply roofing membrane during unsuitable weather.
   B. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is
expected or occurring.
   C. Do not expose materials vulnerable to water or sun damage in quantities greater than can be
weatherproofed the same day.

1.09 WARRANTY
   A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
   B. Comply with all warranty procedures required by manufacturer, including notifications,
scheduling, and inspections.
C. System Warranty: Provide manufacturer's system warranty agreeing to repair or replace roofing that leaks or is damaged due to wind or other natural causes.
   1. Warranty Term: 20 year.
   2. For repair and replacement include costs of both material and labor in warranty.

D. Insulation Warranty: Separate Insulation Warranty with warranty term coinciding with Red Shield Warranty.
   1. Limit of Liability: No dollar limitation
   2. Scope of Coverage: Provide replacement for insulation that warps, bows, or is on the point of causing a roof leak as a result of manufacturing defect.

E. Metal Roof Edging: Full-system warranty for roof edge system, covering blow-off from winds up to 150 mph.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Thermoplastic Polyolefin Membrane Materials:
   6. Carlisle Coating & Waterproofing (CCW) Barritech VP and/or VP LT.


C. Insulation:

D. Manufacturer of Insulation and Cover Boards: Same manufacturer as roof membrane.

E. Manufacturer of Metal Roof Edging: Same manufacturer as roof membrane.
   1. Metal roof edging products by other manufacturers are not acceptable.
   2. Field- or shop-fabricated metal roof edgings are not acceptable.

F. Substitutions: See Section 01 60 00 - Product Requirements.
   1. Submit evidence that the proposed substitution complies with the specified requirements.

2.02 ROOFING SYSTEM DESCRIPTION

A. Roofing System: Thermoplastic polyolefin (TPO) single-ply membrane.
   1. Membrane Attachment: Fully adhered.
   2. Comply with applicable local building code requirements.
   3. Provide assembly complying with Factory Mutual Corporation (FM) Roof Assembly Classification, FM DS 1-28 and FM DS 1-29, and meeting minimum requirements of FM 1-90 wind uplift rating.

B. Roofing System Components: Listed in order from the top of the roof down:
   1. Membrane: Thickness as specified.
   2. Base Sheet Over Insulation: Cold adhesive attached.
   3. Insulation Cover Board: High density polyisocyanurate; mechanically attached.
   4. Insulation:
      a. Maximum Board Thickness: 3 inches; use as many layers as necessary; stagger joints in adjacent layers.
      b. Tapered: Slope as indicated; provide minimum R-value at thinnest point; place tapered layer on bottom.
      c. Total R-value of 30, minimum. Not required over canopy.
d. Top Layer: Polyisocyanurate foam board, non-composite; cold adhesive attached.
e. Intermediate Layer(s), If Any: Polyisocyanurate foam board, non-composite; cold adhesive attached.
f. Bottom Layer: Polyisocyanurate foam board, non-composite; mechanically fastened.
g. Crickets: Tapered insulation of same type as specified for top layer; slope as indicated.

2.03 MEMBRANE MATERIALS

A. Membrane: Flexible, heat weldable sheet composed of thermoplastic polyolefin polymer and ethylene propylene rubber; complying with ASTM D6878/D6878M, with polyester weft inserted reinforcement and the following additional characteristics:
   1. Thickness: 0.060 inch plus/minus 10 percent, with coating thickness over reinforcement of 0.024 inch plus/minus 10 percent.
   2. Sheet Width: Provide the widest available sheets to minimize field seaming.
B. Membrane Fasteners: Type and size as required by roof membrane manufacturer for roofing system and warranty to be provided; use only fasteners furnished by roof membrane manufacturer.
C. Curb and Parapet Flashing: Same material as membrane, with encapsulated edge which eliminates need for seam sealing the flashing-to-roof splice; precut to 18 inches wide.
D. Formable Flashing: Non-reinforced, flexible, heat weldable sheet, composed of thermoplastic polyolefin polymer and ethylene propylene rubber.
   1. Thickness: 0.060 inch plus/minus 10 percent.
   2. Tensile Strength: 1550 psi, minimum, when tested in accordance with ASTM D638 after heat aging.
   3. Elongation at Break: 650 percent, minimum, when tested in accordance with ASTM D638 after heat aging.
   4. Tearing Strength: 12 lbf, minimum, when tested in accordance with ASTM D1004 after heat aging.
E. Tape Flashing: 5-1/2 inch nominal wide TPO membrane laminated to cured rubber polymer seaming tape, overall thickness 0.065 inch nominal; TPO QuickSeam Flashing by Firestone.
F. Bonding Adhesive: Neoprene and SBR rubber blend, formulated for compatibility with the membrane other substrate materials, including masonry, wood, and insulation facings; UltraPly Bonding Adhesive by Firestone.
G. Pourable Sealer: Two-part polyurethane, two-color for reliable mixing; Pourable Sealer by Firestone.
H. Seam Plates: Steel with barbs and Galvalume coating; corrosion-resistance complying with FM 4470.
I. Termination Bars: Aluminum bars with integral caulk ledge; 1.3 inches wide by 0.10 inch thick; Firestone Termination Bar by Firestone.
J. Cut Edge Sealant: Synthetic rubber-based, for use where membrane reinforcement is exposed; UltraPly TPO Cut Edge Sealant by Firestone.
K. General Purpose Sealant: EPDM-based, one part, white general purpose sealant; UltraPly TPO General Purpose Sealant by Firestone.
L. Molded Flashing Accessories: Unreinforced TPO membrane pre-molded to suit a variety of flashing details, including pipe boots, inside corners, outside corners, etc.; UltraPly TPO Small and Large Pipe Flashing by Firestone.
M. Roof Walkway Pads: Non-reinforced TPO walkway pads, 0.130 inch by 30 inches by 40 feet long with patterned traffic bearing surface; UltraPly TPO Walkway Pads by Firestone.
   1. Surface Color: White or yellow.

N. Thinners and Cleaners: As recommended by adhesive manufacturer, compatible with membrane.

### 2.04 ROOF INSULATION AND COVER BOARDS

A. Polysiocyanurate Board Insulation: Closed cell polysiocyanurate foam with black glass reinforced mat laminated to faces, complying with ASTM C1289 Type II Class 1, with the following additional characteristics:
   1. Thickness: As indicated elsewhere.
      a. Exception: Insulation to be attached using adhesive or asphalt may be no larger than 48 inches by 48 inches, nominal.
   3. R-value (LTTR):
      a. 2.0 inch Thickness: 12.1, minimum.
      b. 3.0 inch Thickness: 18.5, minimum.
   4. Compressive Strength: 20 psi when tested in accordance with ASTM C1289.
   5. Ozone Depletion Potential: Zero; made without CFC or HCFC blowing agents.
   6. Recycled Content: 19 percent post-consumer and 15 percent pre-consumer (post-industrial), average.

B. High Density Polysiocyanurate Cover Board: Non-combustible, water resistant, high density closed cell polysiocyanurate core with coated glass mat facers, with the following characteristics:
      a. Exception: Board to be attached using adhesive or asphalt may be no larger than 48 inches by 48 inches, nominal.
   2. Thickness: 1/2 inch.
   3. Thermal Value: R-value of 2.5, when tested in accordance with ASTM C518 and ASTM C177.
   4. Surface Water Absorption: 3 percent, maximum, when tested in accordance with ASTM C209.
   5. Compressive Strength: 120 psi, when tested in accordance with ASTM D1621.
   6. Density: 5pcf, when tested in accordance with ASTM D1622/D1622M.
   7. Factory Mutual approved for use with FM 1-60 and 1-90 rated roofing assemblies.

C. Insulation Fasteners: Type and size as required by roof membrane manufacturer for roofing system and warranty to be provided; use only fasteners furnished by roof membrane manufacturer.

D. Adhesive for Insulation Attachment: Type as required by roof membrane manufacturer for roofing system and warranty to be provided; use only adhesives furnished by roof membrane manufacturer.

### PART 3 INSTALLATION

#### 3.01 GENERAL

A. Perform work in accordance with NRCA Roofing and Waterproofing Manual and manufacturer's instructions.

B. Install roofing, insulation, flashings, and accessories in accordance with roofing manufacturer's published instructions and recommendations for the specified roofing system. Where manufacturer provides no instructions or recommendations, follow good roofing practices and industry standards. Comply with federal, state, and local regulations.

C. Obtain all relevant instructions and maintain copies at project site for duration of installation period.
D. Do not start work until Pre-Installation Notice has been submitted to manufacturer as notification that this project requires a manufacturer's warranty.

E. Do not apply roofing membrane during unsuitable weather.

F. Perform work using competent and properly equipped personnel.

G. Temporary closures, which ensure that moisture does not damage any completed section of the new roofing system, are the responsibility of the applicator. Completion of flashings, terminations, and temporary closures shall be completed as required to provide a watertight condition.

H. Install roofing membrane only when surfaces are clean, dry, smooth and free of snow or ice; do not apply roofing membrane during inclement weather or when ambient conditions will not allow proper application; consult manufacturer for recommended procedures during cold weather. Do not work with sealants and adhesives when material temperature is outside the range of 60 to 80 degrees F.

I. Protect adjacent construction, property, vehicles, and persons from damage related to roofing work; repair or restore damage caused by roofing work.
   1. Protect from spills and overspray from bitumen, adhesives, sealants and coatings.
   2. Particularly protect metal, glass, plastic, and painted surfaces from bitumen, adhesives, and sealants within the range of wind-borne overspray.
   3. Protect finished areas of the roofing system from roofing related work traffic and traffic by other trades.

J. Until ready for use, keep materials in their original containers as labeled by the manufacturer.

K. Consult membrane manufacturer's instructions, container labels, and Material Safety Data Sheets (MSDS) for specific safety instructions. Keep all adhesives, sealants, primers and cleaning materials away from all sources of ignition.

L. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.

M. Coordinate the work with installation of associated counterflashings installed by other sections as the work of this section proceeds.

3.02 EXAMINATION

A. Examine roof deck to determine that it is sufficiently rigid to support installers and their mechanical equipment and that deflection will not strain or rupture roof components or deform deck.

B. Verify that surfaces and site conditions are ready to receive work. Correct defects in the substrate before commencing with roofing work.

C. Examine roof substrate to verify that it is properly sloped to drains.

D. Verify that the specifications and drawing details are workable and not in conflict with the roofing manufacturer's recommendations and instructions; start of work constitutes acceptable of project conditions and requirements.

E. Verify that wood nailers have been properly installed.

3.03 PREPARATION

A. Take appropriate measures to ensure that fumes from adhesive solvents are not drawn into the building through air intakes.

B. Prior to proceeding, prepare roof surface so that it is clean, dry, and smooth, and free of sharp edges, fins, roughened surfaces, loose or foreign materials, oil, grease and other materials that may damage the membrane.

C. Fill all surface voids in the immediate substrate that are greater than 1/4 inch wide with fill material acceptable insulation to membrane manufacturer.

D. Seal, grout, or tape deck joints, where needed, to prevent bitumen seepage into building.
3.04 VAPOR RETARDER
A. Before installing insulation install vapor retarder directly over the deck.
B. Install polyethylene sheet with all joints, edges, and penetrations taped.
C. Ensure that all penetrations and edge conditions are sealed to prevent moisture and air drive into the roofing system.

3.05 INSULATION AND COVER BOARD INSTALLATION
A. Install insulation in configuration and with attachment method(s) specified in PART 2, under Roofing System.
B. Install insulation in a manner that will not compromise the vapor retarder integrity.
C. Attachment of Insulation:
   1. Mechanically fasten first layer of insulation to deck in accordance with roofing manufacturer’s instructions.
   2. Embed second layer (and intermediate layer) of insulation into full bed of adhesive in accordance with roofing and insulation manufacturers’ instructions.
D. Lay subsequent layers of insulation with joints staggered minimum 6 inch from joints of preceding layer.
E. Lay boards with edges in moderate contact without forcing. Cut insulation to fit neatly to perimeter blocking and around penetrations through roof.
F. At roof drains, use factory-tapered boards to slope down to roof drains over a distance of 18 inches.
G. Install only as much insulation as can be covered with the completed roofing system before the end of the day’s work or before the onset of inclement weather.
H. Lay roof insulation in courses parallel to roof edges.
I. Neatly and tightly fit insulation to all penetrations, projections, and nailers, with gaps not greater than 1/4 inch. Fill gaps greater than 1/4 inch with acceptable insulation. Do not leave the roofing membrane unsupported over a space greater than 1/4 inch.
J. Mechanical Fastening: Using specified fasteners and insulation plates engage fasteners through insulation into deck to depth and in pattern required by Factory Mutual for FM Class specified in PART 2 and membrane manufacturer, whichever is more stringent.

3.06 SINGLE-PLY MEMBRANE INSTALLATION
A. Beginning at low point of roof, place membrane without stretching over substrate and allow to relax at least 30 minutes before attachment or splicing; in colder weather allow for longer relax time.
B. Lay out the membrane pieces so that field and flashing splices are installed to shed water.
C. Install membrane without wrinkles and without gaps or fishmouths in seams; bond and test seams and laps in accordance with membrane manufacturer's instructions and details.
D. Install membrane adhered to the substrate, with edge securement as specified.
E. Adhered Membrane: Bond membrane sheet to substrate using membrane manufacturer’s recommended bonding material, application rate, and procedures.
F. Edge Securement: Secure membrane at all locations where membrane terminates or goes through an angle change greater than 2 in 12 inches using mechanically fastened reinforced perimeter fastening strips, plates, or metal edging as indicated or as recommended by roofing manufacturer.
   1. Exceptions: Round pipe penetrations less than 18 inches in diameter and square penetrations less than 4 inches square.
   2. Metal edging is not merely decorative; ensure anchorage of membrane as intended by roofing manufacturer.
3.07 FLASHING AND ACCESSORIES INSTALLATION

A. Install flashings, including laps, splices, joints, bonding, adhesion, and attachment, as required by membrane manufacturer's recommendations and details.

B. Metal Accessories: Install metal edgings, gravel stops, and copings in locations indicated on the drawings, with horizontal leg of edge member over membrane and flashing over metal onto membrane.
   1. Follow roofing manufacturer's instructions.
   2. Remove protective plastic surface film immediately before installation.
   3. Install water block sealant under the membrane anchorage leg.
   4. Flash with manufacturer's recommended flashing sheet unless otherwise indicated.
   5. Where single application of flashing will not completely cover the metal flange, install additional piece of flashing to cover the metal edge.
   6. If the roof edge includes a gravel stop and sealant is not applied between the laps in the metal edging, install an additional piece of self-adhesive flashing membrane over the metal lap to the top of the gravel stop; apply seam edge treatment at the intersections of the two flashing sections.
   7. When the roof slope is greater than 1:12, apply seam edge treatment along the back edge of the flashing.

C. Flashing at Walls, Curbs, and Other Vertical and Sloped Surfaces: Install weathertight flashing at all walls, curbs, parapets, curbs, skylights, and other vertical and sloped surfaces that the roofing membrane abuts to; extend flashing at least 8 inches high above membrane surface.
   1. Use the longest practical flashing pieces.
   2. Evaluate the substrate and overlay and adjust installation procedure in accordance with membrane manufacturer's recommendations.
   3. Complete the splice between flashing and the main roof sheet with specified splice adhesive before adhering flashing to the vertical surface.
   4. Provide termination directly to the vertical substrate as shown on roof drawings.

D. Roof Drains:
   1. Taper insulation around drain to provide smooth transition from roof surface to drain. Use specified pre-manufactured tapered insulation with facer or suitable bonding surface to achieve slope; slope not to exceed manufacturer's recommendations.
   2. Position membrane, then cut a hole for roof drain to allow 1/2 to 3/4 inch of membrane to extend inside clamping ring past drain bolts.
   3. Make round holes in membrane to align with clamping bolts; do not cut membrane back to bolt holes.
   4. Apply sealant on top of drain bowl where clamping ring seats below the membrane.
   5. Install roof drain clamping ring and clamping bolts; tighten clamping bolts to achieve constant compression.

3.08 FINISHING AND WALKWAY INSTALLATION

A. Install walkways at access points to the roof, around rooftop equipment that may require maintenance, and where indicated on the drawings.

B. Walkway Pads: Adhere to the roofing membrane, spacing each pad at minimum of 1.0 inch and maximum of 3.0 inches from each other to allow for drainage.
   1. If installation of walkway pads over field fabricated splices or within 6 inches of a splice edge cannot be avoided, adhere another layer of flashing over the splice and extending beyond the walkway pad a minimum of 6 inches on either side.
   2. Prime the membrane, remove the release paper on the pad, press in place, and walk on pad to ensure proper adhesion.
3.09 FIELD QUALITY CONTROL
   A. Inspection by Manufacturer: Provide final inspection of the roofing system by a Technical
      Representative employed by roofing system manufacturer specifically to inspect installation for
      warranty purposes (i.e. not a sales person).
   B. Perform all corrections necessary for issuance of warranty.

3.10 CLEANING
   A. Clean all contaminants generated by roofing work from building and surrounding areas,
      including bitumen, adhesives, sealants, and coatings.
   B. Repair or replace building components and finished surfaces damaged or defaced due to the
      work of this section; comply with recommendations of manufacturers of components and
      surfaces.
   C. Remove leftover materials, trash, debris, equipment from project site and surrounding areas.

3.11 PROTECTION
   A. Where construction traffic must continue over finished roof membrane, provide durable
      protection and replace or repair damaged roofing to original condition.

END OF SECTION
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SECTION 07 62 00
SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Fabricated sheet metal items, including flashings, counterflashings, gutters, and downspouts.
B. Sealants for joints within sheet metal fabrications.

1.02 RELATED REQUIREMENTS
A. Section 05 50 00 - Metal Fabrications: Downspout Boots.
B. Section 06 10 00 - Rough Carpentry: Wood nailers for sheet metal work.
C. Section 07 71 00 - Roof Specialties: Manufactured copings, flashings, and expansion joint covers.

1.03 REFERENCE STANDARDS
D. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
F. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.

1.04 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.
C. Samples: Submit two samples 3 by 4 inch in size illustrating metal finish color.

1.05 QUALITY ASSURANCE
A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.
B. Fabricator and Installer Qualifications: Company specializing in sheet metal work with 5 years of documented experience.
1.06 DELIVERY, STORAGE, AND HANDLING
A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
B. Prevent contact with materials that could cause discoloration or staining.

PART 2 PRODUCTS

2.01 SHEET MATERIALS
A. Pre-Finished Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24 gage, (0.0239) inch thick base metal, shop pre-coated with PVDF coating.
   1. PVDF (Polyvinylidene Fluoride) Coating: Superior Performance Organic Finish, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system.
   2. Color: As indicated on drawings.
B. Stainless Steel: ASTM A666, Type 304 alloy, soft temper, 28 gage, (0.0156 inch) thick; smooth No. 4 - Brushed finish.

2.02 FABRICATION
A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
B. Form pieces in longest possible lengths.
C. Hem exposed edges on underside 1/2 inch; miter and seam corners.
D. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
E. Fabricate corners from one piece with minimum 18 inch long legs; seal for rigidity, seal with sealant.
F. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.

2.03 GUTTER AND DOWNSPOUT FABRICATION
A. Gutters: Profile as indicated.
B. Downspouts: Profile as indicated.
C. Gutters and Downspouts: Sizes indicated.
D. Accessories: Profiled to suit gutters and downspouts.
   2. Downspout Supports: Brackets.
E. Roof Edge Flashing: Continuous - color to match gutter.
F. Downspout Boots: Cast iron. See section 05 50 00 Metal Fabrications.
G. Seal metal joints.

2.04 EXTERIOR PENETRATION FLASHING PANELS
A. Flashing Panels for Exterior Wall Penetrations: Premanufactured components and accessories as required to preserve integrity of building envelope; suitable for conduits and facade materials to be installed.

2.05 ACCESSORIES
A. Fasteners: Galvanized steel, with soft neoprene washers.
B. Underlayment: ASTM D226/D226M, organic roofing felt, Type I (No. 15).
C. Primer: Zinc chromate type.
D. Protective Backing Paint: Zinc molybdate alkyd.
E. Concealed Sealants: Non-curing butyl sealant.
F. Exposed Sealants: ASTM C920; elastomeric sealant, with minimum movement capability as recommended by manufacturer for substrates to be sealed; color to match adjacent material.
G. Plastic Cement: ASTM D4586/D4586M, Type I.
PART 3 EXECUTION

3.01 EXAMINATION
A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.
B. Verify roofing termination and base flashings are in place, sealed, and secure.

3.02 PREPARATION
A. Install starter and edge strips, and cleats before starting installation.
B. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil.

3.03 INSTALLATION
A. Secure flashings in place using concealed fasteners.
B. Apply plastic cement compound between metal flashings and felt flashings.
C. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.
D. Seal metal joints watertight.
E. Secure gutters and downspouts in place with concealed fasteners.
F. Slope gutters 1/4 inch per 10 feet, minimum.
G. Connect downspouts to downspout boots, and seal connection watertight.

END OF SECTION
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SECTION 07 71 00
ROOF SPECIALTIES

PART 1  GENERAL

1.01 SECTION INCLUDES
A. Manufactured roof specialties, including copings.

1.02 RELATED REQUIREMENTS
A. Section 07 72 00 - Roof Accessories: Manufactured curbs and roof hatches.

1.03 REFERENCE STANDARDS

1.04 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide data on shape of components, materials and finishes, anchor types and locations.
C. Shop Drawings: Indicate configuration and dimension of components, adjacent construction, required clearances and tolerances, and other affected work.
D. Samples: Submit two appropriately sized samples of coping.
E. Manufacturer's Installation Instructions: Indicate special procedures, fasteners, supporting members, and perimeter conditions requiring special attention.

1.05 WARRANTY
A. Manufacturer's Standard Warranty: Warranted materials shall be free of defects in material and workmanship for five years after shipment. If, after inspection, the manufacturer agrees that materials are defective, the manufacturer shall at their option repair or replace them. For decorative finish warranty, consult manufacturer.
B. 20-Year Warranty: Manufacturer shall guarantee that a standard size roof edge system, when installed per manufacturer's instructions, will not blow off, leak, or cause membrane failure, even in wind conditions up to 110 mph, or the manufacturer shall at their option repair or replace their materials.

1.06 QUALITY ASSURANCE
A. High performance coping shall be CERTIFIED by the coping manufacturer to meet performance design criteria according to the following test standards:
   1. ANSI/SPRI ES-1 Test RE-3 for Coping: The coping system shall be tested simultaneously on horizontal and vertical surfaces and shall exceed horizontal and vertical design wind pressure as calculated in accord with the ANSI/SPRI ES-1 Test RE-3. Use the current edition of ANSI/SPRI ES-1 Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems.
B. Perform work in accordance with SMACNA (ASMM) details.
PART 2 PRODUCTS

2.01 MANUFACTURERS
   A. Roof Edge Flashings and Copings:
      1. ATAS International, Inc; Continuous Cleat Coping: www.atas.com/sle.
      4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 COMPONENTS
   A. Copings: Factory fabricated to sizes required; mitered, welded corners; concealed fasteners.
      1. Configuration: Concealed continuous hold down cleat at both legs; internal splice piece at joints of same material, thickness and finish as cap; concealed stainless steel fasteners.
      2. Pull-Off Resistance: Tested in accordance with ANSI/SPRI/FM 4435/ES-1 using test method RE-3 to positive and negative design wind pressure as defined by applicable local building code.
      3. Material: Formed aluminum sheet, 0.063 inch thick, minimum.
      4. Finish: 70 percent polyvinylidene fluoride.
      5. Color: To be selected by Architect from manufacturer's standard range.

2.03 ACCESSORIES
   A. Roof Cement: ASTM D4586, Type II.

2.04 FINISHES
   A. PVDF (Polyvinylidene Fluoride) Coating: Superior Performance Organic Finish, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system; color as scheduled.

2.05 ACCESSORIES
   A. Sealant for Joints in Linear Components: As recommended by component manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION
   A. Verify that deck, curbs, roof membrane, base flashing, and other items affecting work of this Section are in place and positioned correctly.

3.02 INSTALLATION
   A. Install components in accordance with manufacturer's instructions.
   B. Seal joints within components when required by component manufacturer.
   C. Anchor components securely.
   D. Coordinate installation of components of this section with installation of roofing membrane and base flashings.
   E. Coordinate installation of sealants and roofing cement with work of this section to ensure watertightness.

END OF SECTION
SECTION 07 72 00
ROOF ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Roof hatches, manual and automatic operation, including smoke vents.

1.02 RELATED REQUIREMENTS
A. Section 07 54 23 - Thermoplastic-Polyolefin Roofing (TPO).

1.03 REFERENCE STANDARDS

1.04 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Manufacturer's data sheets on each product to be used.
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.
   4. Maintenance requirements.
C. Shop Drawings: Submit detailed layout developed for this project and provide dimensioned location and number for each type of roof accessory.
D. Warranty Documentation:
   1. Submit manufacturer warranty.
   2. Ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING
A. Store products in manufacturer's unopened packaging until ready for installation.
B. Store products under cover and elevated above grade.

1.06 WARRANTY
A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
B. Correct defective Work within a five year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 ROOF HATCHES AND VENTS, MANUAL AND AUTOMATIC OPERATION
A. Roof Hatch Manufacturers:
   4. Substitutions: See Section 01 60 00 - Product Requirements.
B. Roof Hatches, General: Factory-assembled steel frame and cover, complete with operating and release hardware.
   1. Style: Provide flat metal covers unless otherwise indicated.
   2. Mounting: Provide frames and curbs suitable for mounting conditions as indicated on drawings.
   3. Thermally Broken Hatches: Added insulation to frame and cover; available in each manufacturer's standard, single leaf sizes; special sizes available upon request
   4. Size(s): As indicated on drawings; single-leaf style.
C. Frames and Curbs: One-piece curb and frame with integral cap flashing to receive roof flashings; extended bottom flange to suit mounting.
   1. Material: Stainless steel, Type 304, 14 gage, 0.0747 inch thick.
   3. Insulation: Manufacturer's standard; 1 inch rigid glass fiber, located on inside hollow curb.

D. Metal Covers: Flush, insulated, hollow metal construction.
   1. Capable of supporting 40 psf live load.
   2. Material: Galvanized steel; outer cover 14 gage, 0.0747 inch thick, liner 22 gage, 0.03 inch thick.
   4. Insulation: Manufacturer's standard 1 inch rigid glass fiber.
   5. Gasket: Neoprene, continuous around cover perimeter.

E. Safety Railings System: Manufacturer's standard accessory safety rail system mounted directly to curb.
   2. Posts and Rails: Steel tube.
   3. Gate: Same material as railing; automatic closing with latch.
   4. Finish: Manufacturer's standard, factory applied finish.
   5. Gate Hinges and Post Guides: ASTM B221 (ASTM B221M), 6063 alloy, T5 temper aluminum.
   7. Fasteners: Stainless steel, Type 316.
   8. Manufacturers:
      a. BILCO Company; Bil-Guard 2.0: www.bilco.com/#sle.
      b. or equal.

F. Hardware: Steel, zinc coated and chromate sealed, unless otherwise indicated or required by manufacturer.
   1. Lifting Mechanisms: Compression or torsion spring operator with shock absorbers that automatically opens upon release of latch; capable of lifting covers despite 10 psf load.
   2. Hinges: Heavy duty pintle type.
   3. Hold open arm with vinyl-coated handle for manual release.

PART 3 EXECUTION

3.01 EXAMINATION
   A. Do not begin installation until substrates have been properly prepared.
   B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION
   A. Clean surfaces thoroughly prior to installation.
   B. Prepare surfaces using methods recommended by manufacturer for achieving acceptable results for applicable substrate under project conditions.
3.03 INSTALLATION
   A. Install in accordance with manufacturer's instructions, in manner that maintains roofing system weather-tight integrity.

3.04 CLEANING
   A. Clean installed work to like-new condition.

3.05 PROTECTION
   A. Protect installed products until completion of project.
   B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION
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SECTION 07 84 00
FIRESTOPPING

PART 1 GENERAL

1.01 SECTION INCLUDES
   A. Firestopping systems.
   B. Firestopping of joints and penetrations in fire resistance rated and smoke resistant assemblies, whether indicated on drawings or not, and other openings indicated.

1.02 RELATED REQUIREMENTS
   A. Section 09 21 16 - Gypsum Board Assemblies: Gypsum wallboard fireproofing.

1.03 REFERENCE STANDARDS
   B. ITS (DIR) - Directory of Listed Products; current edition.
   D. FM (AG) - FM Approval Guide; current edition.
   E. UL (DIR) - Online Certifications Directory; Current Edition.

1.04 SUBMITTALS
   A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
   B. Schedule of Firestopping: List each type of penetration, fire rating of the penetrated assembly, and firestopping test or design number.
   C. Product Data: Provide data on product characteristics, performance ratings, and limitations.
   D. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.
   E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
   F. Installer Qualification: Submit qualification statements for installing mechanics.

1.05 QUALITY ASSURANCE
   A. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with methods indicated.
      1. Listing in UL (FRD), FM (AG), or ITS (DIR) will be considered as constituting an acceptable test report.
      2. Valid evaluation report published by ICC Evaluation Service, Inc. (ICC-ES) at www.icc-es.org will be considered as constituting an acceptable test report.
      3. Submission of actual test reports is required for assemblies for which none of the above substantiation exists.
   B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
   C. Installer Qualifications: Company specializing in performing the work of this section and:
      1. Approved by Factory Mutual Research Corporation under FM 4991, or meeting any two of the following requirements:
      2. Verification of minimum three years documented experience installing work of this type.
      3. Verification of at least five satisfactorily completed projects of comparable size and type.
      4. Licensed by local authorities having jurisdiction (AHJ).
1.06 MOCK-UP
A. Install one firestopping assembly representative of each fire rating design required on project.
   1. Where one design may be used for different penetrating items or in different wall constructions, install one assembly for each different combination.
   2. Where firestopping is intended to fill a linear opening, install minimum of 1 linear ft.
B. Obtain approval of authorities having jurisdiction (AHJ) before proceeding.
C. If accepted, mock-up will represent minimum standard for the Work.
D. If accepted, mock-up may remain as part of the Work. Remove and replace mock-ups not accepted.

1.07 FIELD CONDITIONS
A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation; maintain minimum temperature before, during, and for three days after installation of materials.
B. Provide ventilation in areas where solvent-cured materials are being installed.

PART 2 PRODUCTS

2.01 MANUFACTURERS
A. Firestopping Manufacturers:
   1. 3M Fire Protection Products: www.3m.com/firestop/#sle.
   4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 MATERIALS
A. Firestopping Materials: Any materials meeting requirements.
B. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Provide type of materials as required for tested firestopping assembly.
C. Fire Ratings: Refer to drawings for required systems and ratings.

2.03 FIRESTOPPING ASSEMBLY REQUIREMENTS
A. Perimeter Fire Containment Firestopping: Use system that has been tested according to ASTM E2307 to have fire resistance F Rating equal to required fire rating of floor assembly.
   1. Movement: Provide systems that have been tested to show movement capability as indicated.
   2. Temperature Rise: Provide systems that have been tested to show T Rating as indicated.
   3. Air Leakage: Provide systems that have been tested to show L Rating as indicated.
   4. Where floor assembly is not required to have a fire rating, provide systems that have been tested to show L Rating as indicated.
B. Head-of-Wall Joint System Firestopping at Joints Between Fire-Rated Wall Assemblies and Non-Rated Horizontal Assemblies: Use system that has been tested according to ASTM E2837 to have fire resistance F Rating equal to required fire rating of floor or wall, whichever is greater.
   1. Movement: Provide systems that have been tested to show movement capability as indicated.
C. Floor-to-Floor, Wall-to-Wall, and Wall-to-Floor Joints, Except Perimeter, Where Both Are Fire-Rated: Use system that has been tested according to ASTM E1966 or UL 2079 to have fire resistance F Rating equal to required fire rating of the assembly in which the joint occurs.
   1. Movement: Provide systems that have been tested to show movement capability as indicated.
   2. Air Leakage: Provide systems that have been tested to show L Rating as indicated.
   3. Watertightness: Provide systems that have been tested to show W Rating as indicated.
   4. Listing by FM (AG), ITS (DIR), UL (DIR), or UL (FRD) in their certification directories will be considered evidence of successful testing.
D. Through Penetration Firestopping: Use system that has been tested according to ASTM E814 to have fire resistance F Rating equal to required fire rating of penetrated assembly.
   1. Temperature Rise: Provide systems that have been tested to show T Rating as indicated.
   2. Air Leakage: Provide systems that have been tested to show L Rating as indicated.
   3. Watertightness: Provide systems that have been tested to show W Rating as indicated.
   4. Listing by FM (AG), ITS (DIR), UL (DIR), or UL (FRD) in their certification directories will be considered evidence of successful testing.

2.04 FIRESTOPPING SYSTEMS
   A. Firestopping: Any material meeting requirements.
      1. Fire Ratings: Use system that is listed by FM (AG), ITS (DIR), or UL (FRD) and tested in accordance with ASTM E814, ASTM E119, or UL 1479 with F Rating equal to fire rating of penetrated assembly and minimum T Rating Equal to F Rating and in compliance with other specified requirements.
      2. Fire Ratings: See drawings for required systems and ratings.

PART 3 EXECUTION

3.01 EXAMINATION
   A. Verify openings are ready to receive the work of this section.

3.02 PREPARATION
   A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other materials that could adversely affect bond of firestopping material.
   B. Remove incompatible materials that could adversely affect bond.

3.03 INSTALLATION
   A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.
   B. Do not cover installed firestopping until inspected by authorities having jurisdiction.
   C. Install labeling required by code.

3.04 FIELD QUALITY CONTROL
   A. Independent Testing Agency: Inspection agency employed and paid by Owner, will examine penetration firestopping in accordance with ASTM E2174, and ASTM E2393.
   B. Repair or replace penetration firestopping and joints at locations where inspection results indicate firestopping or joints do not meet specified requirements.

3.05 CLEANING
   A. Clean adjacent surfaces of firestopping materials.

3.06 PROTECTION
   A. Protect adjacent surfaces from damage by material installation.

END OF SECTION
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SECTION 07 92 00
JOINT SEALANTS

PART 1  GENERAL

1.01 SECTION INCLUDES

A. Nonsag gunniable joint sealants.
B. Self-leveling pourable joint sealants.
C. Joint backings and accessories.

1.02 RELATED REQUIREMENTS

A. Section 07 26 50 - Weather Barriers: Sealants required in conjunction with air barriers and vapor retarders.
B. Section 07 84 00 - Firestopping: Firestopping sealants.
C. Section 07 95 13 - Expansion Joint Cover Assemblies: Sealants forming part of expansion joint cover assemblies.
D. Section 09 21 16 - Gypsum Board Assemblies: Sealing acoustical and sound-rated walls and ceilings.
E. Section 09 30 00 - Tiling: Sealant between tile and plumbing fixtures and at junctions with other materials and changes in plane.

1.03 REFERENCE STANDARDS

C. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications; 2012 (Reapproved 2017).

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following:
   1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
   2. List of backing materials approved for use with the specific product.
   3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
   4. Substrates the product should not be used on.
   5. Substrates for which use of primer is required.
   6. Substrates for which laboratory adhesion and/or compatibility testing is required.
   7. Installation instructions, including precautions, limitations, and recommended backing materials and tools.
   8. Sample product warranty.
C. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.
D. Samples for Verification: Where custom sealant color is specified, obtain directions from Architect and submit at least two physical samples for verification of color of each required sealant.

1.05 QUALITY ASSURANCE
A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
B. Installer Qualifications: Company specializing in performing the work of this section and with at least five years of documented experience.
C. Owner has expressed that the sealant shall be installed in good workmanship professional manner.

1.06 WARRANTY
A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
B. Correct defective work within a five year period after Date of Substantial Completion.
C. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS
2.01 MANUFACTURERS
A. Non-Sag Sealants: Permits application in joints on vertical surfaces without sagging or slumping.
5. Substitutions: See Section 01 60 00 - Product Requirements.
B. Self-Leveling Sealants: Pourable or self-leveling sealant that has sufficient flow to form a smooth, level surface when applied in a horizontal joint.
3. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 JOINT SEALANT APPLICATIONS
A. Scope:
1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.
   a. Wall expansion and control joints.
   b. Joints between door, window, and other frames and adjacent construction.
   c. Joints between different exposed materials.
   d. Openings below ledge angles in masonry.
   e. Other joints indicated below.
2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
   a. Joints between door, window, and other frames and adjacent construction.
   b. In sound-rated wall and ceiling assemblies, gaps at electrical outlets, wiring devices, piping, and other openings; between wall/ceiling and other construction; and other flanking sound paths.
   c. Other joints indicated below.
3. Do not seal the following types of joints.
   a. Intentional weepholes in masonry.
   b. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
   c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
   d. Joints where installation of sealant is specified in another section.
   e. Joints between suspended panel ceilings/grid and walls.

B. Exterior Joints: Use nonsag non-staining silicone sealant, Type 1, unless otherwise indicated.
   1. Lap Joints in Sheet Metal Fabrications: Butyl rubber, non-curing; Type 7.
   2. Lap Joints between Manufactured Metal Panels: Butyl rubber, non-curing; Type 7.
   3. Type 8 - Control and Expansion Joints in Concrete Paving: Self-leveling polyurethane "traffic-grade" sealant.

C. Interior Joints: Use nonsag polyurethane sealant, Type 3, unless otherwise indicated.
   1. Wall and Ceiling Joints in Non-Wet Areas: Acrylic emulsion latex sealant; Type 6.
   2. Wall and Ceiling Joints in Wet Areas: Nonsag polyurethane sealant for continuous liquid immersion; Type 4.
   3. Wall, Ceiling, and Floor Joints Where Tamper-Resistance is Required: Nonsag tamper-resistant silyl-terminated polyurethane sealant; Type 5.
   4. Joints between Fixtures in Wet Areas and Floors, Walls, and Ceilings: Mildew-resistant silicone sealant; Match adjacent surfaces; Type 2.
   5. In Sound-Rated Assemblies: Acrylic emulsion latex sealant; Type 6. Concealed locations: Type 7. Sealant bead between top stud runner and structure and bottom stud track and floor.
   6. Type 9 - Narrow Control Joints in Interior Concrete Slabs: Self-leveling epoxy sealant.
   7. Other Floor Joints: Self-leveling polyurethane "traffic-grade" sealant; Type 8.

D. Interior Wet Areas: Bathrooms and restrooms; fixtures in wet areas include plumbing fixtures, countertops, cabinets, and other similar items.

E. Sound-Rated Assemblies: Walls and ceilings identified as "STC-rated", "sound-rated", or "acoustical".

2.03 JOINT SEALANTS - GENERAL

A. Sealants and Primers: Provide products having lower volatile organic compound (VOC) content than indicated in SCAQMD 1168.

2.04 NONSAG JOINT SEALANTS

A. Type 1 - Non-Staining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
   1. Movement Capability: Plus and minus _____ percent, minimum.
   2. Non-Staining To Porous Stone: Non-staining to light-colored natural stone when tested in accordance with ASTM C1248.
   3. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.
   5. Color: Match adjacent finished surfaces.

B. Type 2 - Mildew-Resistant Silicone Sealant: ASTM C920, Grade NS, Uses M and A; single component, mildew resistant; not expected to withstand continuous water immersion or traffic.

C. Type 3 - Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single or multicomponent; not expected to withstand continuous water immersion or traffic.
   1. Movement Capability: Plus and minus _____ percent, minimum.
   3. Color: Match adjacent finished surfaces.
D. Type 4 - Polyurethane Sealant for Continuous Water Immersion: ASTM C920, Grade NS, Uses M and A; single or multicomponent; explicitly approved by manufacturer for continuous water immersion; suitable for traffic exposure when recessed below traffic surface.
   1. Movement Capability: Plus and minus 35 percent, minimum.
   3. Color: Match adjacent finished surfaces.

E. Type 5 - Tamper-Resistant Polyurethane Sealant: ASTM C920, Grade NS, Uses M, G, and A; single or multicomponent; not expected to withstand continuous water immersion or traffic.
   1. Movement Capability: Plus and minus 12-1/2 percent, minimum.
   2. Hardness Range: 50 to 60, Shore A, when tested in accordance with ASTM C661.
   3. Color: Match adjacent finished surfaces.

F. Type 6 - Acrylic Emulsion Latex: Water-based; ASTM C834, single component, non-staining, non-bleeding, non-sagging; not intended for exterior use.
   1. Color: To be selected by Architect from manufacturer's full range.

G. Type 7 - Non-Curing Butyl Sealant: Solvent-based; ASTM C1311; single component, nonsag, non-skinning, non-hardening, non-bleeding; vapor-impermeable; intended for fully concealed applications.

2.05 SELF-LEVELING SEALANTS

A. Type 8 - Self-Leveling Polyurethane Sealant: ASTM C920, Grade P, Uses M and A; single or multicomponent; explicitly approved by manufacturer for traffic exposure; not expected to withstand continuous water immersion.
   2. Hardness Range: 35 to 55, Shore A, when tested in accordance with ASTM C661.
   3. Color: Color as selected.

B. Type 9 - Semi-Rigid Self-Leveling Epoxy Joint Filler: Epoxy or epoxy/polyurethane copolymer; intended for filling cracks and control joints not subject to significant movement; rigid enough to support concrete edges under traffic.
   1. Composition: Multi-component, 100 percent solids by weight.
   2. Durometer Hardness: Minimum of 85 for Type A or 35 for Type D, after seven days when tested in accordance with ASTM D2240.
   3. Color: Match adjacent finished surfaces.

2.06 ACCESSORIES

A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.

B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that joints are ready to receive work.
B. Verify that backing materials are compatible with sealants.
C. Verify that backer rods are of the correct size.
3.02 PREPARATION
A. Remove loose materials and foreign matter that could impair adhesion of sealant.
B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.
C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

3.03 INSTALLATION
A. Owner has expressed that the sealant shall be installed in good workmanship professional manner. Joints shall be smooth, clean and straight in appearance - "E" below shall be followed at a minimum. Unsatisfactory sealant will be removed and replaced to the owners satisfaction.
B. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
C. Perform installation in accordance with ASTM C1193.
D. Perform acoustical sealant application work in accordance with ASTM C919.
E. Install bond breaker backing tape where backer rod cannot be used.
F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.
G. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.
H. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.
I. Concrete Floor Joint Filler: After full cure, shave joint filler flush with top of concrete slab.

3.04 FIELD QUALITY CONTROL
A. Perform field quality control inspection/testing as specified in PART 1 under QUALITY ASSURANCE article.
B. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.

END OF SECTION
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SECTION 07 95 13
EXPANSION JOINT COVER ASSEMBLIES

PART 1 GENERAL
1.01 SECTION INCLUDES
   A. Expansion joint cover assemblies for floor, wall, and soffit surfaces.

1.02 RELATED REQUIREMENTS
   A. Section 04 20 00 - Unit Masonry: Placement of joint cover assembly frames in masonry.
   B. Section 07 92 00 - Joint Sealants: Sealing expansion and control joints using gunnable and pourable sealants.

1.03 REFERENCE STANDARDS

1.04 ADMINISTRATIVE REQUIREMENTS
   A. Installation Templates: For frames and anchors to be embedded in concrete or masonry, furnish templates to relevant installers; include installation instructions and tolerances.

1.05 SUBMITTALS
   A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
   B. Product Data: Provide joint assembly profiles, profile dimensions, anchorage devices and available colors and finish.
   C. Shop Drawings: Indicate joint and splice locations, miters, layout of the work, effected adjacent construction and anchorage locations.
   D. Samples: Submit two samples 6” inch long, illustrating profile, dimension, color, and finish selected.
   E. Manufacturer's Installation Instructions: Indicate rough-in sizes and required tolerances for item placement.
   F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
      1. See Section 01 60 00 for additional provisions.

PART 2 PRODUCTS
2.01 MANUFACTURERS
   A. Expansion Joint Cover Assemblies:
      4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 EXPANSION JOINT COVER ASSEMBLY APPLICATIONS
   A. Interior Floor Joints Subject to Seismic Movement:
      1. Manufacturers:
         c. See drawings for locations.
B. Interior Non-Fire-Rated Wall/Ceiling Joints Subject to Seismic Movement:
   1. Products:
      a. MM Systems Corp; Flushline System FSW-200 at gypsum, VSS-200 at CMU,
         FSX-100 @ ACT: www.mmsystemscorp.com/#sle.
      b. Inpro; Jointmaster 113 at gypsum, Jointmaster 611 @ CMU, Jointmaster 821 @ ACT:
         www.inprocorp.com/#sle.
      c. See drawings for locations.

C. Exterior Wall Joints Subject to Seismic Movement:
   1. Manufacturers:
      b. Inpro Corp.; Jointmaster 615 Series: www.inprocorp.com
      c. See drawings for locations.

D. Exterior Roof Joints Subject to Seismic Movement:
   1. Manufacturers:
      b. MM Systems Corp; ERFL: www.mmsystemscorp.com/#sle.
      c. See drawings for locations.

2.03 EXPANSION JOINT COVER ASSEMBLIES

A. Expansion Joint Cover Assemblies - General: Factory-fabricated and assembled; designed
to completely fill joint openings, sealed to prevent passage of air, dust, water, smoke; suitable
for traffic expected.
   1. Joint Dimensions and Configurations: As indicated on drawings.
   2. Joint Cover Sizes: Selected to suit joint width and configuration, based on manufacturer's
      published recommendations and limitations.
   3. Joint Cover Styles: As indicated on drawings.
   4. Joint Movement Capability: If not indicated, provide minimum plus/minus 25 percent joint
      movement capability.
   5. Lengths: Provide covers in full lengths required; avoid splicing wherever possible.
   6. Anchors, Fasteners, and Fittings: Provided by cover manufacturer.

B. Floor Joint Covers: Coordinate with indicated floor coverings.
   1. If floor covering is not indicated, obtain instructions from Architect before proceeding.
   2. If style is not indicated, provide extruded aluminum frame both sides, resilient seals, and
      minimize exposed metal.

C. Resilient Seal Type Covers: Having flat exposed surface without crevices that could collect
dirt; designed to withstand expected movement without extrusion of seal from joint assembly; for
floors, provide style that is flush with top of floor covering; for exterior joints, weathertight.

D. Sliding Cover Plate Type Covers: Provide plate with beveled edges and neat fit that does not
   collect dirt.

E. Covers In Gypsum Board Assemblies: Provide style with anchoring wings that can be
   completely covered by joint compound.

2.04 MATERIALS

A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper; or ASTM
   B308/B308M, 6061 alloy, T6 temper.

B. Resilient Seals:
   1. For Pedestrian Traffic Applications: EPDM rubber, Neoprene, or Santoprene; no PVC;
      Shore A hardness of 40 to 50 Durometer.
   2. Color: To be selected by the Architect from the manufacturers full range of colors.

C. Anchors and Fasteners: As recommended by cover manufacturer.

D. Backing Paint for Aluminum Components in Contact with Cementitious Materials: Asphaltic
type.
PART 3  EXECUTION

3.01  EXAMINATION
   A. Verify that joint preparation and dimensions are acceptable and in accordance with manufacturer's requirements.
   B. Verify that frames and anchors installed by others are in correct locations and suitable for installation of remainder of assembly.

3.02  INSTALLATION
   A. Install components and accessories in accordance with manufacturer's instructions.
   B. Align work plumb and level, flush with adjacent surfaces.
   C. Rigidly anchor to substrate to prevent misalignment.

3.03  PROTECTION
   A. Do not permit traffic over unprotected floor joint surfaces.
   B. Provide strippable coating to protect finish surface.

END OF SECTION
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SECTION 080671 – DOOR HARDWARE SETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section references specification sections relating to commercial door hardware for the following:

1. Swinging doors.
2. Other doors to the extent indicated.

B. Commercial door hardware includes, but is not necessarily limited to, the following:

1. Mechanical door hardware.
2. Electromechanical and access control door hardware.
3. Electromechanical and access control door hardware power supplies, back-ups and surge protection.
4. Automatic operators.
5. Cylinders specified for doors in other sections.

C. Related Sections:

1. Division 08 Section “Hollow Metal Doors and Frames”.
2. Division 08 Sections “Flush and Clad Wood Doors”.
3. Division 08 Section “Aluminum Framed Entrances and Storefronts”.
4. Division 08 Section “All-Glass Entrances”.
5. Division 08 Section “Door Hardware”.
6. Division 08 Section “Automatic Door Operators”.
7. Division 08 Section “Access Control Hardware”.
8. Division 26 Sections “Electrical”.

D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

6. NFPA 105 - Installation of Smoke Door Assemblies.
7. State Building Codes, Local Amendments.

E. Standards: Reference Related Sections for requirements regarding compliance with applicable industry standards.

1.3 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."

2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.

3. Content: Include the following information:

   a. Type, style, function, size, label, hand, and finish of each door hardware item.
   b. Manufacturer of each item.
   c. Fastenings and other pertinent information.
   d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
   e. Explanation of abbreviations, symbols, and codes contained in schedule.
   f. Mounting locations for door hardware.
   g. Door and frame sizes and materials.

4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

C. Keying Schedule: Prepared under the supervision of the Owner, separate schedule detailing final keying instructions for locksets and cylinders in writing. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner to approve submitted keying schedule prior to the ordering of permanent cylinders.
D. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

E. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Submittals. The manual to include the name, address, and contact information of the manufacturers providing the hardware and their nearest service representatives. The final copies delivered after completion of the installation test to include "as built" modifications made during installation, checkout, and acceptance.

F. Warranties and Maintenance: Special warranties and maintenance agreements specified in the Related Sections.

1.4 QUALITY ASSURANCE

A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum [5] years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

B. Installer Qualifications: Installers, trained by the primary product manufacturers, with a minimum [3] years documented experience installing both standard and electrified builders hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

C. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum [5] years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor in good standing by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.

D. Source Limitations: Obtain each type and variety of Door Hardware specified in the Related Sections from a single source, qualified supplier unless otherwise indicated.

E. Regulatory Requirements: Comply with NFPA 70, NFPA 80, NFPA 101 and ANSI A117.1 requirements and guidelines as directed in the applicable model building code.

F. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.
1.5 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.6 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

B. Door and Frame Preparation: Division 08 Sections (Steel, Aluminum and Wood) doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.7 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

1.8 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. Refer to “PART 3 – EXECUTION” for required specification sections.
PART 3 - EXECUTION

3.1 DOOR HARDWARE SETS

A. The door hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

B. The supplier is responsible for handing and sizing all products and providing the correct option for the appropriate door type and material where more than one is presented in the hardware sets. Quantities listed are for each pair of doors, or for each single door.

C. Products listed in the Door Hardware Sets must meet the requirements described in the specification sections noted.

1. Section 08 41 26 – All Glass Entrances.
2. Section 08 71 00 – Door Hardware.
3. Section 08 71 13 – Automatic Door Operators.
4. Section 28 13 00 – Access Control.

D. Manufacturer’s Abbreviations:

1. MK - McKinney
2. PE - Pemko
3. GS - ASSA ABLOY Glass Solutions
4. RF - Rixson
5. RO - Rockwood
6. AD - Adams Rite
7. SA - SARGENT
8. SU - Securitron
9. NO - Norton
10. MC - Medeco
11. LU - Lund Equipment Co
12. OT - OTHER
Set: 1.0

Doors: 1000A, 1000B

2 Continuous Hinge CFM_SLF-HD1 PT x Length Required PE 087100
1 CVR Exit Device (NL, ELR, RX, CD) NB 16 55 56 AD8410 106 US32D SA 087100
1 CVR Exit Device (EO, ELR, RX, CD) 16 55 56 AD8410 US32D SA 087100
1 Rim Cylinder 3_tailpiece to suit US32D SA 087100
2 Mortised Cylinder Size and Cam as required US32D SA 087100
2 Door Pull RM3331-36 Mtg-Type 12XHD US32D RO 087100
1 Surface Closer UNI7500 689 NO 087100
1 Blade Stop 689 689 NO 087100
1 Drop Plate 7788 689 NO 087100
1 Automatic Opener 6310 / 6330 (As Required) 689 NO 087113
1 Threshold 273x224AFGT x Length Required x MSES25SS PE 087100
2 Sweep 3452CNB x Length Required PE 087100
2 Harness Adaptor 52-2946 SA
2 Electric Power Transfer EL-CEPT SU 087100
1 Card Reader By Security Supplier
2 ElectroLynx Harness QC-C**** x Length Required MK 087100
2 ElectroLynx Harness QC-C1500P MK 087100
1 Push Button PB SU 087100
2 Door Switch 505D NO 087100
2 Position Switch DPS2 - M / W-BK SU 087100
1 Power Supply BPS (Size & Type as Required) SU 087100
1 Wiring Diagram Elevation and Point to Point as Specified OT

Notes: Perimeter and meeting stile gasket by door / frame manufacturer.

System Operational Narrative:
• Doors normally closed and secure.
• Access by valid credential presentation retracting exit device latches and activating the auto operator actuator on the pull side of the doors for a predetermined amount of time to allow for manual or automatic operator entry.
• Access by remote push button (location to be determined) retracting exit device latches and activating the auto operator to allow for entry.
• Egress from the pull side by pressing the auto operator actuator switch on the push side of the doors, which will momentarily retract the exit device latches and activate the auto operator to allow for auto operator egress.
• Egress always free for immediate manual exit. Request-to-Exit sensors allows exit without alarm condition.
• Door position switches provide open/closed monitoring to both access control system and intrusion alarm service.
• Latches remain projected/locked (fail secure) in event of power loss. Key override cylinder for emergency access.

Set: 2.0

Doors: 1100

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<th>Supplier Code</th>
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<td>1 Exit Device (exit only)</td>
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<td>1 Rim Cylinder</td>
<td>3_ tailpiece to suit</td>
<td>US32D SA 087100</td>
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<td>1 Mortised Cylinder</td>
<td>Size and Cam as required</td>
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<td>1 Surface Closer</td>
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<td>1 Blade Stop</td>
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<td>1 Drop Plate</td>
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<td>689 NO 087100</td>
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<td>1 Threshold</td>
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<td>1 Sweep</td>
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<td>1 Harness Adaptor</td>
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<td>1 Card Reader</td>
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<td>1 ElectroLynx Harness</td>
<td>QC-C**** x Length Required</td>
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<td>1 ElectroLynx Harness</td>
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<td>1 Position Switch</td>
<td>DPS2 - M / W-BK</td>
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<td>1 Power Supply</td>
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<td>1 Wiring Diagram</td>
<td>Elevation and Point to Point as Specified</td>
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</table>

Notes: Perimeter and meeting stile gasket by door / frame manufacturer.

System Operational Narrative:
• Door is normally closed and secure.
• Access by valid credential presentation retracting exit device latch for a predetermined amount of time to allow for entry.
• Access by remote push button (location to be determined) retracting exit device latch to allow for entry.
• Egress always free for immediate manual exit. Request-to-Exit sensors allows exit without alarm condition.
• Door position switches provide open/closed monitoring to both access control system and intrusion
alarm service.
• Latches remain projected/locked (fail secure) in event of power loss. Key override cylinder for emergency access.

Set: 3.0

Doors: 1423, 1612A

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<th>Model</th>
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<td>1 Surface Closer</td>
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<td>1 Blade Stop</td>
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<td>1 Power Supply</td>
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<td>1 Wiring Diagram</td>
<td>Elevation and Point to Point as Specified</td>
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Notes: Perimeter and meeting stile gasket by door / frame manufacturer. 5" Minimum Stile Width is required to accommodate the exit device.

System Operational Narrative:
• Door is normally closed and secure.
• Access by valid credential presentation at exit trim releasing thee trim lever for a predetermined amount of time to allow for entry.
• Egress always free for immediate manual exit. Request-to-Exit sensors allows exit without alarm condition.
• Door position switches provide open/closed monitoring to both access control system and intrusion alarm service.
• Latches remain projected/locked (fail secure) in event of power loss. Key override cylinder for emergency access.

Set: 4.0

Doors: 1021A

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DOOR HARDWARE SETS 080671 - 8
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</tbody>
</table>

Notes: Perimeter and meeting stile gasket by door / frame manufacturer.

System Operational Narrative:
• Doors normally closed and secure.
• Access by valid credential presentation retracting exit device latches for a predetermined amount of time to allow for entry.
• Egress always free for immediate exit. Request-to-Exit sensors allows exit without alarm condition.
• Door position switches provide open/closed monitoring to both access control system and intrusion alarm service.

Set: 5.0

Doors: 1006B

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Model</th>
<th>Finish</th>
<th>Color</th>
<th>Part Number</th>
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<tbody>
<tr>
<td>Continuous Hinge</td>
<td></td>
<td>CFM_SLF-HD1 x Length Required</td>
<td>PE</td>
<td>087100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rim Exit Device (NL, CD)</td>
<td></td>
<td>16 AD8510</td>
<td>US32D</td>
<td>SA 087100</td>
<td></td>
<td></td>
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<tr>
<td>Rim Cylinder</td>
<td></td>
<td>3_ tailpiece to suit</td>
<td>US32D</td>
<td>SA 087100</td>
<td></td>
<td></td>
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<tr>
<td>Mortised Cylinder</td>
<td></td>
<td>Size and Cam as required</td>
<td>US32D</td>
<td>SA 087100</td>
<td></td>
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<tr>
<td>Door Pull</td>
<td></td>
<td>RM3331-36 Mtg-Type 12XHD</td>
<td>US32D</td>
<td>RO 087100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blade Stop</td>
<td></td>
<td>6891</td>
<td>689</td>
<td>NO 087100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drop Plate</td>
<td></td>
<td>7788</td>
<td>689</td>
<td>NO 087100</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
1 Door Closer        UNI7500 689 NO 087100
1 Threshold       273x224AFGT x Length Required x MSES25SS PE 087100
1 Sweep           3452CNB x Length Required PE 087100
1 Position Switch DPS2 - M / W-BK SU 087100

Notes: Perimeter gasket by door / frame manufacturer.

System Operational Narrative:
• Door normally closed and secure.
• Door position switches provide open/closed monitoring to both access control system and intrusion alarm service.

Set: 6.0

Doors: 1435B

1 Continuous Hinge CFM_SLF-HD1 x Length Required PE 087100
1 Rim Exit Device (NL, CD) 16 AD8510 US32D SA 087100
1 Mortised Cylinder Size and Cam as required US32D SA 087100
1 Surface Closer UNI7500 689 NO 087100
1 Blade Stop 6891 689 NO 087100
1 Drop Plate 7788 689 NO 087100
1 Threshold 273x224AFGT x Length Required x MSES25SS PE 087100
1 Sweep 3452CNB x Length Required PE 087100
1 Position Switch DPS2 - M / W-BK SU 087100

Notes: Perimeter gasket by door / frame manufacturer.

System Operational Narrative:
• Door normally closed and secure.
• Door position switch provides open/closed monitoring to both access control system and intrusion alarm service.

Set: 7.0

Doors: 1005, 1652A, 1652F, 1659

1 Continuous Hinge CFM_HD1 PT x Length Required PE 087100
1 Access Control Rim Exit IN220-8878 IPS ETL US32D SA 281300
1 Surface Closer UNI7500 689 NO 087100
1 Kick Plate K1050 10” high BEV CSK US32D RO 087100
1 Threshold 273x224AFGT x Length Required PE 087100

DOOR HARDWARE SETS 080671 - 10
SCCAD HEADQUARTERS
SAINT PETERS, MO

Notes: System Operational Narrative:
• Door is normally closed and secure.
• Access by valid credential presentation at exit trim releasing the trim lever for a predetermined amount of time to allow for entry.
• Egress always free for immediate manual exit. Request-to-Exit sensors allows exit without alarm condition.
• Door position switches provide open/closed monitoring to both access control system and intrusion alarm service.
• Latches remain projected/locked (fail secure) in event of power loss. Key override cylinder for emergency access.

Set: 8.0

Doors: 1652C

Continuous Hinge: CFM_SLF-HD1 x Length Required PE 087100
Rim Exit Device (nightlatch): 16 8804 US32D SA 087100
Rim Cylinder: 3_ tailpiece to suit US32D SA 087100
Mortised Cylinder: Size and Cam as required US32D SA 087100
Door Pull: RM3331-36 Mtg-Type 12XHD US32D RO 087100
Surface Closer: UNI7500 689 NO 087100
Kick Plate: K1050 10” high BEV CSK US32D RO 087100
Threshold: 273x224AFGT x Length Required x MSES25SS PE 087100
Gasketing: 303AS (Head & Jambs) PE 087100
Rain Guard: 346C x Width of Frame Head PE 087100
Sweep: 3452CNB x Length Required PE 087100
Position Switch: DPS2 - M / W-BK SU 087100

Notes: System Operational Narrative:
• Door normally closed and secure.
• Door position switch provides open/closed monitoring to both access control system and intrusion alarm service.

DOOR HARDWARE SETS 080671 - 11
Set: 9.0

Doors: 1004A

1 Continuous Hinge    CFM_HD1 x Length Required    PE 087100
1 Rim Exit Device (exit only) LD 8810    US32D    SA 087100
1 Surface Closer    UNI7500    689    NO 087100
1 Kick Plate    K1050 10" high BEV CSK    US32D    RO 087100
1 Threshold    273x224AFGT x Length Required x MSES25SS    PE 087100
1 Gasketing    303AS (Head & Jambs)    PE 087100
1 Rain Guard    346C x Width of Frame Head    PE 087100
1 Sweep    3452CNB x Length Required    PE 087100
1 Position Switch    DPS2 - M / W-BK    SU 087100

Notes: System Operational Narrative:
• Door normally closed and secure.
• Door position switch provides open/closed monitoring to both access control system and intrusion alarm service.

Set: 10.0

Doors: 1627

6 Hinge (heavy weight)    T4A3386 NRP    US32D    MK 087100
1 Self Latching Flush Bolt Set    2845 / 2495 as required    US32D    RO 087100
1 Dust Proof Strike    570    US26D    RO 087100
1 Storeroom Lock    28 41 10G04 LL    US26D    SA 087100
2 Surface Closer    UNI7500    689    NO 087100
2 Kick Plate    K1050 10" high BEV CSK    US32D    RO 087100
1 Threshold    273x224AFGT x Length Required x MSES25SS    PE 087100
1 Gasketing    303AS (Head & Jambs)    PE 087100
1 Rain Guard    346C x Width of Frame Head    PE 087100
2 Sweep    3452CNB x Length Required    PE 087100
2 Position Switch    DPS2 - M / W-BK    SU 087100

Set: 11.0

Doors: 1007B, 1500A, 1600B, 1643B

Continuous Hinge    CFM_SLF-HD1 PT x Length Required    PE 087100

DOOR HARDWARE SETS 080671 - 12
Access Control Cyl Lock: 28 41 IN220-10G77 IPS LL US26D SA 281300
Surface Closer: UNI7500 689 NO 087100
Kick Plate: K1050 10" high BEV CSK US32D RO 087100
Threshold: 273x224AFGT x Length Required x MSES25SS PE 087100
Gasketing: 303AS (Head & Jambs) PE 087100
Rain Guard: 346C x Width of Frame Head PE 087100
Sweep: 3452CNB x Length Required PE 087100
PoE - ElectroLynx Harness/Power Transfer (Frame): PoE-CEPT30 MK 087100
PoE - ElectroLynx Harness (Door): PoE-C***P x Length Required MK 087100
Position Switch: DPS2 - M / W-BK SU 087100
Power Supply: BPS (Size & Type as Required) SU 087100
Wiring Diagram: Elevation and Point to Point as Specified OT

Notes: System Operational Narrative:
• Door is normally closed and secure.
• Access by valid credential presentation at lockset escutcheon releasing the lever for a predetermined amount of time to allow for entry.
• Egress always free for immediate manual exit. Request-to-Exit sensors allows exit without alarm condition.
• Door position switches provide open/closed monitoring to both access control system and intrusion alarm service.
• Lever remains locked (fail secure) in event of power loss. Key override cylinder for emergency access.

**Set: 12.0**

Doors: 1408

1 Continuous Hinge: CFM_SLF-HD1 x Length Required PE 087100
1 Mortise Deadlock: MS1850S 628 AD 087100
1 Thumb Turn Cylinder: 4066 130 AD 087100
1 Mortised Cylinder: Size and Cam as required US32D SA 087100
1 Push Bar & Pull: BF15847 Mtg-Type 5HD/12XHD US32D-316 RO 087100
1 Surface Closer: 7500 (Reg or P/A) 689 NO 087100
1 Blade Stop: 6891 689 NO 087100
1 Drop Plate: 7788 689 NO 087100

Notes: Weatherstrip by Aluminum Door Manufacturer.
**Set: 13.0**

Doors: 1435A, 2301, 2317, 2337

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<td>Surface Closer</td>
<td>7500 (Reg or P/A)</td>
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<tr>
<td>Blade Stop</td>
<td>6891</td>
<td>NO</td>
<td>087100</td>
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<tr>
<td>Drop Plate</td>
<td>7788</td>
<td>NO</td>
<td>087100</td>
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<tr>
<td>Wall Stop</td>
<td>403 (or) 441CU (As Required)</td>
<td>US26D</td>
<td>087100</td>
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Notes: Weatherstrip and Astragals by Aluminum Door Manufacturer.

**Set: 14.0**

Doors: 1400

<table>
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<td>PV-ENDLOAD</td>
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<td>Stop</td>
<td>60131</td>
<td>RF</td>
<td>087100</td>
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<tr>
<td>Magnetic Lock</td>
<td>MAG-SAM-1224VDC</td>
<td>US32D</td>
<td>GS</td>
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<td>Door Pull</td>
<td>RM3301 Mtg-Type 13HD</td>
<td>US32D</td>
<td>GS</td>
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<tr>
<td>Concealed Closer</td>
<td>OHC-609-90NHO</td>
<td>GS</td>
<td>084126</td>
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<tr>
<td>Wall Stop</td>
<td>403 (or) 441CU (As Required)</td>
<td>US26D</td>
<td>RO</td>
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<tr>
<td>Card Reader</td>
<td>By Security Supplier</td>
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<tr>
<td>Position Switch</td>
<td>DPS2 - M/W-BK</td>
<td>SU</td>
<td>087100</td>
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<td>Motion Sensor</td>
<td>XMS</td>
<td>SU</td>
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<td>Push Button</td>
<td>EEB2</td>
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<tr>
<td>Power Supply</td>
<td>BPS (Size &amp; Type as Required)</td>
<td>SU</td>
<td>087100</td>
</tr>
</tbody>
</table>

Notes: Balance of hardware by glass door supplier.
Connect power supply to fire alarm system.

**DESCRIPTION OF OPERATION:**
- Door normally locked.
- Valid credential releases magnetic lock.
- Free egress at all times by motion sensor or push button.
- In case of power loss or fire alarm, door is unlocked.

**Set: 15.0**

Doors: 1009, 2300

<table>
<thead>
<tr>
<th>Item</th>
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<tbody>
<tr>
<td>Bottom Pivot</td>
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<td>GS</td>
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</tbody>
</table>

DOOR HARDWARE SETS 080671 - 14
**Notes:**
Balance of hardware by glass door supplier.

**Set: 16.0**

**Doors:** 1020, 1105, 1200B, 1500D

<table>
<thead>
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<th>Item Description</th>
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<tr>
<td>1 Stop</td>
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<td>626</td>
<td>RF 087100</td>
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<tr>
<td>2 Door Pull</td>
<td>RM3301 Mtg-Type 13HD</td>
<td>US32D</td>
<td>GS 084126</td>
</tr>
<tr>
<td>1 Concealed Closer</td>
<td>OHC-609-90NHO</td>
<td>GS</td>
<td>084126</td>
</tr>
<tr>
<td>1 Wall Stop</td>
<td>403 (or) 441CU (As Required)</td>
<td>US26D</td>
<td>RO 087100</td>
</tr>
</tbody>
</table>

**Notes:** System Operational Narrative:
- Door normally closed and secure.
- Access from the pull side by valid credential presentation unlocking lever trim and deactivating the delayed egress magnetic lock for a pre-determined time limit and then relocking.
- Access from the push side by a valid credential presented to the card reader to momentarily deactivate the delayed egress magnetic lock to allow egress.
- Attempting to egress without an authorized card read will initiate an audible alarm and the magnetic lock will hold the door for 15 seconds before releasing the door, alarm will continue to sound until manually reset.
- Door position switch integrated into the magnetic lock provides open/closed monitoring to both access control system and intrusion alarm service.
- Outside lever trim remains locked (fail secure) in event of power loss. Key override cylinder for emergency access.
- Magnetic Lock will release in the event of a fire alarm or power loss, (Fail Safe).

**Set: 17.0**

Doors: 1200A, 1621B, 2011, 2309, 2339, 2401

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
<th>Manufacturer</th>
<th>Code/Part Number</th>
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<tbody>
<tr>
<td>Hinge (heavy weight)</td>
<td>T4A3786 NRP</td>
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<td>US2D MK 087100</td>
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<tr>
<td>Access Control Rim Exit</td>
<td>IN220-8878 IPS ETL</td>
<td></td>
<td>US32D SA 281300</td>
</tr>
<tr>
<td>Mortised Cylinder</td>
<td>Size and Cam as required</td>
<td></td>
<td>US32D SA 087100</td>
</tr>
<tr>
<td>Surface Closer</td>
<td>PR7500</td>
<td></td>
<td>689 NO 087100</td>
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<tr>
<td>Kick Plate</td>
<td>K1050 10&quot; high BEV CSK</td>
<td></td>
<td>US32D RO 087100</td>
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<tr>
<td>Wall Stop</td>
<td>403 (or) 441CU (As Required)</td>
<td></td>
<td>US2D RO 087100</td>
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<tr>
<td>Silencer</td>
<td>608</td>
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<td>RO 087100</td>
</tr>
<tr>
<td>ElectroLynx Harness (Door)</td>
<td>PoE-C**** x Length Required</td>
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<tr>
<td>PoE - ElectroLynx Harness/Power Transfer (Frame)</td>
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</tr>
<tr>
<td>Power Supply</td>
<td>BPS (Size &amp; Type as Required)</td>
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<tr>
<td>Wiring Diagram</td>
<td>Elevation and Point to Point as Specified</td>
<td></td>
<td>OT</td>
</tr>
</tbody>
</table>

Notes: System Operational Narrative:
- Door normally closed and secure.
- Access by valid credential presentation unlocking lever trim for a pre-determined time limit and then relocking.
- Egress always free for immediate exit. Request-to-Exit sensor allows exit without alarm condition.
- Door position switch provides open/closed monitoring to both access control system and intrusion alarm service.
- Outside lever trim remains locked (fail secure) in event of power loss. Key override cylinder for emergency access.

**Set: 18.0**

Doors: 1621A, 1643D

<table>
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<td>1 Fire Rated Access Control Rim Exit</td>
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<tr>
<td>1 Surface Closer</td>
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</tr>
<tr>
<td>1 Kick Plate</td>
<td>K1050 10&quot; high BEV CSK</td>
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<td>US32D RO 087100</td>
</tr>
<tr>
<td>1 Wall Stop</td>
<td>403 (or) 441CU (As Required)</td>
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<td>US2D RO 087100</td>
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<tr>
<td>1 Gasketing</td>
<td>S88D (Head &amp; Jambs)</td>
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<tr>
<td>1 ElectroLynx Harness (Door)</td>
<td>PoE-C**** x Length Required</td>
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<td>PoE - ElectroLynx Harness/Power Transfer (Frame)</td>
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</table>
1 Power Supply  BPS (Size & Type as Required)  SU 087100
1 Wiring Diagram Elevation and Point to Point as Specified OT

Notes: System Operational Narrative:
• Door normally closed and secure.
• Access by valid credential presentation unlocking lever trim for a pre-determined time limit and then relocking.
• Egress always free for immediate exit. Request-to-Exit sensor allows exit without alarm condition.
• Door position switch provides open/closed monitoring to both access control system and intrusion alarm service.
• Outside lever trim remains locked (fail secure) in event of power loss. Key override cylinder for emergency access.

Set: 19.0

Doors: 1647

3 Hinge (heavy weight) T4A3786 NRP US26D MK 087100
1 Fire Rim Exit Device (storeroom) 12 8806 ETL US32D SA 087100
1 Mortised Cylinder Size and Cam as required US32D SA 087100
1 Surf Overhead Stop 10-X36 630 RF 087100
1 Surface Closer 7500 (Reg or P/A) 689 NO 087100
1 Kick Plate K1050 10” high BEV CSK US32D RO 087100
1 Wall Stop 403 (or) 441CU (As Required) US26D RO 087100
1 Gasketing S88D (Head & Jambs) PE 087100

Set: 20.0

Doors: 1006A

8 Hinge (heavy weight) T4A3786 NRP US26D MK 087100
1 Surface Vert Rod Exit (CD,LBR) 16 NB8710 306 US32D SA 087100
1 Surface Vert Rod Exit (CD,LBR) 16 NB8710 EO US32D SA 087100
1 Rim Cylinder 3_ tailpiece to suit US32D SA 087100
1 Mortised Cylinder Size and Cam as required US32D SA 087100
2 Door Pull RM3331-36 Mtg-Type 12XHD US32D RO 087100
2 Conc Overhead Stop 6-X36 630 RF 087100
2 Surface Closer 7500 (Reg or P/A) 689 NO 087100
2 Kick Plate K1050 10” high BEV CSK US32D RO 087100
2 Silencer 608 RO 087100
### Set: 21.0

Doors: 1424, 1429A, 1434A, 1434B, 1434C, 1434D

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<td>1 Kick Plate</td>
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### Set: 22.0

Doors: 1021B

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<td>1 Kick Plate</td>
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### Set: 23.0

Doors: 1004B, 2004, 2005

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<td></td>
<td>K1050 10&quot; high BEV CSK</td>
<td>US32D</td>
<td>RO 087100</td>
</tr>
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<td>1 Wall Stop</td>
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<td>US26D</td>
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### Set: 24.0

Doors: 1304, 1403, 1617, 1618, 1622, 1644, 1651, 2302, 2307

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<tr>
<td>1 Hinge (heavy weight)</td>
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<td>MK 087100</td>
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<td>7500 (Reg or P/A)</td>
<td>689</td>
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<td>1 Kick Plate</td>
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<td>K1050 10&quot; high BEV CSK</td>
<td>US32D</td>
<td>RO 087100</td>
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<td></td>
<td>403 (or) 441CU (As Required)</td>
<td>US26D</td>
<td>RO 087100</td>
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<tr>
<td>1 Silencer</td>
<td></td>
<td>608</td>
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DOOR HARDWARE SETS 080671 - 18
Notes:
System Operational Narrative:
• Door normally closed and secure.
• Access by valid credential presentation unlocking lever trim for a pre-determined time limit and then relocking.
• Egress always free for immediate exit. Request-to-Exit sensor allows exit without alarm condition.
• Door position switch provides open/closed monitoring to both access control system and intrusion alarm service.
• Outside lever trim remains locked (fail secure) in event of power loss. Key override cylinder for emergency access.

### Set: 25.0
Doors: 1000C, 1011, 1017, 1109B, 1300, 1406, 1608B, 1619E, 1620B, 2016, 2100, 2111, 2200

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<td>1 Surface Closer</td>
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<td>689 NO 087100</td>
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<td>1 Wall Stop</td>
<td>403 (or) 441CU (As Required)</td>
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<td>1 Silencer</td>
<td>608</td>
<td>1</td>
<td>RO 087100</td>
</tr>
<tr>
<td>1 PoE - ElectroLynx Harness (Door)</td>
<td>PoE-C***P x Length Required</td>
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</tr>
<tr>
<td>1 PoE - ElectroLynx Harness (Frame)</td>
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<td>1</td>
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<tr>
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<td>BPS (Size &amp; Type as Required)</td>
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<td>SU 087100</td>
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<td>1 Wiring Diagram</td>
<td>Elevation and Point to Point as Specified</td>
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Notes: System Operational Narrative:
• Door normally closed and secure.
• Access by valid credential presentation unlocking lever trim for a pre-determined time limit and then relocking.
• Egress always free for immediate exit. Request-to-Exit sensor allows exit without alarm condition.
• Door position switch provides open/closed monitoring to both access control system and intrusion alarm service.
• Outside lever trim remains locked (fail secure) in event of power loss. Key override cylinder for emergency access.
**Set: 26.0**

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<td>Surface Closer</td>
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<td>7500 (Reg or P/A)</td>
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<td>NO</td>
<td>087100</td>
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<td>Kick Plate</td>
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<td>K1050 10” high BEV CSK</td>
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<td>RO</td>
<td>087100</td>
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<td>Silencer</td>
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<td>RO</td>
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<tr>
<td>PoE - ElectroLynx Harness (Frame)</td>
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<td>Elevation and Point to Point as Specified</td>
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**Notes:** System Operational Narrative:

- Door normally closed and secure.
- Access by valid credential presentation unlocking lever trim for a pre-determined time limit and then relocking.
- Egress always free for immediate exit. Request-to-Exit sensor allows exit without alarm condition.
- Door position switch provides open/closed monitoring to both access control system and intrusion alarm service.
- Outside lever trim remains locked (fail secure) in event of power loss. Key override cylinder for emergency access.

**Set: 27.0**

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<td>US26D</td>
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<tr>
<td>Access Control Cyl Lock</td>
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<td>28 41 IN220-10G77 IPS LL</td>
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<td>SA</td>
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<td>1</td>
<td>7500 (Reg or P/A)</td>
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<td>087100</td>
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<tr>
<td>Kick Plate</td>
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<td>K1050 10” high BEV CSK</td>
<td>US32D</td>
<td>RO</td>
<td>087100</td>
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<td>BPS (Size &amp; Type as Required)</td>
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Notes:
System Operational Narrative:
• Door normally closed and secure.
• Access by valid credential presentation unlocking lever trim for a pre-determined time limit and then relocking.
• Egress always free for immediate exit. Request-to-Exit sensor allows exit without alarm condition.
• Door position switch provides open/closed monitoring to both access control system and intrusion alarm service.
• Outside lever trim remains locked (fail secure) in event of power loss. Key override cylinder for emergency access.

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<td>1 Self Latching Flush Bolt Set</td>
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<tr>
<td>1 Dust Proof Strike</td>
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<tr>
<td>1 Storeroom Lock</td>
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<tr>
<td>2 Surf Overhead Stop</td>
</tr>
<tr>
<td>2 Silencer</td>
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<table>
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<tbody>
<tr>
<td>6 Hinge</td>
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<tr>
<td>1 Self Latching Flush Bolt Set</td>
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<tr>
<td>1 Dust Proof Strike</td>
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<tr>
<td>1 Storeroom Lock</td>
</tr>
<tr>
<td>2 Surface Closer</td>
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<tr>
<td>2 Kick Plate</td>
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<tr>
<td>3 Hinge</td>
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<tr>
<td>1 Storeroom Lock</td>
</tr>
<tr>
<td>1 Surf Overhead Stop</td>
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<td>3 Silencer</td>
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### Set: 31.0
Doors: 1015, 1204, 1430, 2303, 2319, 2321, 2330

| 3 Hinge  | TA2714 | US26D  | MK  | 087100 |
| 1 Storeroom Lock | 28 41 10G04 LL | US26D  | SA  | 087100 |
| 1 Surface Closer | 7500 (Reg or P/A) | 689 | NO  | 087100 |
| 1 Kick Plate | K1050 10" high BEV CSK | US32D  | RO  | 087100 |
| 1 Wall Stop | 403 (or) 441CU (As Required) | US26D  | RO  | 087100 |
| 3 Silencer | 608 | RO | 087100 |

### Set: 32.0
Doors: 2334.2

| 3 Hinge  | TA2714 NRP | US26D  | MK  | 087100 |
| 1 Storeroom Lock | 28 41 10G04 LL | US26D  | SA  | 087100 |
| 1 Surf Overhead Stop | 10-X36 | 630 | RF  | 087100 |
| 1 Surface Closer | 7500 (Reg or P/A) | 689 | NO  | 087100 |
| 1 Kick Plate | K1050 10" high BEV CSK | US32D  | RO  | 087100 |
| 3 Silencer | 608 | RO | 087100 |

### Set: 33.0
Doors: 1603A, 1605A

| 6 Hinge  | TA2714 | US26D  | MK  | 087100 |
| 1 Self Latching Flush Bolt Set | 2845 / 2495 as required | US32D  | RO  | 087100 |
| 1 Dust Proof Strike | 570 | US26D  | RO  | 087100 |
| 1 Office Lock | 28 41 10G05 LL | US26D  | SA  | 087100 |
| 2 Surface Closer | 7500 (Reg or P/A) | 689 | NO  | 087100 |
| 2 Kick Plate | K1050 10" high BEV CSK | US32D  | RO  | 087100 |
| 2 Wall Stop | 403 (or) 441CU (As Required) | US26D  | RO  | 087100 |

### Set: 34.0
Doors: 1019, 1032, 1102, 1107, 1405, 1615, 1645, 1646, 2102, 2202, 2203, 2204, 2205, 2206, 2207, 2304, 2305A, 2305B, 2306, 2310, 2311, 2312, 2316, 2324, 2325A, 2325B, 2326, 2327, 2335, 2340, 2343, 2344, 2345

| 3 Hinge  | TA2714 | US26D  | MK  | 087100 |
| 1 Office Lock | 28 41 10G05 LL | US26D  | SA  | 087100 |
| 1 Wall Stop | 403 (or) 441CU (As Required) | US26D  | RO  | 087100 |
| 1 Silencer | 608 | RO | 087100 |
### Set: 35.0

Doors: 1108

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<td>US26D SA 087100</td>
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<tr>
<td>1 Wall Stop</td>
<td>403 (or) 441CU (As Required)</td>
<td>US26D RO 087100</td>
</tr>
<tr>
<td>3 Silencer</td>
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### Set: 36.0

Doors: 1307, 2323

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<td>US26D MK 087100</td>
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<td>1 Office Lock</td>
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<td>US26D SA 087100</td>
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<tr>
<td>1 Surface Closer</td>
<td>7500 (Reg or P/A)</td>
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<td>1 Kick Plate</td>
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<td>US32D RO 087100</td>
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<tr>
<td>1 Wall Stop</td>
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### Set: 37.0

Doors: 1604A, 2338

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<tr>
<td>1 Office Lock</td>
<td>28 41 10G05 LL</td>
<td>US26D SA 087100</td>
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<tr>
<td>1 Surf Overhead Stop</td>
<td>10-X36</td>
<td>630 RF 087100</td>
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<td>1 Surface Closer</td>
<td>7500 (Reg or P/A)</td>
<td>689 NO 087100</td>
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<tr>
<td>1 Kick Plate</td>
<td>K1050 10&quot; high BEV CSK</td>
<td>US32D RO 087100</td>
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### Set: 38.0

Doors: 1422

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<tr>
<td>1 Self Latching Flush Bolt Set</td>
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<td>US32D RO 087100</td>
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<tr>
<td>1 Dust Proof Strike</td>
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<td>US26D RO 087100</td>
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<tr>
<td>1 Classroom Lock</td>
<td>28 41 10G37 LL</td>
<td>US26D SA 087100</td>
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<tr>
<td>2 Surf Overhead Stop</td>
<td>10-X36</td>
<td>630 RF 087100</td>
</tr>
<tr>
<td>2 Surface Closer</td>
<td>7500 (Reg or P/A)</td>
<td>689 NO 087100</td>
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Doors: 1008, 1014A, 1431, 1434, 1435.1, 1435.2

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### Set: 40.0
Doors: 1007E, 1410, 1412, 1413, 1415, 1416, 1417, 1418, 1419, 2329

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<td>3 Hinge</td>
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<td>MK 087100</td>
</tr>
<tr>
<td>1 Classroom Lock</td>
<td>28 41 10G37 LL</td>
<td>US26D</td>
<td>SA 087100</td>
</tr>
<tr>
<td>1 Surface Closer</td>
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<td>NO 087100</td>
</tr>
<tr>
<td>1 Kick Plate</td>
<td>K1050 10&quot; high BEV CSK</td>
<td>US32D</td>
<td>RO 087100</td>
</tr>
<tr>
<td>1 Wall Stop</td>
<td>403 (or) 441CU (As Required)</td>
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<td>RO 087100</td>
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### Set: 41.0
Doors: 1409, 1421

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<td>MK 087100</td>
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<tr>
<td>1 Classroom Lock</td>
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<td>SA 087100</td>
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<tr>
<td>1 Surf Overhead Stop</td>
<td>10-X36</td>
<td>630</td>
<td>RF 087100</td>
</tr>
<tr>
<td>1 Surface Closer</td>
<td>7500 (Reg or P/A)</td>
<td>689</td>
<td>NO 087100</td>
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<tr>
<td>1 Kick Plate</td>
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<td>US32D</td>
<td>RO 087100</td>
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### Set: 42.0
Doors: 1104, 1303, 1648, 1649

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Set: 43.0
Doors: 1613, 2107, 2336

3 Hinge  
1 Privacy Lock  
1 Surface Closer  
1 Kick Plate  
1 Wall Stop  
1 Gasketing  
1 Coat Hook

3 Hinge: TA2714  
1 Privacy Lock: 28 41 10U65 LL  
1 Surface Closer: 7500 (Reg or P/A)  
1 Kick Plate: K1050 10" high BEV CSK  
1 Wall Stop: 403 (or) 441CU (As Required)  
1 Gasketing: S88D (Head & Jambs)  
1 Coat Hook: RM801

US26D  MK  087100
US26D  SA  087100
689  NO  087100
US32D  RO  087100
US26D  RO  087100
PE  087100
US26D  RO  087100

Set: 44.0

6 Hinge  
1 Self Latching Flush Bolt Set  
1 Dust Proof Strike  
1 Passage Latch  
1 Surface Closer  
2 Kick Plate  
2 Wall Stop

6 Hinge: TA2714  
1 Self Latching Flush Bolt Set: 2845 / 2495 as required  
1 Dust Proof Strike: 570  
1 Passage Latch: 28 41 10U15 LL  
1 Surface Closer: 7500 (Reg or P/A)  
2 Kick Plate: K1050 10" high BEV CSK  
2 Wall Stop: 403 (or) 441CU (As Required)

US32D  RO  087100
US26D  RO  087100
US26D  RO  087100
689  NO  087100
US32D  RO  087100
US26D  RO  087100

Set: 45.0
Doors: 1001, 1006, 1407, 1631, 2109, 2329.1

3 Hinge  
1 Passage Latch  
1 Wall Stop  
3 Silencer

3 Hinge: TA2714  
1 Passage Latch: 28 41 10U15 LL  
1 Wall Stop: 403 (or) 441CU (As Required)  
3 Silencer: 608

US26D  MK  087100
US26D  SA  087100
US26D  RO  087100
RO  087100

Set: 46.0
Doors: 1007A, 1110, 1111, 1112, 1113, 1426, 1426A, 1427, 1427A, 1428, 1428A, 1501, 1623

3 Hinge  
1 Passage Latch  
1 Surf Overhead Stop  
3 Silencer

3 Hinge: TA2714  
1 Passage Latch: 28 41 10U15 LL  
1 Surf Overhead Stop: 10-X36  
3 Silencer: 608

US26D  MK  087100
US26D  SA  087100
630  RF  087100
608  RO  087100

DOOR HARDWARE SETS  
080671 - 25
Set: 47.0

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Set: 48.0
Doors: 1109A, 1650

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Set: 49.0
Doors: 1012, 1013, 1201, 1202, 1432, 1433, 1610, 1611, 2009, 2010

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Set: 50.0
Doors: 2346, 2347

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1 Silencer 608 RO 087100

**Set: 51.0**


1 All Hardware Provided By Door Supplier

**Set: 52.0**

1 Repair Kit QC-R001 MK 087100
1 Crimp Tool QC-R003 MK 087100
1 Test Unit WT2 SA 087100
1 Key Management System EA-100117 MC 087100
1 Key Cabinet 1200 Series (capacity as required) LU

END OF SECTION 080671
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SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Standard and custom hollow metal doors and frames.
2. Steel sidelight, borrowed lite and transom frames.
3. Light frames and glazing installed in hollow metal doors.

B. Related Sections:

1. Division 04 Section "Unit Masonry" for embedding anchors for hollow metal work into masonry construction.
2. Division 08 Section “Flush Wood Doors”.
3. Division 08 Section "Glazing" for glass view panels in hollow metal doors.
4. Division 08 Section "Door Hardware".
5. Division 08 Section "Access Control Hardware".
6. Division 09 Sections "Exterior Painting" and "Interior Painting" for field painting hollow metal doors and frames.
7. Division 26 "Electrical" Sections for electrical connections including conduit and wiring for door controls and operators installed on frames with factory installed electrical knock out boxes.

C. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI/SDI A250.8 - Recommended Specifications for Standard Steel Doors and Frames.
2. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames, Frames Anchors and Hardware Reinforcing.
3. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames.
4. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
5. ANSI/SDI A250.11 - Recommended Erection Instructions for Steel Frames.
6. ASTM A1008 - Standard Specification for Steel Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
7. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
10. ANSI/BHMA A156.115 - Hardware Preparation in Steel Doors and Frames.
17. UL 10C - Positive Pressure Fire Tests of Door Assemblies.
18. UL 1784 - Standard for Air Leakage Tests of Door Assemblies.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, hardware reinforcements, profiles, anchors, fire-resistance rating, and finishes.

B. Door hardware supplier is to furnish templates, template reference number and/or physical hardware to the steel door and frame supplier in order to prepare the doors and frames to receive the finish hardware items.

C. Shop Drawings: Include the following:
   1. Elevations of each door design.
   2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
   3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
   4. Locations of reinforcement and preparations for hardware.
   5. Details of anchorages, joints, field splices, and connections.
   6. Details of accessories.
   7. Details of moldings, removable stops, and glazing.
   8. Details of conduit and preparations for power, signal, and control systems.

D. Samples for Verification:
   1. Samples are only required by request of the architect and for manufacturers that are not current members of the Steel Door Institute.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain hollow metal doors and frames through one source from a single manufacturer wherever possible.

B. Quality Standard: In addition to requirements specified, furnish SDI-Certified manufacturer products that comply with ANSI/SDI A250.8, latest edition, "Recommended Specifications for Standard Steel Doors and Frames".
C. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to UL10C (neutral pressure at 40” above sill) or UL 10C.

1. Oversize Fire-Rated Door Assemblies Construction: For units exceeding sizes of tested assemblies, attach construction label certifying doors are built to standard construction requirements for tested and labeled fire rated door assemblies except for size.
2. Temperature-Rise Limit: Where indicated and at vertical exit enclosures (stairwell openings) and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.
   a. Smoke "S" Label: Doors to bear “S” label, and include smoke and draft control gasketing applied to frame and on meeting stiles of pair doors.

D. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257. Provide labeled glazing material.

E. Energy Efficient Exterior Openings: Comply with minimum thermal ratings, based on ASTM C1363. Openings to be fabricated and tested as fully operable, thermal insulating door and frame assemblies.

1. Thermal Performance (Exterior Openings): Independent testing laboratory certification for exterior door assemblies being tested in accordance with ASTM C1363 and meet or exceed the following requirements:
   a. Door Assembly Operable U-Factor and R-Value Ratings: U-Factor 0.29, R-Value 3.4, including insulated door, thermal-break frame and threshold.
2. Air Infiltration (Exterior Openings): Independent testing laboratory certification for exterior door assemblies being tested in accordance with ASTM E283 to meet or exceed the following requirements:
   a. Rate of leakage of the door assembly shall not exceed 0.25 cfm per square foot of static differential air pressure of 1.567 psf (equivalent to 25 mph wind velocity).

F. Pre-Submittal Conference: Conduct conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier, Installer, and Contractor to review proper methods and procedures for installing hollow metal doors and frames and to verify installation of electrical knockout boxes and conduit at frames with electrified or access control hardware.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project site storage. Do not use non-vented plastic.
B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch high wood blocking. Do not store in a manner that traps excess humidity.

   1. Provide minimum 1/4-inch space between each stacked door to permit air circulation. Door and frames to be stacked in a vertical upright position.

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.7 COORDINATION

A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.

B. Warranty includes installation and finishing that may be required due to repair or replacement of defective doors.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide steel doors and frames from a SDI Certified manufacturer:

   1. CECO Door Products (C).
   2. Curries Company (CU).

2.2 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.
C. Frame Anchors: ASTM A 653/A 653M, Commercial Steel (CS), Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

2.3 HOLLOW METAL DOORS

A. General: Provide 1-3/4 inch doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8 and ANSI/NAAMM HMMA 867.

B. Exterior Doors (Energy Efficient): Face sheets fabricated of commercial quality hot-dipped zinc coated steel that complies with ASTM A924 A60. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model, and ANSI/SDI A250.4 for physical performance level.

1. Design: Flush panel.
2. Core Construction: Foamed in place polyurethane and steel reinforced core with no stiffener face Welds.
   a. Provide 18 gauge steel vertical reinforcements 6 inches apart and welded in place. Foamed in place polyurethane core is chemically bonded to all interior surfaces. No face welding is permitted.
   b. Thermal properties to rate at a fully operable minimum U-Factor 0.374 and R-Value 2.53, including insulated door, Mercury thermal-break frame and threshold.
   c. Kerf Type Frames: Thermal properties to rate at a fully operable minimum U-Factor 0.378 and R-Value 2.5, including insulated door, kerf type frame, and threshold.

3. Level/Model: Level 3 and Physical Performance Level A (Extra Heavy Duty), Minimum 16 gauge (0.053-inch - 1.3-mm) thick steel, Model 2.
4. Vertical Edges: Vertical edges to be mechanically interlocked with hairline seam. Beveled Lock Edge, 1/8 inch in 2 inches (3 mm in 50 mm).
5. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gauge, extending the full width of the door and welded to the face sheet. Doors with an inverted top channel to include a steel closure channel, screw attached, with the web of the channel flush with the face sheets of the door. Plastic or composite channel fillers are not acceptable.
6. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9".
7. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

C. Interior Doors: Face sheets fabricated of commercial quality cold rolled steel that complies with ASTM A 1008/A 1008M. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:

1. Design: Flush panel.
   a. Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.
2. Level/Model: Level 2 and Physical Performance Level B (Heavy Duty), Minimum 18 gauge (0.042-inch - 1.0-mm) thick steel, Model 2.

3. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gauge, extending the full width of the door and welded to the face sheet.

4. Hinge Reinforcement: Minimum 7 gauge (3/16”) plate 1-1/4” x 9” or minimum 14 gauge continuous channel with pierced holes, drilled and tapped.

5. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

D. Manufacturers Basis of Design:

1. Curries Company (CU) - Polystyrene Core - 707 Series.
2. Curries Company (CU) - Energy Efficient - 797 Mercury Series.

2.4 HOLLOW METAL FRAMES

A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.

B. Thermal Break Frames: Subject to the same compliance standards and requirements as standard hollow metal frames. Tested for thermal performance in accordance with NFRC 102, and resistance to air infiltration in accordance with NFRC 400. Where indicated provide thermally broken frame profiles available for use in both masonry and drywall construction. Fabricate with 1/16” positive thermal break and integral vinyl weatherstripping.

1. Frames: Minimum 14 gauge (0.067-inch -1.7-mm) thick steel sheet.
2. Manufacturers Basis of Design:

D. Interior Frames: Fabricated from cold-rolled steel sheet that complies with ASTM A 1008/A 1008M.
1. Fabricate frames with mitered or cope corner. Profile as indicated on drawings.
2. Frames: Minimum 16 gauge (0.053-inch -1.3-mm) thick steel sheet.
3. Manufacturers Basis of Design:
   a. Curries Company (CU) - CM Series.
   b. Curries Company (CU) - M Series.

E. Fire rated frames: Fabricate frames in accordance with NFPA 80, listed and labeled by a qualified testing agency, for fire-protection ratings indicated.

F. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 Table 4 with reinforcement plates from same material as frames.
2.5 FRAME ANCHORS

A. Jamb Anchors:
   1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, formed from A60 metallic coated material, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
   2. Stud Wall Type: Designed to engage stud and not less than 0.042 inch thick.

B. Floor Anchors: Floor anchors to be provided at each jamb, formed from A60 metallic coated material, not less than 0.042 inches thick.

C. Mortar Guards: Formed from same material as frames, not less than 0.016 inches thick.

2.6 LIGHT OPENINGS AND GLAZING

A. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints at fabricator's shop. Fixed and removable stops to allow multiple glazed lites each to be removed independently. Coordinate frame rabbet widths between fixed and removable stops with the type of glazing and installation indicated.

B. Moldings for Glazed Lites in Doors and Loose Stops for Glazed Lites in Frames: Minimum 20 gauge thick, fabricated from same material as door face sheet in which they are installed.

C. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch (16 mm) high unless otherwise indicated. Provide fixed frame moldings and stops on outside of exterior and on secure side of interior doors and frames.

D. Preformed Metal Frames for Light Openings: Manufacturer's standard frame formed of 0.048-inch-thick, cold rolled steel sheet; with baked enamel or powder coated finish; and approved for use in doors of fire protection rating indicated. Match pre-finished door paint color where applicable.

2.7 ACCESSORIES

A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.

B. Grout Guards: Formed from same material as frames, not less than 0.016 inches thick.

2.8 FABRICATION

A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. When shipping limitations so dictate, frames for large openings are to be fabricated in sections for splicing or splining in the field by others.

B. Tolerances: Fabricate hollow metal work to tolerances indicated in ANSI/SDI A250.8.
C. Hollow Metal Doors:

1. Exterior Doors: Provide optional weep-hole openings in bottom of exterior doors to permit moisture to escape where specified.
2. Glazed Lites: Factory cut openings in doors with applied trim or kits to fit. Factory install glazing where indicated.
3. Astragals: Provide overlapping astragals as noted in door hardware sets in Division 08 Section "Door Hardware" on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted.
4. Continuous Hinge Reinforcement: Provide welded continuous 12 gauge strap for continuous hinges specified in hardware sets in Division 08 Section "Door Hardware".
5. Electrical Raceways: Provide hollow metal doors to receive electrified hardware with concealed wiring harness and standardized Molex™ plug connectors on both ends to accommodate up to twelve wires. Coordinate connectors on end of the wiring harness to plug directly into the electrified hardware and the through-wire transfer hardware or wiring harness specified in hardware sets in Division 08 Sections "Door Hardware" and "Access Control Hardware". Wire nut connections are not acceptable.

D. Hollow Metal Frames:

1. Shipping Limitations: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
2. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
   a. Welded frames are to be provided with two steel spreaders temporarily attached to the bottom of both jambs to serve as a brace during shipping and handling. Spreader bars are for bracing only and are not to be used to size the frame opening.
3. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
4. High Frequency Hinge Reinforcement: Provide high frequency hinge reinforcements at door openings 48-inches and wider with mortise butt type hinges at top hinge locations.
5. Continuous Hinge Reinforcement: Provide welded continuous 12 gauge straps for continuous hinges specified in hardware sets in Division 08 Section "Door Hardware".
6. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated for removable stops, provide security screws at exterior locations.
7. Mortar Guards: Provide guard boxes at back of hardware mortises in frames at all hinges and strike preps regardless of grouting requirements.
8. Electrical Knock Out Boxes: Factory weld 18 gauge electrical knock out boxes to frame for electrical hardware preps; including but not limited to, electric through wire transfer hardware, electrical raceways and wiring harnesses, door position switches, electric strikes, magnetic locks, and jamb mounted card readers as specified in hardware sets in Division 08 Sections "Door Hardware" and "Access Control Hardware".
   a. Provide electrical knock out boxes with a dual 1/2-inch and 3/4-inch knockouts.
b. Conduit to be coordinated and installed in the field (Division 26) from middle hinge box and strike box to door position box.

c. Electrical knock out boxes to comply with NFPA requirements and fit electrical door hardware as specified in hardware sets in Division 08 Section "Door Hardware".

d. Electrical knock out boxes for continuous hinges should be located in the center of the vertical dimension on the hinge jamb.

9. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.

10. Jamb Anchors: Provide number and spacing of anchors as follows:

a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

   1) Two anchors per jamb up to 60 inches high.
   2) Three anchors per jamb from 60 to 90 inches high.
   3) Four anchors per jamb from 90 to 120 inches high.
   4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.

b. Stud Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

   1) Three anchors per jamb up to 60 inches high.
   2) Four anchors per jamb from 60 to 90 inches high.
   3) Five anchors per jamb from 90 to 96 inches high.
   4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
   5) Two anchors per head for frames above 42 inches wide and mounted in metal stud partitions.

11. Door Silencers: Except on weatherstripped or gasketed doors, drill stops to receive door silencers. Silencers to be supplied by frame manufacturer regardless if specified in Division 08 Section "Door Hardware".

12. Bituminous Coating: Where frames are fully grouted with an approved Portland Cement based grout or mortar, coat inside of frame throat with a water based bituminous or asphaltic emulsion coating to a minimum thickness of 3 mils DFT, tested in accordance with UL 10C and applied to the frame under a 3rd party independent follow-up service procedure.

E. Hardware Preparation: Factory prepare hollow metal work to receive template mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."

1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.

2. Reinforce doors and frames to receive non-template, mortised and surface mounted door hardware.

3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.

2.9 STEEL FINISHES

A. Prime Finishes: Doors and frames to be cleaned, and chemically treated to insure maximum finish paint adhesion. Surfaces of the door and frame exposed to view to receive a factory applied coat of rust inhibiting shop primer.

1. Shop Primer: Manufacturer's standard, fast-curing, lead and chromate free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; and compatible with substrate and field-applied coatings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. General Contractor to verify the accuracy of dimensions given to the steel door and frame manufacturer for existing openings or existing frames (strike height, hinge spacing, hinge back set, etc.).

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove welded in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Prior to installation, adjust and securely brace welded hollow metal frames for square, level, twist, and plumb condition.

C. Tolerances shall comply with SDI-117 "Manufacturing Tolerances Standard Steel Doors and Frames."

D. Drill and tap doors and frames to receive non-template, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.

B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11 and NFPA 80 at fire rated openings.
1. Set frames accurately in position, plumbed, leveled, aligned, and braced securely until permanent anchors are set. After wall construction is complete and frames properly set and secured, remove temporary braces, leaving surfaces smooth and undamaged. Shim as necessary to comply with installation tolerances.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.

3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with mortar.

4. Grout Requirements: Do not grout head of frames unless reinforcing has been installed in head of frame. Do not grout vertical or horizontal closed mullion members.

C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Standard Steel Doors:
   a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
   b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
   c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.

D. Field Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturer's written instructions.

3.4 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow metal work immediately after installation.

C. Prime-Coat and Painted Finish Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat, or painted finishes, and apply touchup of compatible air drying, rust-inhibitive primer, zinc rich primer (exterior and galvanized openings) or finish paint.

END OF SECTION 081113
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SECTION 08 12 13
EXTRUDED ALUMINUM DOOR FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Aluminum frames.

1.02 RELATED REQUIREMENTS
A. Section 08 71 00 - Door Hardware: Hardware for aluminum doors.
B. Section 09 21 16 - Gypsum Board Assemblies: Wall finish adjacent to frame.

1.03 REFERENCE STANDARDS
A. AAMA 607.1 – Guide Specification and Inspection Methods for Clear Anodized finishes

1.04 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Manufacturer's descriptive literature for each type of door; include information on fabrication methods.
   1. Preparation instructions and recommendations.
   2. Storage/handling requirements and recommendations.
   3. Installation instructions.
C. Shop Drawings: Include elevations of each opening type.
   1. Verify dimensions by field measurements before fabrication and indicate on shop drawings.
   2. Details jambs, headers, trims and connections.
   3. Details and identification of each frame type.
   4. Elevations.
   5. Location and installation requirements of door hardware and reinforcements.
   6. Door Frame Schedule of openings and locations including fire rated frame requirements.
D. Verification Samples: Actual pieces of products in each finish specified, not less than 6 inches square or 6 inches long for linear components. For finishes subject to color variation, include not less than two samples illustrating extreme range to be anticipated.
E. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
1.05 QUALITY ASSURANCE
   A. Quality Assurance Certification: Submit manufacturer’s certification that products have been constructed and tested.
   B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with not less than five years of documented experience.
   C. Installer Qualifications: Company specializing in performing work of type specified and with at least two years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING
   A. Deliver aluminum components in manufacturer’s standard protective packaging, palleted, crated, or banded together.
   B. Inspect delivered components for damage and replace. Repaired components will not be accepted.
   C. Store components in clean, dry, indoor area, under cover in manufacturer’s packaging until installation.
   D. Protect materials and finish from damage during handling and installation.

1.07 FIELD CONDITIONS
   A. Field measurements: Verify actual dimensions of Minimalist interior aluminum frame openings by field measurement prior to installation of frames. Incorrect openings must be corrected prior to frame installation.
   B. Work area must be completely enclosed and protected from the elements prior to Minimalist frame installation.
   C. Do not begin installation of interior aluminum components until space has been enclosed and ambient thermal conditions are being maintained at levels consistent with final project requirements.
   D. Maintain temperature, humidity, and ventilation conditions so as to not adversely affect door frames or packaging. Keep cartons dry.

1.08 WARRANTY
   A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
   B. Provide manufacturer’s written warranty against defects in materials and workmanship for a period of one year from date of substantial completion.
   C. Correct defective Work within a five year period after Date of Substantial Completion.
   D. Provide ten year manufacturer warranty for defects in workmanship and materials.

PART 2 PRODUCTS

2.01 MANUFACTURERS
   A. Aluminum Frames:
      1. Provide Minimalist aluminum door frames as manufactured by:
         a. Fry Reglet Corporation; 1377 Stonefield Court, Alpharetta, GA 30005. 800-237-9773
         b. Fry Reglet Corporation; 12342 Hawkins Street, Santa Fe Springs, CA 90670
         c. Substitutions: See Section 01 60 00 - Product Requirements.
            1) Alternate interior door frames will not be accepted without prior written and sample approval from Architect.

2.02 DOORS AND FRAMES
   A. Accessibility: Comply with ICC A117.1 and ADA Standards.
   B. Aluminum Frames for Doors, Sidelights, or Transoms: Extruded aluminum, non-thermally broken hollow or C-shaped sections; no steel components.
1. General: Fabricate Minimalist frames for scheduled openings providing extruded flanges for integration to adjoining drywall.
   a. Minimum Frame Extrusion Wall Thickness: 0.078 inch (1.98 mm).
   b. Construction: Extruded aluminum hinge jamb, strike jamb and header section factory mitered to install with hair-line seams.
   c. Provide continuous door silencer of thermoplastic vulcanizate (TPV) material. (Outswing only)
   d. Frame sections shall be extruded to include continuous, punched, taping flanges along each exposed section for application of tape, mud, primer and paint.
2. Frame Sizes: Minimalist aluminum frame capable of accepting standard 1-3/4 inch (44.5 mm) door thicknesses:
   a. Minimalist door frame throat size: 4 – 7/8 inches (123.83 mm).
3. Finish: Custom powder painted color as selected by Architect
4. Reinforcements: Include integral hinge and strike reinforcements designed to position hinge and strike plates flush with face of frame.
C. Dimensions and Shapes: As indicated on drawings; dimensions indicated are nominal.
   1. Provide the following clearances:
      b. Between Meeting Stiles: 1/4 inch.
      c. At Top Rail and Bottom Rail: 1/8 inch.

2.03 COMPONENTS
   A. Frames: Extruded aluminum shapes, not less than 0.062 inch thick, reinforced at hinge and strike locations.
      2. Trim: Extruded aluminum, not less than 0.062 inch thick, removable snap-in type without exposed fasteners.

2.04 MATERIALS
   A. Extruded Aluminum: ASTM B221 (ASTM B221M), alloy 6063, temper T5, or alloy 6463, temper T5.

2.05 FINISHES
   A. Class I Natural Anodized Finish: Clear anodic coating; AAMA 611 AA-M12C22A41, minimum dry film thickness (DFT) of 0.7 mils, 0.0007 inch.
   B. Superior Performing Organic Coatings System: Manufacturer's standard multi-coat superior performing organic coatings system complying with AAMA 2605, including at least 70 percent polyvinylidene fluoride (PVDF) resin, and at least 80 percent of aluminum extrusion and panels surfaces having minimum total dry film thickness (DFT) of 1.2 mils, 0.0012 inch.

PART 3 EXECUTION
3.01 EXAMINATION
   A. Verify that wall surfaces and openings are ready to receive frames and are within tolerances specified in manufacturer's instructions.
   B. If rough openings sizes are not correct, notify Architect of incorrect dimensions and have corrected before proceeding.
   C. Before beginning installation, verify that wall thickness does not exceed industry standard tolerance of + or – 1/16”.
   D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
3.02 INSTALLATION
   A. Install doors and frames in accordance with manufacturer's instructions and approved shop drawings.
   B. Fasteners: Use screws, per manufacturer's standard installation instruction, secure attachment to wall conditions.
   C. Set frames plumb, square, level, and aligned to receive doors. Anchor frames to adjacent construction in strict accordance with manufacturer's recommendations and within specified tolerances.
   D. Where aluminum surfaces contact metals other than stainless steel, zinc, or small areas of white bronze, protect from direct contact by painting dissimilar metal with heavy coating of bituminous paint.
   E. Hang doors and adjust hardware to achieve specified clearances and proper door operation.

3.03 PROTECTION
   A. Protect products of this section from damage caused by subsequent construction until Date of Substantial Completion.
   B. Replace damaged or defective components that cannot be repaired to a condition indistinguishable from undamaged components.
   C. Clean-Up: Clean frames, if necessary, using mild soap and water. Use NO abrasive agents.

END OF SECTION
SECTION 08 14 16
FLUSH WOOD DOORS

PART 1 GENERAL

1.01 RELATED DOCUMENTS
   A. Drawings and general provisions of the Contract, including General and Supplementary
      Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY
   A. Section Includes:
      1. Solid core doors with wood veneer faces.
      2. Factory finishing wood doors.
      3. Factory fitting wood doors to frames and factory machining for hardware.
      4. Light frames and glazing installed in wood doors.

1.03 RELATED SECTIONS:
   A. Division 08 Section “Door Schedule”.
   B. Division 08 Section “Hollow Metal Doors and Frames”.
   C. Division 08 Section “Glazing”.
   D. Division 08 Section “Door Hardware”.
   E. Division 08 Section “Access Control Hardware”.
   F. Division 28 Section “Access Control”.

1.04 STANDARDS AND REFERENCES:
   COMPLY WITH THE VERSION YEAR ADOPTED BY THE AUTHORITY HAVING JURISDICTION.
   B. ANSI A208.1 – Wood Particleboard.
   D. ASTM E 413 - Classification for Rating Sound Insulation.
   E. Intertek Testing Service (ITS Warnock Hersey) - Certification Listings for Fire Doors.
   G. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; National Fire Protection
      Association.
   H. UL 10C - Positive Pressure Fire Tests of Door Assemblies; UL 1784 - Standard for Air Leakage
      Tests of Door Assemblies.
   I. Window and Door Manufacturers Association - WDMA I.S.1-A Architectural Wood Flush Doors.

1.05 SUBMITTALS
   A. Product Data: For each type of door indicated. Include details of core and edge construction,
      louvers, trim for openings, and WDMA I.S.1-A classifications. Include factory finishing
      specifications.
   B. Shop Drawings shall include:
      1. Indicate location, size, and hand of each door.
      2. Indicate dimensions and locations of mortises and holes for hardware.
      3. Indicate dimensions and locations of cutouts.
      4. Indicate requirements for veneer matching.
      5. Indicate location and extent of hardware blocking.
      7. Indicate doors to be factory finished and finish requirements.
      8. Indicate fire protection ratings for fire rated doors.
C. Samples for Initial Selection: For factory finished doors.
   1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches, for each material and finish. For each wood species and transparent finish, provide set of three samples showing typical range of color and grain to be expected in the finished work.
   2. Corner sections of doors, 8 by 10 inches, with door faces and edges representing actual materials to be used.
      a. Provide samples for each species of veneer and core material.
      b. Finish veneer faced door samples with same materials proposed for factory finished doors.
   3. Frames for light openings, 6 inches long, for each material, type, and finish required.

D. Warranty: Provide sample of manufacturer's warranty.

1.06 QUALITY ASSURANCE

A. Source Limitations: Obtain flush wood doors through one source from a single manufacturer wherever possible.

B. Quality Standard: In addition to requirements specified, comply with WDMA I.S.1-A, latest edition, "Industry Standard for Architectural Wood Flush Doors".

C. Fire Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing at positive pressure according to NFPA 252 (neutral pressure at 40" above sill) or UL10C.
   1. Oversize Fire Rated Door Assemblies: For units exceeding sizes of tested assemblies provide manufacturer's construction label, indicating compliance to independent 3rd party certification agency's procedure, except for size.
   2. Temperature Rise Limit: Where required and at vertical exit enclosures (stairwell openings) and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire test exposure.
   4. Smoke "S" Label: Doors to bear "S" label, and include smoke and draft control gasketing applied to frame and on meeting stiles of pair doors.

D. Sound Rating Test Reports: Submit manufacturer's test results of STC ratings from testing performed by independent testing agency for sound resistant doors.

E. Pre-Submittal Conference: Conduct conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier, Installer, and Contractor to review proper methods and procedures for receiving, handling, and installing flush wood doors.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of referenced standard and manufacturer's written instructions.

B. Package pre-finished doors individually in plastic bags and wrap bundles of doors in plastic sheeting.

C. Mark each door on top rail with opening number used on Shop Drawings.

1.08 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weather tight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
1.09 WARRANTY

A. Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
      b. Telegraphing of core construction in wood face veneers exceeding 0.01 inch in a 3-inch span.
   2. Warranty includes installation and finishing that may be required due to repair or replacement of defective doors.

PART 2 PRODUCTS

2.01 DOOR CONSTRUCTION – GENERAL

A. WDMA I.S.1-A Performance Grade: Extra Heavy Duty; Aesthetic Grade: Premium.

B. Fire Rated Doors: Provide construction and core as needed to provide fire ratings indicated.
   1. Category A Edge Construction: Provide fire rated door edge construction with intumescent seals concealed by outer stile (Category A) at 45, 60, and 90 minute rated doors. Comply with specified requirements for exposed edges.
      a. Provide fire retardant stiles that are listed and labeled for applications indicated without formed steel edges and astragals.
      b. Where required for concealed hardware, provide formed steel edges and astragals with intumescent seals. Finish steel edges and astragals with baked enamel.

C. Environmentally Responsible Doors: Provide doors constructed with the following environmentally responsible characteristics:
   1. Low-Emitting Materials: Fabricate doors with adhesives and composite wood products that do not contain added urea formaldehyde.

2.02 CORE CONSTRUCTION

A. Particleboard Core Doors:
   3. Blocking: As indicated under article “Blocking”.

B. Fire Resistant Composite Core Doors:
   1. Core: Non-combustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire protection rating indicated.
   2. Blocking: As indicated under article “Blocking”.
   3. Edge Construction: At hinge stiles, provide laminated edge construction with improved screw holding capability and split resistance. Comply with specified requirements for exposed edges.

C. Sound Resistant Doors:
   1. Provide 1-3/4" thick sound resistant doors complying with the Sound Transmission Class (STC) ratings as prescribed in the latest version of ASTM Standard E-90. Doors are to be furnished complete with gaskets and other acoustical accessories required for specified STC rating. Consult manufacturer details for gasketing, automatic door seals, thresholds, and other hardware or special frames which may be required.
   2. Blocking: As indicated under article “Blocking”.
   3. Provide sound resistant doors with minimum STC sound rating as indicated.
2.03 BLOCKING

A. Non-Fire-Rated Doors:
1. Blocking is not required when using SCLC or SLC doors.
2. Provide blocking as indicated below:
   a. 5 inch top and bottom rail blocking, in doors indicated to have closers and kick plates.
   b. Two 5 inch x 14 inch corner blocking, in doors indicated to have flush bolts.
   c. 5 inch mid-rail blocking in doors indicated to have exit devices.
   d. Two 5 inch x 14 inch corner blocking and two 5 inch x 14 inch lock blocking on doors to have vertical rod exit devices.

B. Fire Rated Doors:
1. Provide blocking as indicated below:
   a. 5 inch top and bottom rail blocking, in doors indicated to have closers and kick plates.
   b. Two 5 inch x 14 inch lock blocking, in doors indicated to have exit devices.
   c. Two 5 inch x 14 inch corner blocking, in doors indicated to have flush bolts.
   d. Two 5 inch x 14 inch corner blocking and two 5 inch x 14 inch lock blocking on doors to have vertical rod exit devices.

2.04 VENEERED DOORS FOR TRANSPARENT FINISH

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Eggers Industries: Premium Series.
4. VT Industries: Artistry Series.
5. Oshkosh:

B. Interior Solid Core Doors:
1. Grade: Premium.
2. Faces: Veneer grades as noted below; veneer minimum 1/50-inch (0.5mm) thickness at moisture content of 12% or less.
   a. Plain Sliced Select White Maple, A grade faces. Color: as indicated on the finish schedule.
4. Assembly of Veneer Leaves on Door Faces:
   a. Running Match.
5. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.
6. Transom Match: Continuous match.
7. Vertical Edges: Matching same species as faces. Wood or composite material, one piece, laminated, or veneered. Minimum requirements per WDMA section P-1, Performance Standards for Architectural Wood Flush Doors.
8. Horizontal Edges: Solid wood or structural composite material meeting the minimum requirements per WDMA section P-1, Performance Standards for Architectural Wood Flush Doors.
9. Construction: Five plies. Stiles and rails are bonded to core, then entire unit sanded before applying face veneers.
10. At doors over 40% of the face cut-out for lights and or louvers, furnish engineered composite lumber core.

2.05 LIGHT FRAMES AND GLAZING

A. Wood Beads for Light Openings in Wood Doors up to and including 20-minute rating:
1. Wood Species: Same species as door faces.
2. Profile:
   a. M1 Flush Bead.
b. At wood core doors with 20-minute fire protection ratings, provide wood beads and metal glazing clips approved for such use.
B. Metal Frames for Light Openings in Fire Rated Doors over 20-minute Rating: Manufacturer's standard frame formed of 0.048-inch-thick, cold rolled steel sheet; with baked enamel or powder coated finish; and approved for use in doors of fire protection rating indicated.
   1. Manufacturers:
      a. Air Louver.
      b. All Metal Stamping.
      c. Anemostat.
      d. Pemko.

C. Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with the flush wood door manufacturer's written instructions.

2.06 FABRICATION
A. Factory fit doors to suit frame opening sizes indicated.
   1. Comply with requirements in NFPA 80 for fire rated doors.
   2. Undercut: As required per manufacturer's templates and sill condition.

B. Factory machine doors for hardware that is not surface applied. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.
   1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
   2. Metal Astragals: Factory machine astragals and formed steel edges for hardware for pairs of fire rated doors.

C. Openings: Cut and trim openings through doors in factory.
   1. Light Openings: Trim openings with moldings of material and profile indicated.
   2. Glazing: Comply with applicable requirements in Division 08 Section "Glazing."

D. Electrical Raceways: Provide flush wood doors receiving electrified hardware with concealed wiring harness and standardized Molex™ plug connectors on both ends to accommodate up to twelve wires. Coordinate connectors on end of the wiring harness to plug directly into the electrified hardware and the through wire transfer hardware or wiring harness specified in hardware sets in Division 08 "Door Hardware". Wire nut connections are not acceptable.

E. Thermal Performance Requirements: Fenestration Product Rating: U-Factors of fenestration products shall be determined in accordance with NFRC 100 by an accredited, independent laboratory, and labeled and certified by the manufacturer. Products lacking such a labeled U-factor shall be assigned a default U-factor from Table 303.1.3(1) or 303.1.3(2). The solar heat gain coefficient (SHGC) of glazed fenestration products shall be determined in accordance with NFRC 200 by an accredited, independent laboratory, and labeled and certified by the manufacturer. Products lacking such a labeled SHGC shall be assigned a default SHGC from Table 303.1.3(3).

2.07 FACTORY FINISHING
A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
   1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.
B. Transparent Finish: Provide a clear protective coating over the wood veneer allowing the natural color and grain of the selected wood species to provide the appearance specified. Stain is applied to the wood surface underneath the transparent finish to add color and design flexibility.  
   1. Finish: Meet or exceed WDMA I.S. 1A TR8 UV Cured Acrylated Polyester finish performance requirements.  
   2. Staining:  
      a. See architectural finish schedule.  
      b. Manufacturers other than the basis of design may require custom stain to match architect’s sample at no additional cost.  

PART 3 EXECUTION  
3.01 EXAMINATION  
   A. Examine doors and installed door frames before hanging doors.  
      1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.  
      2. Reject doors with defects.  
   B. Proceed with installation only after unsatisfactory conditions have been corrected.  

3.02 INSTALLATION  
   A. Hardware: For installation, see Division 8 Section "Door Hardware."  
   B. Installation Instructions: Install doors and frames to comply with manufacturer’s written instructions and the referenced quality standard, and as indicated.  
      1. Install fire rated doors in corresponding fire rated frames according to NFPA 80.  
   C. Factory Fitted Doors: Align in frames for uniform clearance at each edge.  
   D. Factory Finished Doors: Restore finish before installation if fitting or machining is required at Project site.  
   E. Field modifications to doors shall not be permitted, except those specifically allowed by manufacturer or fire rating requirements.  

3.03 ADJUSTING  
   A. Operation: Re-hang or replace doors that do not swing or operate freely.  
   B. Finished Doors: Replace doors that do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.  

END OF SECTION
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SECTION 08 31 00
ACCESS DOORS AND PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Wall and ceiling access door and frame units.

1.02 RELATED REQUIREMENTS
A. Section 09 91 23 - Interior Painting: Field paint finish.

1.03 REFERENCE STANDARDS
A. ITS (DIR) - Directory of Listed Products; current edition.

1.04 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.
C. Shop Drawings: Indicate exact position of each access door and/or panel unit.
D. Manufacturer's Installation Instructions: Indicate installation requirements.
E. Project Record Documents: Record actual locations of each access unit.

PART 2 PRODUCTS

2.01 WALL AND CEILING MOUNTED UNITS
A. Manufacturers:
   1. ACUDOR Products Inc: www.acudor.com/#sle.
   5. Substitutions: See Section 01 60 00 - Product Requirements.
B. Wall and Ceiling Mounted Units: Factory fabricated door and frame, fully assembled units with corner joints welded, filled and ground flush; square and without rack or warp; coordinate requirements with type of installation assembly being used for each unit.
   1. Material: Steel.
   2. Door Style: Single thickness with rolled or turned in edges.
   3. Heavy Duty Single Steel Sheet Door Panels: 14 gage, 0.0747 inch, minimum thickness.
   5. Units in Fire-Rated Assemblies: Fire rating as required by applicable code for fire-rated assembly that access doors are being installed.
      a. Provide products listed by ITS (DIR) or UL (FRD) as suitable for purpose indicated.
      b. Provide certificate of compliance from authorities having jurisdiction indicating approval of fire rated doors.
   7. Hardware:
      a. Hardware for Fire-Rated Units: As required for listing.
      b. Hinges for Non-Fire-Rated Units: Concealed, constant force closure spring type.
      c. Latch/Lock: Screw driver slot for quarter turn cam latch.
PART 3 EXECUTION

3.01 EXAMINATION
   A. Verify that rough openings are correctly sized and located.
   B. Begin installation only after substrates have been properly prepared, and if the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 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 33 13
COILING COUNTER DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES
   A. Non-fire-rated coiling counter doors and operating hardware.

1.02 RELATED REQUIREMENTS
   A. Section 04 20 00 - Unit Masonry: Rough Openings.
   B. Section 07 92 00 - Joint Sealants: Sealing joints between frames and adjacent construction.

1.03 REFERENCE STANDARDS

1.04 SUBMITTALS
   A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
   B. Product Data: Submit manufacturer's standard literature showing materials and details of construction and finish. Include data on electrical operation.
   C. Shop Drawings: Indicate rough and actual opening dimensions, anchorage methods, hardware locations, and installation details.
   D. Samples: Submit two slats, 4 inch long, illustrating shape, color and finish texture.
   E. Manufacturer's Instructions: Indicate installation sequence and installation, adjustment, and alignment procedures.
   F. Operation and Maintenance Data: Indicate modes of operation, lubrication requirements and frequency, and periodic adjustments required.

PART 2 PRODUCTS

2.01 MANUFACTURERS
   A. Coiling Counter Doors:
      3. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 COILING COUNTER DOORS
   A. Coiling Counter Doors, Non-Fire-Rated: Aluminum slat curtain.
      1. Mounting: Interior face mounted.
      3. Slat Profile: Flat, perforated.
      5. Color: As selected by Architect from manufacturer's standard range.
      6. Guides: Formed track; same material and finish unless otherwise indicated.

2.03 MATERIALS
   A. Curtain Construction: Interlocking, single thickness slats.
      1. Slat Ends: Alternate slats fitted with end locks to act as wearing surface in guides and to prevent lateral movement.
      2. Curtain Bottom: Fitted with angles to provide reinforcement and positive contact in closed position.
      3. Aluminum Slats: ASTM B221 (ASTM B221M), aluminum alloy Type 6063; minimum thickness 0.05 inch.
B. Guide Construction: Continuous, of profile to retain door in place, with mounting brackets of same metal.
   1. Aluminum Guides: Extruded aluminum channel, with wool pile runners along inside.
C. Hood Enclosure: Internally reinforced to maintain rigidity and shape.
D. Lock Hardware:
   1. Slide Bolt: Provide on single-jamb side, extending into slot in guides, with padlock on one side.
E. Roller Shaft Counterbalance: Steel pipe and torsion steel spring system, capable of producing torque sufficient to ensure smooth operation of curtain from any position and capable of holding position at mid-travel; with adjustable spring tension; requiring 25 lb nominal force to operate.

PART 3 EXECUTION

3.01 EXAMINATION
A. Verify that opening sizes, tolerances and conditions are acceptable.

3.02 INSTALLATION
A. Install units in accordance with manufacturer's instructions.
B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.
C. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.
D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.

3.03 TOLERANCES
A. Maintain dimensional tolerances and alignment with adjacent work.
B. Maximum Variation From Plumb: 1/16 inch.
C. Maximum Variation From Level: 1/16 inch.
D. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch per 10 ft straight edge.

3.04 ADJUSTING
A. Adjust operating assemblies for smooth and noiseless operation.

3.05 CLEANING
A. Clean installed components.
B. Remove labels and visible markings.

END OF SECTION
PART 1 GENERAL

1.01 SECTION INCLUDES

A. Overhead coiling doors, operating hardware, fire-rated and exterior; electrically operated.
B. Wiring from electric circuit disconnect to operator to control station.

1.02 RELATED REQUIREMENTS

A. Section 26 05 83 - Wiring Connections: Power to disconnect.
B. Section 26 05 00 - Common Work Results for Electrical.

1.03 REFERENCE STANDARDS

D. ITS (DIR) - Directory of Listed Products; current edition.
E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
G. NEMA MG 1 - Motors and Generators; 2017.
I. UL (DIR) - Online Certifications Directory; Current Edition.
J. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide general construction, electrical equipment, and component connections and details.
   1. Include construction details, material descriptions, dimensions of individual components, profiles for slats, and finishes.
   2. Include rated capacities, operating characteristics, electrical characteristics, and furnished accessories.
   3. Include description of automatic closing device and testing and resetting instructions.
C. Shop Drawings: Indicate pertinent dimensioning, anchorage methods, hardware locations, and installation details.
   1. Include plans, elevations, sections, and mounting details
   2. Include details of equipment assemblies and indicate dimensions, required clearances, and components.
   3. Provide BIM models upon request.
   4. Show controls, locking devices, [detectors] [fusible links], and other accessories.
D. Samples: Submit two slats, 4 inch in size illustrating shape, color and finish texture.
   1. Provide manufacturer’s finish charts showing full range of colors and textures available for units with factory applied finishes.
E. Manufacturer’s Installation Instructions: Indicate installation sequence and procedures, adjustment and alignment procedures.
F. Closeout Submittals:
   1. Operation and maintenance data.
1.05 QUALITY ASSURANCE
A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years of documented experience.
B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years documented experience.
C. Products Requiring Electrical Connection: Listed and classified by ITS (DIR) or UL (DIR) as suitable for purpose specified.
D. Fire Rated Door Assemblies: Assemblies complying with NFPA 80 that are tested and labeled by a qualifying testing agency for fire protection ratings indicated and based on testing at as close to neutral pressure as possible according to UL 10B.
   1. Smoke Control: [Where indicated] [In corridors and smoke barriers], provide doors that are listed and labeled with the letter “S” on the fire rating label by a qualified testing agency for smoke- and draft-control based on testing according to UL 1784; with maximum air-leakage rate of 3.0 cfm/sq. ft. (0.01524 cu. m/s x sq. m) of door opening at 0.10-inch wg (24.9 Pa) for both ambient and elevated temperature tests.

1.06 DELIVERY, STORAGE, AND HANDLING
A. Store products in manufacturer's unopened packaging until ready for installation.
B. Store and dispose of all materials in accordance with federal, state and local laws.

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

1.08 COORDINATION
A. Coordinate with other operations and installation of adjacent materials to avoid damage to installed materials.

1.09 WARRANTY
A. Warranty: Manufacturer's warranty that all parts and components are to be free from defects in materials and workmanship for 1 year.
   1. Warranty: Manufacturer’s warranty that all parts and components, except counterbalance spring and finish, are to be free from defects in materials and workmanship for 5 years. Counterbalance springs to be warrantied for 1 year.

PART 2 PRODUCTS
2.01 MANUFACTURERS
A. Overhead Coiling Fire Doors:
   4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 COILING DOORS
A. Exterior Coiling Doors: Steel slat curtain.
   1. Capable of withstanding positive and negative wind loads of 20 psf, without undue deflection or damage to components.
   2. Sandwich slat construction with insulated core of foamed-in-place polyurethane insulation; minimum R-value of 8.1.
   3. Nominal Slat Size: 2 inches wide x required length.
   4. Finish: As indicated on the drawings to match the other exterior doors.
B. Fire-Rated Coiling Doors: Steel slat curtain; comply with NFPA 80.
   1. 1 hour fire rating.
   2. Fire Door Construction: Conform to UL 10B.
   3. Provide products listed and labeled by ITS (DIR) or UL (DIR) as suitable for the purpose specified and indicated.
   4. Installed Fire Door Assembly: Conform to NFPA 80.
   5. Seismic Performance: Overhead coiling doors shall be evaluated for seismic performance to withstand the effect of earthquake motions determined according to ASCE/SEI 7.
   6. Oversized Openings: Provide certificate of compliance from authorities having jurisdiction indicating approval of fire rated units and operating hardware assembly.
   7. Operation: Design complete door assembly including operator for use of not less than 20,000 cycles
   8. Single thickness slats.
   9. Nominal Slat Size: 2 inches wide by required length.
   10. Finish: As indicated on the drawings.

C. Source Limitations: Provide overhead coiling doors from one manufacturer for each type of door. Provide operators and other accessories from source acceptable to overhead coiling door manufacturer.

2.03 MATERIALS AND COMPONENTS

A. Garage side of door shall be considered the exterior side.

B. Curtain Construction: Interlocking slats.
   1. Slat Ends: Alternate slats fitted with end locks to act as wearing surface in guides and to prevent lateral movement.
   2. Curtain Bottom: Fitted with angles to provide reinforcement and positive contact in closed position.
   3. Weatherstripping: Moisture and rot proof, resilient type, located at jamb edges, bottom of curtain, and where curtain enters hood enclosure of exterior doors.

   2. Finish: Hot-dipped galvanized in accordance with ASTM A653 and with baked on enamel primer coat and polyester finish coat.
      a. Polyester Finish: Galvanized

D. Back Slat Material:
   1. 24 gauge galvanized steel.
      a. Finish: Hot-dipped galvanized in accordance with ASTM A653 and with baked on enamel primer coat and polyester finish coat.
         1) Polyester Finish: Galvanized

E. Insulation:
   1. Fill slats with mineral wool insulation board and enclose insulation within slat faces to achieve a minimum R-Value of 4.2.

F. Guide Construction: Continuous, of profile to retain door in place with snap-on trim, mounting brackets of same metal.

G. Guides - Angle: ASTM A36/A36M metal angles, size as indicated.
   1. Hot-dip galvanized in compliance with ASTM A123/A123M.
H. Lock Hardware:
   1. End locks: Galvanized malleable iron, attached to every other slat to act as wearing surface and prevent lateral movement.
      a. Two plated steel slide bolt locks with padlock provisions.
      b. Chain keeper suitable for padlocking.
      c. Cylinder lock mounted to double angle bottom bar.
         1) Keyed on exterior of door with thumb turn on interior.
         2) Keyed on both sides of the door.

I. Bottom bar:
   1. Two steel angles bolted back-to-back, with adjustable tubular compression weather seal.
      a. Bottom Bar Finish:
         1) Hot Dipped Galvanized

J. Head Plate: Rectangular steel plate, with precision sealed ball bearings supporting drive side axle.

K. Roller Shaft Counterbalance: Steel pipe and helical steel spring system, capable of producing torque sufficient to ensure smooth operation of curtain from any position and capable of holding position at mid-travel; with adjustable spring tension; requiring 25 lb nominal force to operate.
   1. Barrel Assembly: Steel pipe sized for maximum deflection under full load not to exceed 0.03” per foot of span with threaded rings or lugs welded to barrel assembly for curtain attachment.

L. Springs: Spring tension assembly supported within barrel by precision ball bearings. Curtain weight counterbalanced by oil tempered, helically wound torsion springs; grease packed and mounted on steel torsion shafts with cast spring plug.
   1. Designed for minimum 20,000 cycles.

M. Hood Material:
   1. Minimum 24 gauge galvanized steel
      a. Hood finish:
      2. Polyester Finish: Galvanized

N. Smoke Seals: Equip each fire rated door with replaceable smoke seal perimeter gaskets or brushes for smoke and draft control as required for door listing and labeling by a qualified testing agency.
   1. Smoke Label: Provide doors with U.L. “S” label in addition to the fire door label to certify smoke control listing.

O. Weather Seal:
   1. Tubular vinyl bottom seal

P. Mounting:
   1. Face of wall and above lintel.

Q. Jamb Construction:
   1. Solid Masonry
      a. Provide anchor bolt fasteners complying with fire door listing.

R. Automatic Closing Device: Equip each fire rated door with an automatic closing device or release holder mechanism and governor unit complying with NFPA 80. Automatic closing device shall be designed for activation by the following:
   1. Manufacturer’s standard UL labeled photo electric smoke detectors on both sides of the wall and door holder release device.
   2. Manufacturer’s standard UL labeled heat rise detectors on both sides of the wall and door holder release device.
   3. Connected to building fire detection, smoke detection, and alarm systems through manufacturer’s UL labeled release device.
4. Release Holder: Provide fail safe release holder as an interface between the detection device specified and fire rated door.
   a. Provide adjustable time delay for up to 10 seconds.
   b. Provide battery back-up system.
   c. Provide speaker and verbal warning when activated.
5. Provide warning strobe light when activated.
   a. Provide warning horn when activated.

2.04 ELECTRIC OPERATION

A. Electric Motor Operator: Provide fail safe operator unit that is listed and approved for use on door. Operator to be of size and capacity recommended and provided by door manufacturer for door, maintains spring tension when activated by alarm, and be easily reset from the floor without requiring tools.
   1. Usage Classification: Electric operator and components capable of operating for not less than number of cycles indicated for each door.
B. Operator, Controls, Actuators, and Safeties: Comply with UL 325; provide products listed by ITS (DIR), UL (DIR), or testing agency acceptable to authorities having jurisdiction.
   1. Provide interlock switches on motor operated units.

C. Electric Operators:
   1. Mounting: Side mounted.
   2. Motor Enclosure:
      a. Interior Coiling Doors: NEMA MG 1, Type 1; open drip proof.
   4. Motor Voltage: 120 volts, single phase, 60 Hz.
   7. Opening Speed: 12 inches per second.
   10. Refer to Section 26 05 83 for electrical connections.
D. Control Station: Provide standard three button (Open-Close-Stop) momentary-contact control device for each operator complying with UL 325.
   1. 24 volt circuit.
   2. Surface mounted, at interior door jamb.
   3. Entrapment Protection Devices: Provide sensing devices and safety mechanisms complying with UL 325.
      a. Primary Device: Provide electric sensing edge, wireless sensing, NEMA 1 photo eye sensors, or NEMA 4X photo eye sensors as required with momentary-contact control device.
E. Safety Edge: Located at bottom of coiling door, full width, electro-mechanical sensitized type, wired to stop and reverse door direction upon striking object, hollow neoprene covered.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that opening sizes, tolerances and conditions are acceptable.

3.02 INSTALLATION

A. Install units in accordance with manufacturer's instructions.
B. Install fire-rated doors in accordance with NFPA 80.
C. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.
D. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.
E. Fit and align assembly including hardware; level and plumb, to provide smooth operation.
F. Coordinate installation of electrical service with Section 26 05 83.
G. Complete wiring from disconnect to unit components.
H. Complete wiring from fire alarm system.

3.03 TOLERANCES
A. Maintain dimensional tolerances and alignment with adjacent work.
B. Maximum Variation From Plumb: 1/16 inch.
C. Maximum Variation From Level: 1/16 inch.
D. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch per 10 ft straight edge.

3.04 ADJUSTING
A. Adjust operating assemblies for smooth and noiseless operation.

3.05 CLEANING
A. Clean installed components.
B. Remove labels and visible markings.

END OF SECTION
SECTION 083449 - RADIATION SHIELDING DOOR AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Radiation shielding swinging doors and frames.
2. Radiation shielding sidelight, borrowed lite and transom panels and frames.

B. Related Sections:

1. Division 01 Section "Sustainable Design Requirements" for additional LEED documentation and requirements.
2. Division 04 Section "Unit Masonry" for embedding anchors for radiation shielding hollow metal work into masonry construction.
3. Division 08 Section "Glazing" for glass view panels in radiation shielding doors.
4. Division 08 Sections "Door Hardware" and "Access Control Hardware" for door hardware for radiation shielding doors and frames.
5. Division 09 Sections "Exterior Painting" and "Interior Painting" for field painting hollow metal doors and frames.
6. Division 26 "Electrical" Sections for electrical connections including conduit and wiring for door controls and operators installed on frames with factory installed electrical knock out boxes.
7. Division 28 Section "Access Control" for access control devices installed at door openings and provided as part of a security access system.

C. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI/SDI A250.8 - Recommended Specifications for Standard Steel Doors and Frames.
2. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames, Frames Anchors and Hardware Reinforcing.
3. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames.
4. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
5. ANSI/SDI A250.11 - Recommended Erection Instructions for Steel Frames.
6. ASTM A1008 - Standard Specification for Steel Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
7. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, hardware reinforcements, profiles, anchors, fire-resistance rating, and finishes.

B. Door hardware supplier is to furnish templates, template reference number and/or physical hardware to the steel door and frame supplier in order to prepare the doors and frames to receive the finish hardware items.

C. Shop Drawings: Include the following:
   1. Elevations of each door design.
   2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
   3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
   4. Locations of reinforcement and preparations for hardware.
   5. Details of each different wall opening condition.
   6. Details of anchorages, joints, field splices, and connections.
   7. Details of accessories.
   8. Details of moldings, removable stops, and glazing.
   9. Details of preparations for power, signal, and control systems.

D. Samples for Verification:
   1. Samples are only required by request of the architect and for manufactures that are not current members of the Steel Door Institute.

E. Informational Submittals:
   1. Certificates of Compliance: Submit any information necessary to indicate compliance with this specification section.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain radiation shielding doors and frames through one source from a single manufacturer wherever possible.
B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 (neutral pressure at 40” above sill) or UL 10C.

1. Oversize Fire-Rated Door Assemblies Construction: For units exceeding sizes of tested assemblies provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.

2. Temperature-Rise Limit: Where indicated and at vertical exit enclosures (stairwell openings) and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.

C. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257. Label each individual glazed lite.

D. Smoke-Control Door Assemblies: Comply with NFPA 105.

E. Pre-Installation Conference: Conduct conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier, Installer, and Contractor to review proper methods and procedures for installing radiation shielding doors and frames and to verify installation of electrical knockout boxes and conduit at frames with electrified or access control hardware.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver radiation shielding work palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use non-vented plastic.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store radiation shielding work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch- (102-mm-) high wood blocking. Do not store in a manner that traps excess humidity.

1. Provide minimum 1/4-inch (6-mm) space between each stacked door to permit air circulation. Door and frames to be stacked in a vertical upright position.

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.
1.7 COORDINATION

   A. Coordinate installation of anchorages for radiation shielding frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.8 WARRANTY

   A. Provide manufacturer's written 5 year warranty against defects in materials and workmanship upon final completion and acceptance of Work in this section.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

   A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      1. CECO Door Products (C).
      2. Curries Company (CU).

   B. Substitutions: Material from alternate radiation shielding door and frame fabricators will not be accepted on jobsite without prior written and sample approval in accordance with requirements specified in Division 01.

2.2 MATERIALS

   A. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

   B. Frame Anchors: ASTM A 653/A 653M, Commercial Steel (CS), Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

   C. Lead Glazing: Comply with requirements in Division 08 Section, "Glazing."

2.3 RADIATION SHIELDING DOORS

   A. General: Provide 1-3/4 inch doors of type and design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8.

      1. Design: Flush panel.

         a. Standard Vertical Steel-Stiffener Core: Minimum 22 gage steel-stiffeners at 6 inches on-center construction attached by spot welds spaced not more than 5” on centers.
         b. Lead Core: Rolled pure sheet lead conforming to ASTM B749.
1) Provide cores with minimum thickness sheet lead as specified:
   a) 1/8-inch.

c. Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.

3. Level/Model: Level 3 and Physical Performance Level A (Extra Heavy Duty), Minimum 16 gage (0.053-inch - 1.3-mm) thick steel, Model 2 (Fully welded, seamless face and edges).

4. Vertical Edges: Vertical edges to have the face sheets joined by a continuous weld extending the full height of the door. Welds are to be ground, filled and dressed smooth. Beveled Edge, 1/8 inch in 2 inches (3 mm in 50 mm).

5. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gage (0.053-inch - 1.3-mm), extending the full width of the door and welded to the face sheet. Finish top and bottom to provide a smooth flush condition.

6. Surface Applied Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

2.4 RADIATION SHIELDING FRAMES

A. General: Provide frames of the type and profile indicated, not less than thickness indicated; to comply with ANSI/SDI A250.8.

1. Fabricate frames with mitered corners.

2. Fabricate frames with "closed and tight" mitered, full depth continuously welded seams, finished smooth with no visible seam unless otherwise indicated. Knock down type frames are not permitted.

3. Minimum 16 gage (0.053-inch -1.3-mm) thick steel sheet

4. Lead-lining: Rolled pure sheet lead conforming to ASTM B749, matching sheet thickness specified for lead door cores.

B. Fire rated frames: Fabricate frames in accordance with NFPA 80, listed and labeled by a qualified testing agency, for fire-protection ratings indicated.

C. Surface Applied Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 Table 4 with reinforcement plates from same material as frames.

2.5 FRAME ANCHORS

A. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup anchors to suit frame size, not less than 16 (0.8 mm) gage thickness, with corrugated or perforated straps not less than 2 inches (50 mm) wide by 10 inches (250 mm) long; or wire anchors not less than 0.177 inch (4.5 mm) thick.

2. Stud Wall Type: Designed to engage stud and not less than 16 gage (0.8 mm) thickness.

B. Floor Anchors: Floor anchors to be provided at each jamb. Formed from same material as frames, not less than 14 gage (0.067-inch -1.7-mm) thick.
C. Mortar Guards: Provide minimum 26 gage mortar guards welded to the back of each hardware cutout.

2.6 STOPS AND GLAZED LITES
A. Moldings for Glazed Lites in Doors and Loose Stops for Glazed Lites in Frames: Factory installed, minimum 16 gauge (0.8 mm) thick, fabricated from same material as door face sheet in which they are installed.

2.7 FABRICATION
A. Fabricate radiation shielding work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. When shipping limitations so dictate, frames for large openings are to be fabricated in sections for splicing or splining in the field by others.

B. Tolerances: Fabricate radiation shielding work to tolerances indicated in ANSI/SDI A250.8.

C. Radiation Shielding Doors:
1. Glazed Lites: Factory cut openings in doors with applied flush trim kit to fit.
2. Astragals: Provide lead-lined overlapping astragals on one leaf of pairs of doors where indicated. Extend minimum 3/4 inch (19 mm) beyond edge of door on which astragal is mounted.
3. Continuous Hinge Reinforcement: Provide welded continuous 12 gage strap for continuous hinges specified in hardware sets in Division 08 Section, "Door Hardware".

D. Radiation Shielding Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
1. Welded Frames: Full depth continuously weld frame seams; grind, fill, dress, and make smooth and flush.
   a. Welded frames are to be provided with two steel spreaders temporarily attached to the bottom of both jambs to serve as a brace during shipping and handling. Spreader bars are for bracing only and are not to be used to size the frame opening.
2. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
3. High Frequency Hinge Reinforcement: Provide 12 gage angle reinforcements for butt type hinges on every door and frame assembly.
4. Continuous Hinge Reinforcement: Provide welded continuous 12 gage straps for continuous hinges specified in hardware sets in Division 08 Section, "Door Hardware".
5. Electrical Knock Out Boxes: Factory weld 18 gage electrical knock out boxes to frame for electrical hardware preps; this includes but not limited to electric through wire transfer hardware, electrical raceways and wiring harnesses, door position switches,
electric strikes, magnetic locks, and jamb mounted card readers as noted in door hardware sets in Division 08 Section, "Door Hardware".

a. Provide electrical knock out boxes as required for Project.
b. Conduit to be coordinated and installed in the field (Division 26) from middle hinge box and strike box to door position box.
c. Electrical knock out boxes to comply with NFPA requirements and fit electrical door hardware as specified in hardware sets in Division 08 Section, "Door Hardware".
d. Electrical knock out boxes for continuous hinges should be located in the center of the vertical dimension on the hinge jamb.

6. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
7. Jamb Anchors: Provide number and spacing of anchors as follows:
   a. Masonry and Stud Wall Types: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c. and as follows:
      1) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches (610 mm) or fraction thereof above 84 inches (2137 mm) high.

E. Surface Hardware Preparation: Factory prepare radiation shielding work to receive template mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section, "Door Hardware."

1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
2. Reinforce doors and frames to receive non-template, mortised and surface-mounted door hardware.
3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of radiation shielding work for hardware.
4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.

F. Stops and Moldings: Provide factory installed stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints at fabricators shop.

1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of radiation shielding work.
2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so glazed lites are capable of being removed independently.
3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
2.8 STEEL FINISHES

A. Prime Finish: Doors and frames to be cleaned, and chemically treated to insure maximum finish paint adhesion. Surfaces of the door and frame exposed to view to receive a factory applied coat of rust inhibiting shop primer.

1. Shop Primer: Manufacturer's standard, fast-curing, lead and chromate free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. General Contractor to verify the accuracy of dimensions given to door and frame manufacturer for existing openings or existing frames (strike height, hinge spacing, hinge back set, etc.).

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Prior to installation, adjust and securely brace welded radiation shielding frames for squareness, alignment, twist, and plumbness.

C. Tolerances shall comply with SDI-117 "Manufacturing Tolerances Standard Steel Doors and Frames."

D. Drill and tap doors and frames to receive non-template, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

A. General: Install radiation shielding work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.

B. Radiation Shielding Frames: Install radiation shielding frames of size and profile indicated. Comply with ANSI/SDI A250.11.

1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged. Shim as necessary to comply with installation tolerances.
a. At fire-protection-rated openings, install frames according to NFPA 80.
b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
c. Install frames with removable glazing stops located on secure side of opening.
d. Install door silencers in frames before grouting.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.

3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with appropriate mortar.

4. Grout Requirements: Do not grout head of frames unless reinforcing has been installed in head of frame. Do not grout vertical or horizontal closed mullion members.

C. Radiation Shielding Doors: Fit radiation shielding doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Standard Steel Doors:
   a. Jambs and Head: 1/8 inch (3 mm) plus or minus 1/16 inch (1.6 mm).
   b. Between Edges of Pairs of Doors: 1/8 inch (3 mm) plus or minus 1/16 inch (1.6 mm).
   c. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch (19 mm).

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.

D. Glazing: Comply with installation requirements in Division 08 Section, "Glazing" and with door manufacturer's written instructions.

3.4 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including radiation shielding work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from radiation shielding work immediately after installation.

C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

END OF SECTION 083449
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SECTION 08 36 13
SECTIONAL DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Overhead sectional doors, electrically operated.
B. Operating hardware and supports.
C. Electrical controls.

1.02 RELATED REQUIREMENTS
A. Section 03 45 00 - Tilt-Up Concrete: Prepared opening in concrete.
B. Section 06 10 00 - Rough Carpentry: Rough wood framing for door opening.
C. Section 07 92 00 - Joint Sealants: Sealing joints between frames and adjacent construction.
D. Section 26 05 00 - Common Work Results for Electrical.

1.03 REFERENCE STANDARDS
C. ITS (DIR) - Directory of Listed Products; current edition.
E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
G. UL (DIR) - Online Certifications Directory; Current Edition.

1.04 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Shop Drawings: Indicate opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.
C. Product Data: Show component construction, anchorage method, and hardware.
D. Submit all equipment that will be part of these doors, motors and all related items, in one submittal.
E. Manufacturer's Installation Instructions: Include any special procedures required by project conditions.
F. Operation Data: Include normal operation, troubleshooting, and adjusting.
G. Maintenance Data: Include data for motor and transmission, shaft and gearing, lubrication frequency, spare part sources.
H. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE
A. Installer Qualifications: Company specializing in performing the work of this section with minimum 10 years of experience.
B. Comply with applicable code for motor and motor control requirements.
C. Products Requiring Electrical Connection: Listed and classified by ITS (DIR), UL (DIR), or testing firm acceptable to authorities having jurisdiction, as suitable for purpose specified.
1.06 WARRANTY
   A. See Section 01 78 00 - Closeout Submittals for warranty requirements.
   B. Correct defective Work within a five year period after Date of Substantial Completion.
   C. Provide five year manufacturer warranty for electric operating equipment.

PART 2 PRODUCTS

2.01 MANUFACTURERS
   A. Basis of Design - Haas Door; Product CHT-2032-20 doors to have 1/2 inch insulated, tempered and clear glass.
   B. Sectional Doors:
      2. Wayne-Dalton, a Division of Overhead Door Corporation; Equivalent to basis of design: www.wayne-dalton.com.
      3. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 STEEL DOORS
   A. Steel Doors: Flush steel, insulated; standard lift operating style with track and hardware; complying with DASMA 102, Commercial application.
      1. Door Nominal Thickness: 2 inches thick.
      3. Interior Finish: Pre-finished with baked enamel; white color. Flush smooth skin.
      4. Glazed Lights: Full panel width, three rows; set in place with resilient glazing channel.
      5. Electric Operation: Electric control station.
   B. Glazing: clear; insulated; clear; 1/2 inch thick.

2.03 COMPONENTS
   A. Track: Rolled galvanized steel, 0.120 inch minimum thickness; 3 inch wide, continuous one piece per side; galvanized steel mounting brackets 1/4 inch thick. High Lift - keep 24” from structure above.
   B. Lift Mechanism: Torsion spring on cross head shaft, with braided stainless steel lifting cables.
      1. 100K Cycle
   C. Sill Weatherstripping: Resilient hollow rubber strip, one piece; fitted to bottom of door panel, full length contact.
   D. Jamb Weatherstripping: Roll formed steel section full height of jamb, fitted with resilient weatherstripping, placed in moderate contact with door panels.
   E. Head Weatherstripping: EPDM rubber seal, one piece full length.
   F. Panel Joint Weatherstripping: Neoprene foam seal, one piece full length.

2.04 MATERIALS
   A. Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G60/Z180 coating, plain surface.
   B. Float Glass: Provide float glass glazing, unless noted otherwise.
   C. Insulation: Foamed-in-place polyurethane, bonded to facing.

2.05 ELECTRIC OPERATION
   A. All wiring including low voltage to be in conduit, concealed within masonry wall.
   B. Electric Operators:
      1. Mounting: Side mounted on cross head shaft.
      2. Motor Enclosure:
      3. Liftmaster H, jackshaft operator; manually operable in case of power failure, transit speed of 12 inches per second, with remote antenna.
4. Motor Voltage: 120 volts, single phase, 60 Hz.
7. Opening Speed: 12 inches per second.
10. Refer to Section 26 05 83 for electrical connections.

C. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated; enclose terminal lugs in terminal box sized to comply with NFPA 70.

D. Control Station: Provide standard three button (Open-Close-Stop) momentary-contact control device for each operator complying with UL 325.
   1. 24 volt circuit.
   2. Surface mounted, at interior door jamb.
   3. Entrapment Protection Devices: Provide sensing devices and safety mechanisms complying with UL 325.
      a. Primary Device: Provide electric sensing edge, wireless sensing, NEMA 1 photo eye sensors, or NEMA 4X photo eye sensors as required with momentary-contact control device.

E. Disconnect Switch: Factory mount disconnect switch in control panel.

F. Electric Operator: Side mounted on cross head shaft, adjustable safety friction clutch; brake system actuated by independent voltage solenoid controlled by motor starter; enclosed gear driven limit switch; enclosed magnetic cross line reversing starter; mounting brackets and hardware.

G. Entrapment Protection: Double set of photoelectric eye sensors located at the bottom of the door jamb and at a location approximately 24 inches above finish floor, but to be determined by the owner at the door jamb.
   1. Mount to wall, track mounted not acceptable.

H. Safety Edge: Located at bottom of sectional door panel, full width; electro-mechanical sensitized type, wired to stop and reverse door direction upon striking object; hollow neoprene covered to provide weatherstrip seal.

I. Door Controls:
   1. Control Station: Standard three button (open-close-stop) momentary type control for each electric operator.
      a. 24 volt circuit.
      b. Surface mounted.
      c. Locate at inside door jamb.
   2. Contact to signal the door is completely open.
   3. Adjustable timer that closes the door to secure the station after a predetermined amount of time.

PART 3 EXECUTION

3.01 EXAMINATION
   A. Verify that wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.
   B. Verify that electric power is available and of the correct characteristics.

3.02 PREPARATION
   A. Prepare opening to permit correct installation of door unit to perimeter air and vapor barrier seal.
   B. Apply primer to wood frame.
3.03 INSTALLATION
A. Install door unit assembly in accordance with manufacturer's instructions.
B. Anchor assembly to wall construction and building framing without distortion or stress.
C. Securely brace door tracks suspended from structure. Secure tracks to structural members only.
D. Fit and align door assembly including hardware.
E. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.

3.04 TOLERANCES
A. Maximum Variation from Plumb: 1/16 inch.
B. Maximum Variation from Level: 1/16 inch.
C. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch from 10 ft straight edge.
D. Maintain dimensional tolerances and alignment with adjacent work.

3.05 ADJUSTING
A. Adjust door assembly for smooth operation and full contact with weatherstripping.
B. Have manufacturer's field representative present to confirm proper operation and identify adjustments to door assembly for specified operation.

3.06 CLEANING
A. Clean doors and frames and glazing.
B. Remove temporary labels and visible markings.

3.07 PROTECTION
A. Protect installed products from damage until Date of Substantial Completion.
B. Do not permit construction traffic through overhead door openings after adjustment and cleaning.

END OF SECTION
SECTION 084126 - ALL-GLASS ENTRANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Exterior, vestibule, and interior, swinging and sliding all-glass entrance doors.
2. All-glass sidelites and transoms.

B. Related Sections:

1. Division 05 Section "Metal Fabrications" for overhead-steel support for all-glass systems.
2. Division 07 Section "Joint Sealants" at interface of all-glass entrances and other building components.
3. Division 08 Section "Aluminum Entrances and Storefronts" for storefront systems with all-glass entrances.
4. Division 08 Section "Automatic Entrance Doors."
5. Division 08 Section "Door Hardware" for lock cylinders installed in all-glass entrance locksets.
6. Division 08 Section "Glazed Aluminum Curtain Walls" for curtain wall systems with all-glass entrances.

C. Reference Standards:

   a. Table 3 - Recommended Maximum Interior or Exterior Swinging Door Sizes.
1.3 PRE-INSTALLATION MEETINGS

A. Pre-installation Conference: Refer to Division 01 Section "Project Requirements".

1.4 SUBMITTALS

A. Product Data: For each type of all-glass entrance component specified. Details of construction relative to materials, dimensions of individual components, profiles, and finishes, including:

1. Glass panels.
2. Rail and Patch fittings.
3. Closer and pivots.
4. Door hardware and accessories.

B. Shop Drawings: Show details of fabrication and installation, including the following:

1. Plans, elevations, and sections.
2. Details of fittings.
3. Hardware quantities, locations, and installation requirements.
4. Anchorages and reinforcement.
5. Glazing details.
6. Door hardware locations, mounting heights, and installation requirements.

C. Samples for Verification: For each type of exposed finish indicated, prepared on Samples of size indicated below as required by Architect.

1. Metal Finishes: 6-inch (150-mm) long sections of rail fittings.
2. Glass: 12-inch (300 mm) square, showing exposed-edge finish and tint.

D. Entrance Door Hardware Schedule: Prepared by or under supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, sidelites, transoms, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.

E. Maintenance Data: For all-glass systems to include in maintenance manuals.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer to perform work of this Section who has specialized in installing all-glass entrances similar to those required for this Project and with a record of successful in-service performance.

B. Supplier Qualifications: All-glass panic device products and accessories are required to be supplied and installed through current members of the ASSA ABLOY "Authorized Channel Partner" (ACP) and "Preferred Installer" (PI) programs. Suppliers are to be authorized prior to project bid, and a direct purchaser of the specified product. Installers are to be authorized prior to project bid, and are responsible for installing, servicing, and warranting the product specified for the project.
C. Source Limitations: Obtain each type of all-glass entrance doors through one source from a single manufacturer.

D. Product Options: Drawings indicate size, profiles, and dimensional requirements of all-glass entrances and are based on the specific system indicated. Other manufacturers' systems with equal performance characteristics may be considered. Refer to Division 01 Section "Product Requirements."

1. Do not modify intended aesthetic effects, as judged solely by the Architect, except with Architect's approval and only to the extent needed to comply with performance requirements. Where modifications are proposed, submit comprehensive explanatory data to Architect for review.

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify opening dimensions of all-glass entrances by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.7 WARRANTY

A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

B. Special Warranty: Submit a written warranty executed by the manufacturer agreeing to repair or replace components of all-glass entrances that fail in materials or workmanship within the specified warranty period. Failures include, but are not limited to, the following:

1. Structural failures.
2. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
3. Failure of operating components to function normally.

C. General Warranty Period: Two years from date of Substantial Completion.

1. Concealed Floor Closers: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design all-glass entrances and storefronts.

B. General Performance: Comply with performance requirements specified, as determined by testing of all-glass entrances and storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
C. Structural Loads:
   1. Wind Loads: As indicated on Drawings.
   2. Other Design Loads: As indicated on Drawings.
   3. Deflection Limits: In accordance with GANA “Fully Tempered Heavy Glass Door and Entrance Systems Design Guide.”

D. Seismic Performance: All-glass entrances and storefronts shall withstand the effects of earthquake motions determined according to ASCE/SEI 7. Coordinate requirements with structural engineer.

E. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes.
   1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

F. Accessibility Standards: Comply with applicable provisions in Accessibility Guidelines for Buildings and Facilities ICC (ANSI) A117.1 and requirements of authorities having jurisdiction.

2.2 MANUFACTURERS
A. Basis-of-Design Products: Subject to compliance with requirements, provide the named product, or the comparable product by one of the alternate specified manufacturers. Comparable products are subject to review and approval through the submittal process specified.

B. Manufacturers (All Glass Doors): Subject to compliance with requirements, provide products by one of the following:
   1. ASSA ABLOY Glass Solutions (All Glass Door components).

2.3 ENTRANCE DOOR MATERIALS
A. Clear Glass: ASTM C 1048, Kind FT (fully tempered), Type I (transparent), Class 1 (clear) requirements. Provide products of thickness indicated that have been tested for surface and edge compression according to ASTM C 1048 and for impact strength according to CPSC 16 CFR, Part 1201 for Category II materials.
   1. Thickness: 1/2 inch (13 mm).
   2. Exposed Edges: Flat polished.
2.4 ENTRANCE DOOR COMPONENTS

A. Patch Fittings: Provide manufacturer's standard patch fittings for all-glass entrance configurations required, unless otherwise indicated, and as follows:
   1. Material: AluminumBright or satin stainless-steel-cladding.

B. Floating Transom Bar: Manufacturer's standard aluminum, floating transom bar clad in metal matching fittings in size recommended by manufacturer for application indicated.
   1. Support Fins: Tempered glass matching the transom glass.

C. Sidelite Channels: Provide manufacturer's standard head and sill channels for sidelite and transom-head support matching fitting-metal finish, unless otherwise indicated.

D. Concealed Sidelite Channels: Provide manufacturer's standard recessed head and sill channels for concealed sidelite and transom-head support, unless otherwise indicated.

E. Rails: Manufacturer's standard continuous horizontal fittings and as follows:
   1. Rail Locations: As follows:
      a. Door tops and bottoms.
      b. Sidelite tops. Provide with manufacturer's standard fixed-mounting system.
      c. Sidelite bottoms. Provide with manufacturer's standard fixed-mounting system.
   2. Top Rail Height: 4 inch (102 mm).
   3. Top Rail Profile: Square.
   4. Bottom Rail Height: 4 inch (102 mm).
   5. Bottom Rail Profile: Square.

F. Accessory Fittings: Manufacturer's standard accessory fittings matching patch fitting or rail metal and finish for the following:
   1. Overhead doorstop.
   2. Center-housing lock.
   3. Glass-support fins.

G. Anchors and Fastenings: Manufacturer's standard concealed anchors and fastenings.

2.5 ENTRANCE DOOR HARDWARE

A. General: Heavy-duty entrance door hardware units in sizes, quantities, and types recommended by manufacturer for all-glass entrance systems indicated. For exposed parts, match metal and finish of patch fittings and rail fittings.

B. Refer to section 080671 “Door Hardware Schedule” for specific hardware sets.

C. Cylinders and Keying: Refer to Section 087100 Door Hardware.
D. Electromagnetic Locking Devices:

1. Concealed Shear Locks: Shear locks to be self-aligning magnetic type suitable for mortised mounting with minimum shear holding force strength of 1200 lbs. Locks to be automatic dual voltage capable of accepting either 12/24VDC without field adjustment. Electronics are to be fully sealed against tampering and allow exterior weatherproof applications. Locks mounted at the top of the door and will operate on either single or double acting doors. Power supply to be by the same manufacturer as the lock with combined products having a lifetime replacement warranty.

   a. Manufacturers:

      1) ASSA ABLOY Glass Solutions (GS) - MAG SAM Series.

E. Door Pulls, Dummy and Mating Pulls: Door pushes and pulls of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.

1. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
2. Fasteners: Provide manufacturer's designated fastener type as indicated in hardware sets.

3. Manufacturers:

   a. ASSA ABLOY Glass Solutions (GS).
   b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).

F. Overhead Concealed Closers (Medium Duty): Center hung, BHMA A156.4, Grade 1; units including arms, pivots, cover plates, mounting clips, and accessories required for complete installation. Provide separate closing and latching valves for closing speed, latch speed, backcheck, and optional hold open.

1. Compact cast iron closers capable of being fully concealed in the frame head for center hung applications.
2. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, interior or exterior application, and exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the physically handicapped, provide units complying with ICC/ANSI A117.1.
3. Closer Accessories: Provide door closer accessories including custom spindles and templates as required for proper installation.
4. Double acting, non-handed with adjustable spring power size 1 through 3 and

5. Manufacturers:

   a. ASSA ABLOY Glass Solutions (GS) - OHC 609 Series.
G. Floor Stops and Overhead Door Stops and Holders: ANSI/BHMA A156.16, Grade 1 certified. Provide floor stops as specified unless overhead door stops and holders are indicated in the hardware sets. Overhead stops and holders to be concealed type. Track, slide, arm and header bracket to be constructed of stainless steel and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.

1. Manufacturers:
   a. ASSA ABLOY Glass Solutions (GS).

2.6 FABRICATION

A. General: Fabricate all-glass entrance components in sizes, profiles, and configurations indicated on Drawings.

B. Provide holes and cutouts in glass to receive hardware, fittings, and accessory fittings before tempering glass. Do not cut, drill, or make other alterations to glass after tempering.
   1. Fully temper glass using horizontal (roller-hearth) process, and fabricate so that when glass is installed, roll-wave distortion is parallel with bottom edge of door or lite.

C. Factory assemble components and factory install hardware and fittings to greatest extent possible.

2.7 FINISHES

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipment.

2.8 STAINLESS-STEEL FINISHES

A. Remove or blend tool and die marks and stretch lines into finish.

B. Grind and polish surfaces to produce uniform, directional textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.

C. Bright, Directional Polish: No. 4 finish.

D. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clear.
PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 DOOR INSTALLATION

A. General: Comply with all-glass entrance manufacturer's written installation instructions and approved shop drawings.

B. Install all-glass door assemblies after other finishing operations have been completed. Coordinate installation of recesses housings with installation of adjacent finishes.

C. Set units level, plumb, and true to line, with uniform joints.

D. Maintain uniform clearances between adjacent components.

E. Set, seal, and grout floor closer cases as required to suit hardware and substrate indicated.

F. Install butt-joint sealants according to manufacturer's instructions and as specified in Section 079200 "Joint Sealants" to produce weathertight installation.

3.3 ADJUSTING AND CLEANING

A. Adjust all-glass entrance doors and hardware to produce smooth operation and tight fit at contact points and weather stripping.

B. Remove excess sealant and glazing compounds and dirt from surfaces.

3.4 PROTECTION

A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensure all-glass entrances are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 084126
SECTION 08 43 13
ALUMINUM-FRAMED STOREFRONTS

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Aluminum-framed storefront, with vision glass.
B. Aluminum doors and frames.
C. Weatherstripping.
D. Door hardware.

1.02 RELATED REQUIREMENTS
A. Section 07 26 50 - Fluid Applied Vapor Permeable Air Barrier: Water-resistive barrier over sheathing.
B. Section 07 92 00 - Joint Sealants: Sealing joints between frames and adjacent construction.
C. Section 08 71 00 - Door Hardware: Hardware items other than specified in this section.
D. Section 08 80 00 - Glazing: Glass and glazing accessories.

1.03 REFERENCE STANDARDS
A. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; 2015.

1.04 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Design Data: Provide framing member structural and physical characteristics, engineering calculations, and dimensional limitations.
C. Hardware Schedule: Complete itemization of each item of hardware to be provided for each door, cross-referenced to door identification numbers in Contract Documents.
D. Field Quality Control Submittals: Report of field testing for water penetration and air leakage.
E. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
1.05 QUALITY ASSURANCE
   A. Designer Qualifications: Design structural support framing components under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in Missouri.
   B. Manufacturer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING
   A. Handle products of this section in accordance with AAMA CW-10.
   B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.07 FIELD CONDITIONS
   A. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.

1.08 WARRANTY
   A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
   B. Correct defective Work within a five year period after Date of Substantial Completion.
   C. Provide five year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.
   D. Provide ten year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.01 MANUFACTURERS
   A. Basis of Design: See below under description of products.
      1. Basis of Design: YKK AP America; Product YES 45 TU (thermally broken storefront system) and 35D (medium stile door): www.ykkap.com. 1-888-955-7007
      2. Mullion Dimensions: 2 inches wide by 4-1/2 inches deep.
   B. Other Manufacturers: Provide either the product identified as "Basis of Design" or an equivalent product of one of the manufacturers listed below:
   C. Center-Set Style, Interior frames

2.02 ALUMINUM-FRAMED STOREFRONT
   A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
      1. Glazing Rabbet: For 1 inch insulating glazing.
      2. Glazing Position: Centered (front to back). Outside glazed.
      4. Air Infiltration Test Pressure Differential: 1.57 psf.
      5. Condensation Resistance Factor: 60 minimum
      6. Finish: Class I natural anodized.
         a. Factory finish all surfaces that will be exposed in completed assemblies.
8. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.


10. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.

11. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.

12. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.

13. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.

B. Performance Requirements:

1. Wind Loads: Design and size components to withstand the specified load requirements without damage or permanent set, when tested in accordance with ASTM E330/E330M, using loads 1.5 times the design wind loads and 10 second duration of maximum load.
   a. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.

2. Water Penetration Resistance on Manufactured Assembly: No uncontrolled water on interior face, when tested in accordance with ASTM E331 at pressure differential of 8 psf.

3. Air Leakage Laboratory Test: Maximum of 0.06 cu ft/min sq ft of wall area, when tested in accordance with ASTM E283 at 6.27 psf pressure differential across assembly.

4. Movement: Accommodate movement between storefront and perimeter framing and deflection of lintel, without damage to components or deterioration of seals.

5. Air Infiltration: Limit air infiltration through assembly to 0.06 cu ft/min/sq ft of wall area, measured at specified differential pressure across assembly in accordance with ASTM E283.

6. Condensation Resistance Factor: Measure in accordance with AAMA 1503 with 1 inch insulating glass installed.

7. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.

8. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.

9. Thermal Performance Requirements: Fenestration Product Rating: U-Factors of fenestration products shall be determined in accordance with NFRC 100 by an accredited, independant laboratory, and labeled and certified by the manufacturer. Products lacking such a labeled U-factor shall be assigned a default U-factor from Table 303.1.3(1) pr 303.1.3(2). The solar heat gain coefficient (SHGC) of glazed fenestration products shall be determined in accordance with NFRC 200 by an accredited, independant laboratory, and labeled and certified by the manufacturer. Products lacking such a labeled SHGC shall be assigned a default SHGC from Table 303.1.3(3).

2.03 COMPONENTS

A. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.


2. Cross-Section: As indicated on drawings.
B. Swing Doors: Glazed aluminum.
   2. Top Rail: 5 inches wide.
   5. Glazing Stops: Square.
   6. Finish: Same as storefront.
   7. Basis of Design: YKK AP America Inc; Model 35D.

2.04 MATERIALS
   B. Fasteners: Stainless steel.
   C. Perimeter Sealant: Type as specified in Section 07 92 00.
   D. Glass: As specified in Section 08 80 00.
   E. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.

2.05 FINISHES
   A. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick.

2.06 HARDWARE
   A. Other Door Hardware: Storefront manufacturer's standard type to suit application.
      1. Finish on Hand-Contacted Items: Polished chrome.
      2. For each door, include butt hinges, push handle, pull handle, exit device, narrow stile handle latch, and closer.
   B. Weatherstripping: Wool pile, continuous and replaceable; provide on all doors.
   C. Sill Sweep Strips: Resilient seal type, retracting, of neoprene; provide on all doors.
   D. Threshold: Extruded aluminum, one piece per door opening, ribbed surface; provide on all doors.

2.07 FABRICATION
   A. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.
   B. Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.
   C. Prepare components to receive anchor devices. Fabricate anchors.
   D. Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous paint.
   E. Arrange fasteners and attachments to conceal from view.
   F. Reinforce components internally for door hardware.
   G. Reinforce framing members for imposed loads.
   H. Finishing: Apply factory finish to all surfaces that will be exposed in completed assemblies.
      1. Touch-up surfaces cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges.

PART 3 EXECUTION
3.01 EXAMINATION
   A. Verify dimensions, tolerances, and method of attachment with other work.
   B. Verify that wall openings and adjoining air and vapor seal materials are ready to receive work of this section.
3.02 INSTALLATION
A. Install wall system in accordance with manufacturer's instructions.
B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
C. Provide alignment attachments and shims to permanently fasten system to building structure.
D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
E. Provide thermal isolation where components penetrate or disrupt building insulation.
F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.
G. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.
H. Coordinate attachment and seal of perimeter air and vapor barrier materials.
I. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
J. Set thresholds in bed of sealant and secure.
K. Install hardware using templates provided.
L. Install glass and infill panels in accordance with Section 08 80 00, using glazing method required to achieve performance criteria.
M. Install perimeter sealant in accordance with Section 07 92 00.
N. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.03 TOLERANCES
A. Maximum Variation from Plumb: 0.06 inch per 3 feet non-cumulative or 0.06 inch per 10 feet, whichever is less.
B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

3.04 FIELD QUALITY CONTROL
A. See Section 01 40 00 - Quality Requirements, for independent field testing and inspection requirements, and requirements for monitoring quality of specified product installations.
B. Water-Spray Test: Provide water spray quality test of installed storefront components in accordance with AAMA 501.2 during construction process and before installation of interior finishes.
   1. Perform a minimum of two tests in each designated area as indicated on drawings.
   2. Conduct tests in each area prior to 10 percent and 50 percent completion of this work.
C. Provide field testing of installed storefront system by independent laboratory in accordance with AAMA 503 during construction process and before installation of interior finishes.
   1. Perform a minimum of two tests in each designated area as indicated on drawings.
   2. Conduct tests in each area prior to 10 percent and 50 percent completion of this work.
   3. Field test for water penetration in accordance with ASTM E1105 with uniform static air pressure difference (Procedure A) not less than 4.18 psf.
      a. Maximum allowable rate of water penetration in 15-minute test is 0.5 ounce that is not contained in an area with provisions to drain to exterior, or collected on surface of interior horizontal framing member.
D. Repair or replace storefront components that have failed designated field testing, and retest to verify performance complies with specified requirements.
3.05 ADJUSTING
   A. Adjust operating hardware and sash for smooth operation.

3.06 CLEANING
   A. Remove protective material from pre-finished aluminum surfaces.
   B. Remove excess sealant by method acceptable to sealant manufacturer.

3.07 PROTECTION
   A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION
SECTION 08 44 13
GLAZED ALUMINUM CURTAIN WALLS

PART 1  GENERAL

1.01  SECTION INCLUDES
   A.  Aluminum-framed curtain wall, with vision glazing and glass infill panels.
   B.  Accessories necessary to complete Work.
   C.  Products Furnished But Not Installed Under this Section: Inserts and anchoring devices that are to be built into structure.

1.02  RELATED REQUIREMENTS
   A.  Section 06 10 00 - Rough Carpentry: Blocking as needed for system installation.
   B.  Section 07 84 00 - Firestopping: Firestop at system junction with structure.
   C.  Section 07 92 00 - Joint Sealants: Sealing joints between frames and adjacent construction.
   D.  Section 08 43 13 - Aluminum-Framed Storefronts: Entrance framing and doors.
   E.  Section 08 80 00 - Glazing.

1.03  REFERENCE STANDARDS
   A.  AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; 2015.
1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, internal drainage details, glazing, and infill.
   1. Submit manufacturer's descriptive literature for each manufactured products.
   2. Include information for factory finishes, accessories and other required components.

C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work, expansion and contraction joint location and details, and field welding required.
   1. Submit shop drawings covering fabrication, installation of specified system.
   2. Submit drawings indicating elevations, detailed design, dimensions, member profiles, joint locations, arrangement of units, member connections, and thickness of various components.
   3. Show following items:
      a. Details of special shapes.
      b. Reinforcing.
      c. Anchorage system.
      d. Interfacing with building construction.
      e. Provisions for expansion and contraction.
   4. Indicate glazing details, methods, locations of various types and thickness of glass, and internal sealant requirements.
   5. Clearly indicate locations of exposed fasteners and joints for Architect's acceptance.
   6. Clearly show where and how manufacturer's system deviates from Contract Drawings and these Specifications.

D. Test Reports: Submit results of full-size mock-up testing. Reports of tests previously performed on the same design are acceptable.

E. Field Quality Control Submittals: Report of field testing for water penetration and air leakage.

F. Certificates:
   1. Submit manufacturer's certification stating that installed system is in compliance with specified requirements.
   2. Submit statement certified by Professional Engineer attesting components, including frames and glass, will withstand design wind loads and that maximum allowable deflections will not be exceeded.

G. Manufacturer's Instructions: Submit manufacturer's printed installation instructions. Include detailed instructions describing each step of re-glazing procedures.

H. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Provide curtain wall systems that are products of a single manufacturer.

B. Designer Qualifications: Design curtain wall and its structural support framing components under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed at Missouri.

C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with not less than three years of documented experience.

D. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.
   1. Certified in writing by system manufacturer as qualified for specified systems.
1.06 PRE-INSTALLATION CONFERENCE
A. Conference Purpose and Agenda:
   1. Arrange with Architect and representatives of window and sealant manufacturer to visit
      Project site before beginning glazing operations to analyze site conditions, and inspect
      surfaces and joints to be sealed in order that recommendations may be made should
      adverse conditions exist.
   2. Discuss following items:
      a. Weather conditions under which work will be done.
      b. Anticipated frequency and extent of joint movement.
      c. Joint design.
      d. Glazing procedures.

1.07 DELIVERY, STORAGE, AND HANDLING
A. Handle products of this section in accordance with AAMA CW-10.
B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed
   coatings that bond to aluminum when exposed to sunlight or weather.
C. Protect finished surfaces to prevent damage.
D. Do not leave coating residue on surfaces.

1.08 FIELD CONDITIONS
A. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this
   minimum temperature during and 48 hours after installation.

1.09 WARRANTY
A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
B. Provide five year manufacturer warranty against failure of glass seal on insulating glass units,
   including interpane dusting or misting. Include provision for replacement of failed units.
C. Provide five year manufacturer warranty against excessive degradation of exterior finish.
   Include provision for replacement of units with excessive fading, chalking, or flaking.
D. Provide written warranty in form acceptable to Owner jointly signed by manufacturer, installer
   and Contractor warranting work to be watertight, free from defective materials, defective
   workmanship, glass breakage due to defective design, and agreeing to replace components
   which fail within 1 year from date of Substantial Completion.
   1. Warranty shall cover following:
      a. Complete watertight and airtight system installation within specified tolerances.
      b. Glass and glazing gaskets will not break or “pop” from frames due to design wind,
         expansion or contraction movement or structural loading.
      c. Glazing sealants and gaskets will remain free from abnormal deterioration or
         dislocation due to sunlight, weather or oxidation

PART 2 PRODUCTS
2.01 MANUFACTURERS
A. Subject to compliance with requirements indicated, provide products by one of the following:
B. Basis of Design:
   1. YKK AP Series; Product YCW 752 Aluminum Curtain Wall Systems, 2" x 7 1/2" or 2" x 10
      1/2" x 1 inch system with mullion caps.
      a. Description: Horizontal and vertical framing members shall have a nominal face
         dimension of 2 inches. Depth as indicated on drawings. Framing shall provide a flush
         glazed appearance on all sides with no protruding glass stops. Framing shall be
         thermally improved. 1 inch glazed system with mullion caps.
C. Other Acceptable - Glazed Aluminum Curtain Walls Manufacturers:
2.02 CURTAIN WALL

A. Aluminum-Framed Curtain Wall: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
   1. Outside glazed, with pressure plate and mullion cover, where indicated on drawings.
   2. Finish: Class I natural anodized.
      a. Factory finish surfaces that will be exposed in completed assemblies.
      b. Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous paint.
   3. Provide flush joints and corners, weathersealed, accurately fitted and secured; prepared to receive anchors; fasteners and attachments concealed from view; reinforced as required for imposed loads.
   5. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.

2.03 SYSTEM REQUIREMENTS

A. General Standard: In addition to requirements shown or specified, comply with applicable provisions of Aluminum Curtain Wall Design Guide Manual for design, materials, fabrication and installation of component parts.

B. Design Requirements:
   1. Metal stick framed systems with interior and exterior exposed metal framing.
   2. System manufacturer shall provide curtain wall systems, including necessary modifications to meet specified requirements and maintaining visual design concepts.
   3. Fabricate glazing systems for exterior glazing at vision areas and exterior glazing at spandrel areas.
   4. Perimeter conditions shall allow for installation tolerances, expansion and contraction of adjacent materials, and sealant manufacturer's recommended joint design.
   5. Drawings are diagrammatic and do not purport to identify nor solve problems of thermal or structural movement, glazing, anchorage or moisture disposal.
   6. Requirements shown by details are intended to establish basic dimension of unit, sight lines and profiles of members.
   7. Do not assume glass, sealants, and interior finishes contribute to framing member strength, stiffness, or lateral stability.
   8. Attachment considerations are to take into account site peculiarities and expansion and contraction movements so there is no possibility of loosening, weakening or fracturing connection between units and building structure or between units themselves.
   9. Anchors, fasteners and braces shall be structurally stressed not more than 50% of allowable stress when maximum loads are applied.
   10. Allow for expansion and contraction due to structural movement without detriment to appearance or performance.
   11. Provide concealed fastening.
   12. Metal faces are required to be visually flat under all lighting conditions, subject to acceptance of Architect.
   13. Provide uniform color and profile appearance at components exposed to view.
   14. Stresses placed on structural silicone sealants shall be kept within sealant manufacturer's recommended maximum.
   15. Not Permitted: Vibration harmonics, wind whistles, noises caused by thermal movement, thermal movement transmitted to other building elements, loosening, weakening, or fracturing of attachments or components of system.
2.04 PERFORMANCE

A. Structural Performance Requirements: Design and size components to withstand the following load requirements without damage or permanent set.
   1. Provide aluminum curtain wall systems that comply with performance requirements indicated, as demonstrated by testing manufacturer’s assemblies in accordance with test method indicated.
   2. Design Wind Loads: Comply with the following:
      a. Completed storefront system shall withstand wind pressure loads normal to wall plane:
         1) Exterior Walls:
            (a) Positive Pressure:
            (b) Negative Pressure:
      b. Utilized wind load data provided on the structural drawings.
      c. Measure performance by testing in accordance with ASTM E330/E330M, using test loads equal to 1.5 times the design wind loads and 10 second duration of maximum pressure.
   3. Deflection: Maximum allowable deflection in any member when tested in accordance with ASTM E 330 with allowable stress in accordance with AA Specifications for Aluminum Structures.
      a. Without Horizontals: L/175 or 3/4" (19.1mm) maximum.
      b. With Horizontals: L/175 or L/240 + 1/4" (6.4mm) for spans greater than 13'-6" (4.1m) but less than 40'-0" (12.2m).
   4. Movement: Accommodate the following movement without damage to components or deterioration of seals:
      a. Expansion and contraction caused by 180 degrees F surface temperature.
      b. Expansion and contraction caused by cycling temperature range of 170 degrees F over a 12 hour period.
      c. Movement of curtain wall relative to perimeter framing.
      d. Deflection of structural support framing, under permanent and dynamic loads.

B. Water Penetration Resistance on Manufactured Assembly: No uncontrolled water on indoor face when tested as follows:
   1. Test Pressure Differential: 12 psf.
   2. Water Infiltration: No uncontrolled water on indoor face of any component when tested in accordance with ASTM E 331 at a static pressure of 12 PSF (575 Pa).

C. Air Leakage Laboratory Test: Maximum of 0.06 cu ft/min sq ft of wall area, when tested in accordance with ASTM E283 at 6.27 psf pressure differential across assembly.

D. Thermal Performance Requirements:
   1. Fenestration Product Rating: U-Factors of fenestration products shall be determined in accordance with NFRC 100 by an accredited, independent laboratory, and labeled and certified by the manufacturer. Products lacking such a labeled U-factor shall be assigned a default U-factor from Table 303.1.3(1) or 303.1.3(2). The solar heat gain coefficient (SHGC) of glazed fenestration products shall be determined in accordance with NFRC 200 by an accredited, independent laboratory, and labeled and certified by the manufacturer. Products lacking such a labeled SHGC shall be assigned a default SHGC from Table 303.1.3(3).
   2. Condensation Resistance Factor of Framing: 50, minimum, measured in accordance with AAMA 1503.
   3. U-factor: When tested to AAMA Specification 1503, the thermal transmittance (U-factor) shall not be more than 0.31 (Low-E). U-factor: When tested to AAMA Specification 1503, the thermal transmittance (U-factor) shall not be more than 0.31 (Low-E).
   4. Framing systems shall accommodate expansion and contraction movement due to surface temperature differential of 180°F without causing buckling, stress on glass, failure of joint seals, excessive stress on structural elements, reduction of performance or other detrimental effects.
E. Parallel to wall and corner mullion deflections: 75% of glass edge bite or 3/8 inch, whichever is less.

F. Compression flanges of flexural members may be assumed to receive effective lateral bracing only from:
   1. Anchors to building structure and
   2. Horizontal glazing rails or interior trim that are in actual contact with compression flange.

G. Do not regard points of contra-flexure as lateral braces or as end points of un-braced length; un-braced length is actual distance between effective lateral braces as defined above.

H. Where framing member reaction is resisted by continuous element, maximum assumed effective length of the resisting element is 4 times bearing length, but not more than 12 inches.

2.05 COMPONENTS

A. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.

B. Glazing: As specified in Section 08 80 00.

2.06 MATERIALS

   1. 6063-T5 and 6063-T6 Aluminum Alloys.
   2. Minimum thickness of 0.125 inch for framing members and 0.050 inch for glazing stops and similar components.

B. Internal Reinforcing:
   1. ASTM A36 for carbon steel; or ASTM B308 for structural aluminum.
   2. Shapes and sizes to suit installation.
   3. Shop coat steel components after fabrication with alkyd type zinc chromate primer complying with FS TT-P-645.

C. Inserts and Anchorage Devices:
   1. Manufacturer's standard formed or fabricated assemblies, steel or aluminum, of shapes, plates, bars or tubes.
   2. Hot-dip galvanize steel assemblies after fabrication; comply with ASTM A123, 2.0 ounce minimum coating.

D. Fasteners:
   1. Fasteners: Zinc plated steel concealed fasteners; Hardened aluminum alloys or AISI 300 series stainless steel exposed fasteners, countersunk, finish to match aluminum color.
   2. Non-magnetic stainless steel or cadmium plated steel coated with yellow or silver iridescence plating, compatible with materials being fastened.
   3. Series 300 stainless steel for exposed locations. Cadmium plated steel with 0.0005 inch plating thickness and color chromate coated for concealed locations.
   4. Provide nuts or washers of design, having means to prevent disengagement; deforming of fastener threads is not acceptable.
   5. Provide concealed fasteners wherever possible.
   6. For exposed locations, provide countersunk flathead fasteners with finish matching item fastened.

E. Expansion Anchor Devices: Lead-shield or toothed-steel, drilled-in, expansion bolt anchors.

F. Shims: Non-staining, non-ferrous, type as recommended by system manufacturer.

G. Protective Coatings: Cold applied asphalt mastic complying with SSPC-Paint 12, compounded for 30 mil thickness for each coat; or alkyd type zinc chromate primer complying with FS TT-P-645.

H. Sealant: Non-skinning type, AAMA 803.3.

I. Glazing: Setting blocks, edge blocks, and spacers in accordance with ASTM C 864, shore durometer hardness as recommended by manufacturer; Glazing gaskets in accordance with ASTM C 864.
J. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.

K. Glazing tapes:
   1. Semi-Rigid polyurethane type design.
   2. Comply with ASTM D-412.
   3. Profile and hardness as necessary to maintain uniform pressure for watertight seal.
   4. Manufacturer's standard black color.

L. Glazing Accessories: As specified in Section 08 80 00.

2.07 FINISHES

A. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick.
   1. Glazing: Setting blocks, edge blocks, and spacers in accordance with ASTM C 864, shore durometer hardness as recommended by manufacturer; Glazing gaskets in accordance with ASTM C 864.

2.08 SYSTEM FABRICATION

A. Take accurate field measurements to verify required dimensions prior to fabrication.

B. Location of exposed joints are subject to Architect's acceptance.

C. Fabricate components in accord with approved shop drawings. Remove burrs and ease edges. Shop fabricate to greatest extent practicable to minimize field cutting, splicing, and assembly. Disassemble only to extent necessary for shipping and handling limitations.

D. Fabricate and install all glass retainers in a clean shop environment.

E. Steel Components:
   1. Clean surfaces after fabrication and immediately prior to application of primer in accord with SSPC-SP2 or SSPC-SP3 at manufacturer's option.
   2. Apply specified shop coat primer in accord with manufacturer's instructions to provide 2.0 minimum dry film thickness.

F. Fabricate components true to detail and free from defects impairing appearance, strength or durability. Fabricate custom extrusions indicated and as necessary for complete installation.

G. Fabricate components to allow for accurate and rigid fit of joints and corners. Match components carefully ensuring continuity of line and design. Ensure joints and connections will be flush and weather-tight. Ensure slip joints make full, tight contact and are weather-tight.

H. Reinforce components as required at anchorage and support points, at joints, and at attachment points for interfacing work.

I. Provide structural reinforcing within framing members where required to maintain rigidity and accommodate design loads.

J. Allow for adequate clearance around perimeter of system to enable proper installation and for thermal movement within system.

K. Separate dissimilar metals with protective coating or preformed separators to prevent contact and corrosion.

L. Provide special shapes and filler pieces with tight corners.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify dimensions, tolerances, and method of attachment with other related work.

B. Verify that curtain wall openings and adjoining air and vapor seal materials are ready to receive work of this section.

C. Verify that anchorage devices have been properly installed and located.
3.02 INSTALLATION
A. Install curtain wall system in accordance with manufacturer's instructions.
B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
C. Provide alignment attachments and shims to permanently fasten system to building structure.
D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
E. Provide thermal isolation where components penetrate or disrupt building insulation.
F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.
G. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
H. Provide attachments and shims to permanently fasten system to building structure.
I. Anchor securely in place, allowing for required movement, including expansion and contraction.
J. Separate dissimilar materials at contract points, including metal in contact with masonry or concrete surfaces, with protective coating or preformed separators to prevent contact and electrolytic action.
K. Fire-Safing and Curtain Wall Insulation:
   1. Install fire-safing and curtain wall insulation specified in Section 07 84 00 - Firestopping.

3.03 TOLERANCES
A. Maximum Variation from Plumb: 0.06 inches every 3 ft non-cumulative or 0.5 inches per 100 ft, whichever is less.
B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.
C. Sealant Space Between Curtain Wall Mullions and Adjacent Construction: Maximum of 3/4 inch and minimum of 1/4 inch.

3.04 FIELD QUALITY CONTROL
A. See Section 01 40 00 - Quality Requirements, for general testing and inspection requirements.
B. Water-Spray Test: Provide water spray quality test of installed curtain wall components in accordance with AAMA 501.2 during construction process and before installation of interior finishes.
   1. Perform a minimum of two tests in each designated area as indicated on drawings.
   2. Conduct tests in each area prior to 10 percent and 50 percent completion of this work.
C. Repair or replace curtain wall components that have failed designated field testing, and retest to verify performance complies with specified requirements.

3.05 CLEANING
A. Remove protective material from pre-finished aluminum surfaces.
B. Upon completion of installation, thoroughly clean aluminum surfaces in accordance with AAMA 609 & 610.

3.06 PROTECTION
A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION
SECTION 087100 – DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY
   A. This Section includes commercial door hardware for the following:
      1. Swinging doors.
      2. Other doors to the extent indicated.
   B. Door hardware includes, but is not necessarily limited to, the following:
      1. Mechanical door hardware.
      2. Electromechanical door hardware.
      3. Cylinders specified for doors in other sections.
   C. Related Sections:
      1. Division 08 Section “Door Hardware Schedule”.
      2. Division 08 Section “Hollow Metal Doors and Frames”.
      3. Division 08 Section “Flush Wood Doors”.
      4. Division 08 Section “Radiation Shielding Doors and Frames”.
      5. Division 08 Section “Aluminum-Framed Entrances and Storefronts”.
      6. Division 08 Section “All-Glass Entrances”.
      7. Division 08 Section “Automatic Door Operators”.
      8. Division 08 Section “Access Control Hardware”.
      9. Division 28 Section “Access Control”.
   D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
      6. NFPA 105 - Installation of Smoke Door Assemblies.
      7. UL/ULC and CSA C22.2 – Standards for Automatic Door Operators Used on Fire and Smoke Barrier Doors and Systems of Doors.
8. State Building Codes, Local Amendments.

E. Standards: All hardware specified herein shall comply with the following industry standards:

1. ANSI/BHMA Certified Product Standards - A156 Series
2. UL10C – Positive Pressure Fire Tests of Door Assemblies

1.3 SUBMITTALS

A. Product Data: Manufacturer’s product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Comply with scheduling sequence and vertical format in DHI’s "Sequence and Format for the Hardware Schedule."

2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.

3. Content: Include the following information:
   a. Type, style, function, size, label, hand, and finish of each door hardware item.
   b. Manufacturer of each item.
   c. Fastenings and other pertinent information.
   d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
   e. Explanation of abbreviations, symbols, and codes contained in schedule.
   f. Mounting locations for door hardware.
   g. Door and frame sizes and materials.
   h. Warranty information for each product.

4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

C. Shop Drawings: Details of electrified access control hardware indicating the following:
1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:
   a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
   b. Complete (risers, point-to-point) access control system block wiring diagrams.
   c. Wiring instructions for each electronic component scheduled herein.

2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.

D. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

E. Informational Submittals:
   1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

F. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Submittals.

1.4 QUALITY ASSURANCE

A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

B. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

C. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project’s vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during
the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.

D. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.

1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.

2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.

E. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.

F. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:

1. Function of building, purpose of each area and degree of security required.
2. Plans for existing and future key system expansion.
3. Requirements for key control storage and software.
4. Installation of permanent keys, cylinder cores and software.
5. Address and requirements for delivery of keys.

G. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.

1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.

2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.

3. Review sequence of operation narratives for each unique access controlled opening.

4. Review and finalize construction schedule and verify availability of materials.

5. Review the required inspecting, testing, commissioning, and demonstration procedures

H. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.
1.5 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.6 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

B. Door Hardware and Electrical Connections: Coordinate the layout and installation of scheduled electrified door hardware and related access control equipment with required connections to source power junction boxes, low voltage power supplies, detection and monitoring hardware, and fire and detection alarm systems.

C. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.7 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:

1. Structural failures including excessive deflection, cracking, or breakage.
2. Faulty operation of the hardware.
3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
4. Electrical component defects and failures within the systems operation.

C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.
D. Special Warranty Periods:
1. Seven years for heavy duty cylindrical (bored) locks and latches.
2. Five years for exit hardware.
3. Twenty five years for manual surface door closer bodies.
4. Two years for overhead concealed closers.
5. Five years for motorized electric latch retraction exit devices.
6. Two years for electromechanical door hardware.

1.8 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.

B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:

1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.

C. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.2 HANGING DEVICES

A. Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.

1. Quantity: Provide the following hinge quantity:

   a. Two Hinges: For doors with heights up to 60 inches.
   b. Three Hinges: For doors with heights 61 to 90 inches.
   c. Four Hinges: For doors with heights 91 to 120 inches.
d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.

2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
   
   a. Widths up to 3’0”: 4-1/2” standard or heavy weight as specified.
   b. Sizes from 3’1” to 4’0”: 5” standard or heavy weight as specified.

3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
   
   a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
   b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.

4. Hinge Options: Comply with the following:
   
   a. Non-removable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for all out-swinging lockable doors.

5. Manufacturers:
   
   a. Bommer Industries (BO) - LB Series.
   b. Hager Companies (HA) - CB Series.
   c. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK) - TA Series.

B. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 certified continuous geared hinge, with minimum 0.120-inch thick extruded 6060 T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.

   1. Manufacturers:
      
      a. Bommer Industries (BO).
      b. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK).
      c. Pemko Products; ASSA ABLOY Architectural Door Accessories (PE).

2.3 POWER TRANSFER DEVICES

A. Concealed Quick Connect Electric Power Transfers: Provide concealed wiring pathway housing mortised into the door and frame for low voltage electrified door hardware. Furnish with Molex™ standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.
1. Manufacturers:
   a. Pemko Products; ASSA ABLOY Architectural Door Accessories (PE) – EL-CEPT Series.
   b. Securitron (SU) - EL-CEPT Series.

B. Electrified Quick Connect Data Transfer Hinges: Provide combined electrified power and Ethernet data transfer hinges with Molex™ standardized plug connectors to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.

1. Data transfer hinges feature two 6-position and two 4-position Molex connectors, 9 multi-strand wires; 2 twisted pairs (26 AWG), 4 straight conductors (28 gauge) and 1 straight conductor (22 AWG) with concealed plug connectors eliminating the need for separate or exposed wiring. Rated 350 mA continuous @ 48 volts DC nominal, the hinge is capable of two PoE wiring configurations:
   a. Power over Data (5 wire): Power and Data supplied together over the 2 twisted 26 AWG) pairs. The 22 AWG conductor is used for the earth ground connection.
   b. Data with Power over Spares (9 wire): Data over 2 twisted (26 AWG) pairs with Power over spare pairs 94 straight 28 AWG conductors). The 22 Awg conductor is used for earth ground connection.

2. Manufacturers:
   b. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK) – PoE Series.
   c. Pemko Products; ASSA ABLOY Architectural Door Accessories (PE) – PoE Series.

C. Concealed Quick Connect Electric Data Transfers: Provide concealed wiring pathway housing mortised into the door and frame for low voltage electrified access control door hardware. Furnish with Molex™ or RJ-45 standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.

1. Manufacturers:
   a. Securitron (SU) – PoE-CEPT Series.

D. Electric Door Wire Harnesses: Provide electric/data transfer wiring harnesses with standardized plug connectors to accommodate up to twelve (12) wires. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Provide
sufficient number and type of concealed wires to accommodate electric function of specified hardware. Provide a connector for through-door electronic locking devices and from hinge to junction box above the opening. Wire nut connections are not acceptable. Determine the length required for each electrified hardware component for the door type, size and construction, minimum of two per electrified opening.

1. Provide one each of the following tools as part of the base bid contract:
   b. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK) - Connector Hand Tool: QC-R003.

2. Manufacturers:
   a. Hager Companies (HA) - Quick Connect.
   b. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK) – QC-C Series.
   c. Stanley Hardware (ST) – WH Series.

2.4 DOOR OPERATING TRIM

A. Flush Bolts and Surface Bolts: ANSI/BHMA A156.3 and A156.16, Grade 1, certified.

1. Flush bolts to be furnished with top rod of sufficient length to allow bolt retraction device location approximately six feet from the floor.
2. Furnish dust proof strikes for bottom bolts.
3. Surface bolts to be minimum 8” in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.
4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.

5. Manufacturers:
   a. Door Controls International (DC).
   b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
   c. Trimco (TC).

B. Coordinators: ANSI/BHMA A156.3 certified door coordinators consisting of active-leaf, hold-open lever and inactive-leaf release trigger. Model as indicated in hardware sets.

1. Manufacturers:
   a. Door Controls International (DC).
   b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
   c. Trimco (TC).

C. Door Push Plates and Pulls: ANSI/BHMA A156.6 certified door pushes and pulls of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.
1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.

2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.

3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.

4. Fastenets: Provide manufacturer's designated fastener type as indicated in Hardware Sets.

5. Manufacturers:
   a. Hiawatha, Inc. (HI).
   b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
   c. Trimco (TC).

2.5 CYLINDERS AND KEYING

A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.

B. Cylinders: Original manufacturer cylinders complying with the following:
   1. Mortise Type: Threaded cylinders with rings and cams to suit hardware application.
   2. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
   3. Bored-Lock Type: Cylinders with tailpieces to suit locks.
   4. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
   5. Keyway: Manufacturer’s Standard.

C. Keying System: Each type of lock and cylinders to be factory keyed.
   1. Conduct specified "Keying Conference" to define and document keying system instructions and requirements.
   2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
   3. New System: Key locks to a new key system as directed by the Owner.

D. Key Quantity: Provide the following minimum number of keys:
   1. Change Keys per Cylinder: Two (2)
   2. Master Keys (per Master Key Level/Group): Five (5).

E. Construction Keying: Provide construction master keyed cylinders.

F. Key Registration List (Bitting List):
1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
2. Provide transcript list in writing or electronic file as directed by the Owner.

G. Key Control Cabinet: Provide a key control system including envelopes, labels, and tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet. Key control cabinet shall have expansion capacity of 150% of the number of locks required for the project.

1. Manufacturers:
   a. Lund Equipment (LU).
   b. MMF Industries (MM).
   c. Telkee (TK).

H. Key Control Software: Provide one network version of "Key Wizard" branded key management software package that includes one year of technical support and upgrades to software at no charge. Provide factory key system formatted for importing into “Key Wizard” software.

2.6 MECHANICAL LOCKS AND LATCHING DEVICES

A. Cylindrical Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.2, Series 4000, Grade 1 certified.

1. Furnish with solid cast levers, standard 2 3/4” backset, and 1/2" (3/4" at rated paired openings) throw brass or stainless steel latchbolt.
2. Locks are to be non-handed and fully field reversible.
3. Manufacturers:
   a. Corbin Russwin Hardware (RU) – CL3300 Series.
   b. Sargent Manufacturing (SA) – 10 Line.
   c. Yale Locks and Hardware (YA) 5400LN Series.

2.7 ELECTROMECHANICAL LOCKING DEVICES

A. Electromechanical Cylindrical Locksets, Grade 1 (Heavy Duty): Subject to same compliance standards and requirements as mechanical cylindrical locksets, electrified locksets to be of type and design as specified below.

1. Electrified Lock Options: Where indicated in the Hardware Sets, provide electrified options including: outside door lock/unlock trim control, latchbolt and lock/unlock status monitoring, and request-to-exit signaling. Unless otherwise indicated, provide electrified locksets standard as fail secure.
2. Manufacturers:
2.8 AUXILIARY LOCKS

A. Narrow Case Deadlocks and Deadlatches: ANSI/BHMA 156.13 Series 1000 Grade 1 certified narrow case deadlocks and deadlatches for swinging or sliding door applications. All functions shall be manufactured in a single sized case formed from 12 gauge minimum, corrosion resistant steel (option for fully stainless steel case and components). Provide minimum 2 7/8” throw laminated stainless steel bolt. Bottom rail deadlocks to have 3/8” diameter bolts.

1. Manufacturers:
   a. Adams Rite Manufacturing (AD) - MS1850S / MS1950 Series.
   b. Adams Rite Manufacturing (AD) – 4900 Series.

2.9 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.

B. Standards: Comply with the following:

2. Strikes for Bored Locks and Latches: BHMA A156.2.
3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
4. Dustproof Strikes: BHMA A156.16.

2.10 CONVENTIONAL EXIT DEVICES

A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:

1. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
2. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer’s catalog and template book for specific requirements.

3. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.

4. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.

5. Electromechanical Options: Subject to same compliance standards and requirements as mechanical exit devices, electrified devices to be of type and design as specified in hardware sets. Include any specific controllers when conventional power supplies are not sufficient to provide the proper inrush current.

6. Motorized Electric Latch Retraction: Devices with an electric latch retraction feature must use motors which have a maximum current draw of 600mA. Solenoid driven latch retraction is not acceptable.

7. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.
   a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
   b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.

8. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.

9. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2” wide stiles.


11. Rail Sizing: Provide exit device rails factory sized for proper door width application.

12. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.

B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 certified panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Exit device latch to be stainless steel, pullman type, with deadlock feature.

1. Manufacturers:
   a. Corbin Russwin Hardware (RU) - ED4000 / ED5000 Series.
b. Sargent Manufacturing (SA) - 80 Series.

2.11 DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:

1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers including installation and adjusting information on inside of cover.

2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.

3. Cycle Testing: Provide closers which have surpassed 15 million cycles in a test witnessed and verified by UL.

4. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the physically handicapped, provide units complying with ANSI ICC/A117.1.

5. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.

6. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.

7. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.

B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.

1. Manufacturers:
   a. Corbin Russwin Hardware (RU) - DC6000 Series.
   b. Norton Door Controls (NO) - 7500 Series.
   c. Yale Locks and Hardware (YA) - 4400 Series.

C. Door Closers, Surface Mounted (Unitrol): Unitrol arms to have door stop mechanism to absorb dead stop shock on arm and top hinge. Hold-open arms to have a spring loaded mechanism in addition to shock absorber assembly. Arms to be provided with rigid steel main arm and secondary arm lengths proportional to the door width.
1. Manufacturers:
   a. Corbin Russwin Hardware (RU) - Unitrol Series.
   b. Norton Door Controls (NO) - Unitrol Series.
   c. Yale Locks and Hardware (YA) - Unitrol Series.

2.12 ARCHITECTURAL TRIM

A. Door Protective Trim
   1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
   2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2” less than door width (LDW) on stop side of single doors and 1” LDW on stop side of pairs of doors, and not more than 1” less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.
   3. Where plates are applied to fire rated doors with the top of the plate more than 16” above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer's catalog and template book for specific requirements for size and applications.
   4. Protection Plates: ANSI/BHMA A156.6 certified protection plates (kick, armor, or mop), fabricated from the following:
      a. Stainless Steel: 300 grade, 050-inch thick.
   5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.
   6. Manufacturers:
      a. Hiawatha, Inc. (HI).
      b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
      c. Trimco (TC).

2.13 DOOR STOPS AND HOLDERS

A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.

B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.
1. Manufacturers:
   a. Hiawatha, Inc. (HI).
   b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
   c. Trimco (TC).

C. Overhead Door Stops and Holders: ANSI/BHMA A156.6, Grade 1 certified overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.

1. Manufacturers:
   a. Rixson Door Controls (RF).
   b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
   c. Sargent Manufacturing (SA).

2.14 ARCHITECTURAL SEALS

A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.

   1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.

   1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NPFA 252, Standard Methods of Fire Tests of Door Assemblies.

D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.

E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

F. Manufacturers:
   1. Pemko Products; ASSA ABLOY Architectural Door Accessories (PE).
   2. Reese Enterprises, Inc. (RE).

2.15 ELECTRONIC ACCESSORIES

A. Exit Delay Locking Systems: Exit delay locking systems are fully integrated units consisting of a minimum 1200 pound holding force magnetic lock, movement initiating device, reset bypass switch, and exit delay timer module. Unit to include an adjustable initiation gap allowing door travel of up to 1 inch before going into alarm condition. Operates on either 12VDC or 24VDC.

1. Manufacturers:
   a. Security Door Controls (SD) - 101 Exit Check Series.
   b. Securitron (SU) - iMXD Series.

B. Push-Button Switches: Industrial grade momentary or alternate contact, back-lighted push buttons with stainless-steel switch enclosures. 12/24 VDC bi-color illumination suitable for either flush or surface mounting.

1. Manufacturers:
   a. Security Door Controls (SD) - 400 Series.
   b. Securitron (SU) - PB Series.

C. Request-to-Exit Motion Sensor: Request-to-Exit Sensors motion detectors specifically designed for detecting exiting through a door from the secure area to a non-secure area. Include built-in timers (up to 60 second adjustable timing), door monitor with sounder alert, internal vertical pointability coverage, 12VDC or 24VDC power and selectable relay trigger with fail safe/fail secure modes.

1. Manufacturers:
   a. Security Door Controls (SD) - MD-31D Series.
   b. Securitron (SU) - XMS Series.

D. Door Position Switches: Door position magnetic reed contact switches specifically designed for use in commercial door applications. On recessed models the contact and magnetic housing snap-lock into a 1" diameter hole. Surface mounted models include wide gap distance design complete with armored flex cabling. Provide SPDT, N/O switches with optional Rare Earth Magnet installation on steel doors with flush top channels.

1. Manufacturers:
   a. Security Door Controls (SD) - DPS Series.
   b. Securitron (SU) - DPS Series.

E. Power Supplies: Provide Nationally Recognized Testing Laboratory Listed 12VDC or 24VDC (field selectable) filtered and regulated power supplies. Include battery backup option with integral battery charging capability in addition to operating the DC load in event of line voltage
failure. Provide the least number of units, at the appropriate amperage level, sufficient to exceed the required total draw for the specified electrified hardware and access control equipment.

1. Manufacturers:
   a. Security Door Controls (SD) - 630 Series.
   b. Securitron (SU) - BPS Series.

2.16 FABRICATION
   A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.17 FINISHES
   A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.
   B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware.
   C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION
   A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
   B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION
   A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.
3.3 INSTALLATION

A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.

1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.

B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.

C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

A. Field Inspection: Supplier will perform a final inspection of installed door hardware and state in report whether work complies with or deviates from requirements, including whether door hardware is properly installed, operating and adjusted.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
3.6 CLEANING AND PROTECTION

A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.

B. Clean adjacent surfaces soiled by door hardware installation.

C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SETS

A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

B. The supplier is responsible for handing and sizing all products and providing the correct option for the appropriate door type and material where more than one is presented in the hardware sets. Quantities listed are for each pair of doors, or for each single door.

C. Refer to Section 080671, Door Hardware Sets, for hardware sets.

END OF SECTION 087100
SECTION 087113 - AUTOMATIC DOOR OPERATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Low energy automatic door operators for swinging doors.

B. Related Sections:
   1. Division 08 Section “Door Schedule”.
   2. Division 08 Section “Hollow Metal Doors and Frames”.
   3. Division 08 Section “Flush Wood Doors”.
   4. Division 08 Section “Door Hardware”.
   5. Division 08 Section “Access Control Hardware”.
   6. Division 26 Section “Electrical”.
   7. Division 28 Section “Access Control”.

A. Codes and Standards: Comply with the version year adopted by the Authority Having Jurisdiction.

1. Codes and Standards: Comply with the version year adopted by the Authority Having Jurisdiction.
   2. ANSI/BHMA A156.4 - Door Controls, Door Closers.
   5. NFPA 70 - National Electrical Code.
   8. NFPA 105 - Installation of Smoke Door Assemblies.
   9. UL/ULC and CSA C22.2 – Standards for Automatic Door Operators Used on Fire and Smoke Barrier Doors and Systems of Doors.
   10. UL 325 - Door, Drapery, Gate, Louver, and Window Operators and Systems.
   11. State Building Codes, Local Amendments.

1.3 PERFORMANCE REQUIREMENTS

A. Automatic door operators to be used on interior or exterior doors; up to 200 pounds (91 kg) weight and maximum door width of 48” (1219 mm).
1. Auto door operator capable of operating within temperature ranges of \(-22^\circ F\) (\(-30^\circ C\)) and \(122^\circ F\) (\(50^\circ C\)).

1.4 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, and finishes for automatic door operators, including activation devices. Include operating characteristics, electrical characteristics, and furnished accessories.

B. Shop Drawings: Include details and attachments to other work.

1. Include locations and elevations of each unique entrance showing activation devices.
2. Indicate required clearances, components, and location and size of field connections.
3. Wiring Diagrams: For power, signal, and activation wiring.

C. Qualification Data: Provide copy of manufacturer's official certification or accreditation document indicating proof of status as a qualified and authorized installer of automatic door operators and accessories.

D. Operating and Maintenance Manuals: Provide manufacturer's operating and maintenance manual for each item comprising the automatic door operator installation in quantity as required in Division 01, Closeout Submittals. The manual to include the name, address, and contact information of the manufacturer and Installer providing the operators and installation. The final copies delivered after completion of the installation test to include "as built" modifications made during installation, checkout, and acceptance.

E. Warranties and Maintenance: Special warranties and maintenance agreements specified in this Section.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation and maintenance of units required for this Project.

B. Certified Installer Qualifications: Locally certified ASSA ABLOY Power Operator Preferred Installer required for the installation and maintenance of the automatic door operator units and accessories indicated for the Project.

C. Source Limitations: Obtain automatic door operators, including activation devices, from single source, qualified supplier unless otherwise indicated.

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a testing agency, and marked for intended location and application.

E. Exit Door Requirements: Comply with requirements of authorities having jurisdiction for doors with automatic door operators serving as a component of a required means of egress.
F. Fire Rated Door Assemblies: Provide operators for fire rated door assemblies that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction for use on types and sizes of labeled fire doors required.

G. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier, Installer, and Contractor to review proper methods and the procedures for receiving, handling, and installing automatic door operators.

1. Prior to installation of automatic door operators, arrange for certified Installer's representative to conduct a project specific meeting to review the installation and maintenance of their respective products. Project meeting to be attended by representatives of related trades furnishing and installing the aluminum, hollow metal and wood doors sections.

2. Review and finalize construction schedule and verify availability of materials.

1.6 COORDINATION

A. Electrical Systems Coordination: Coordinate the layout and installation of scheduled automatic door operators and related activation devices, with required connections to source power junction boxes, remote power supplies, access control equipment, detection and monitoring hardware, and fire alarm system.

B. Templates: Obtain and distribute to the parties involved, templates for doors, frames, operators, and other work specified to be factory prepared and reinforced for installing automatic door operators. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing automatic door operators to comply with indicated requirements.

C. Door and Frame Preparation: Related Division 08 Sections (Steel, Aluminum and Wood) doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified automatic door operators without additional in-field modifications.

1.7 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Special Warranty: Written warranty, executed by manufacturer, agreeing to repair or replace components of automatic door operators that fail in materials or workmanship within specified warranty period after final acceptance by Owner. Failures include, but are not limited to, the following:

1. Faulty or sporadic operation of automatic door operator, including activation and safety devices.

2. Deterioration of metals, metal finishes, and other materials beyond normal weathering or use.
C. Special Warranty Period: Two years from date of Substantial Completion.

D. Provide extended warranty from defects in material or workmanship under normal use for a period of 3 years from the date of substantial completion for units installed by a certified ASSA ABLOY Power Operator Preferred Installer in accordance with the manufacturer's written warranty certificate.

1.8 MAINTENANCE SERVICE

A. Maintenance Service: Beginning at Substantial Completion, and running concurrent with the specified warranty period, provide continuous (6) months full maintenance by skilled employees of automatic door operator Installer. Include planned and preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door operation. Provide parts and supplies the same as those used in the manufacture and installation of original equipment.

B. Extended Maintenance Support and Service Agreement: Submit for Owner’s consideration an optional extended Service Agreement for the installed automatic door operator system. The extended Service Agreement is considered elective and is without manufacturer's requirement stipulating mandatory coverage for owner and/or vendor system support.

1. A published copy of this agreement to be included with the submittal package
2. Support for the installed automatic door operator system is provided through the vendor under a specified, limited 24 hour support program.
3. Automatic door operators and components are to be available on a one-day turn around time frame from the vendor.

PART 2 - PRODUCTS

2.1 ELECTROMECHANICAL DOOR OPERATORS

A. General: Provide low energy operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for compliance with UL 325. Coordinate operator mechanisms with door operation, hinges, and activation devices.

1. Fire-Rated Doors: Provide door operators for fire-rated door assemblies that comply with NFPA 80 for fire-rated door components and are listed and labeled by a qualified testing agency.

B. Standard: Certified ANSI/BHMA A156.19.

C. Performance Requirements:

1. Opening Force if Power Fails: Not more than 15 lbf required to release a latch if provided, not more than 30 lbf required to manually set door in motion, and not more than 15 lbf required to fully open door.
2. Entrapment Protection: Not more than 15 lbf required to prevent stopped door from closing or opening.
D. Configuration: Surface mounted or in-ground as required. Door operators to control single swinging and pair of swinging doors.

E. Operation: Power opening and spring closing operation capable of meeting ANSI A117.1 accessibility guideline. Provide time delay for door to remain open before initiating closing cycle as required by ANSI/BHMA A156.19.

F. Features: Operator units to have full feature adjustments for door opening and closing force and speed, backcheck, motor assist acceleration from 0 to 30 seconds, time delay, vestibule interface delay, obstruction recycle, and hold open time from 0 up to 30 seconds.

G. Provide outputs and relays on board the operator to allow for coordination of exit device latch retraction, electric strikes, magnetic locks, card readers, safety and motion sensors and specified auxiliary contacts.

H. Brackets and Reinforcements: Manufacturer’s standard, fabricated from aluminum with nonferrous shims for aligning system components.

I. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Norton Door Controls (NO) - 6300 Series.

2.2 ACTIVATION DEVICES

A. General: Provide activation devices in accordance with ANSI/BHMA A156.19 standard, for condition of exposure indicated and for long term, maintenance free operation under normal traffic load operation. Coordinate activation control with electrified hardware and access control interfaces. Activation switches are standard SPST, with optional DPDT availability.

B. Push-Plate Switch: Momentary contact door control switch with push-plate actuator.
   1. Configuration: Square or round push-plate control switch with single or double gang junction box mounting. Provide narrow profile face plate where indicated for jamb or mullion mounting.
      a. Mounting Location: As indicated on Drawings.
   4. Manufacturers:
      a. Norton Door Controls (NO) – 500 Series.

C. Key Switch: Key controlled actuator device enclosed in single or double gang junction box.
   1. Faceplate Material: Stainless steel.
   2. Functions: On-off, maintained contact.
   3. Two-way Mounting: Recess or surface mounting as indicated on Drawings.
   4. Manufacturers:
a. Alarm Controls (AK) – MCK Series.
b. Securitron (SU) – MKA Series.
c. Wikk Industries (WI) – KS Series.

2.3 ACCESSORIES

A. Relay Logic Modules: Module containing 3 relays allowing the operator to be used with external locking hardware (exits or locks) or access controls that require dry contact inputs.
   1. Manufacturers:
      a. Norton Door Controls (NO) – 5900RLM Series.

B. Signage: As required by cited ANSI/BHMA A156.19 standard for the type of operator.

2.4 FINISHES

A. Standard: Designations used to indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware. Units will be sprayed with a combination of waterborne acrylic and polyester powder coat.

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances, door and frame preparation and reinforcements, power connections, electrical systems interfaces, and other conditions affecting performance of automatic door operators.

B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 INSTALLATION

A. General: Install complete automatic door operators according to manufacturer's written instructions and ANSI/BHMA A156;19 standard, including activation devices, control wiring, remote power units if any, connection to the building's fire alarm system, and required signage.
B. Power Connection: Reference Division 26 "Electrical" Sections for connection to electrical power distribution system.

C. Access Control System: Coordinate connections and operation with access control system

D. Signage: Apply signage as required by ANSI/BHMA A156.19 standard for type of door operator and direction of pedestrian travel.

3.3 FIELD QUALITY CONTROL

A. Inspection: Certified Installer' representative to inspect and test automatic door operators to determine compliance of installed systems with specifications and ANSI/BHMA A146.19 standard. Report discrepancies in writing to Architect and Contractor within 24 hours after inspection.

3.4 ADJUSTING

A. Comply with requirements of ANSI/BHMA A156.19 standard. Adjust automatic door operators to function smoothly, and lubricate as recommended by manufacturer.

3.5 DEMONSTRATION

A. Certified Installer's representative to provide eight (8) hours of training to Owner's maintenance personnel in the proper adjustment, operation, and maintenance of automatic door operators.

END OF SECTION 087113
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SECTION 08 80 00
GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Insulating glass units.
B. Glazing units.
C. Spandrel Panels
D. Glazing compounds and accessories.

1.02 RELATED REQUIREMENTS
A. Section 05 73 00 - Decorative Railings: Glazing furnished as part of railing system.
B. Section 07 92 00 - Joint Sealants: Sealants for other than glazing purposes.
C. Section 08 11 13 - Hollow Metal Doors and Frames: Glazed lites in doors and borrowed lites.
D. Section 08 14 16 - Flush Wood Doors: Glazed lites in doors.
E. Section 08 41 26 - All-Glass Entrances and Storefronts: Glazing furnished as part of entrance assembly.
F. Section 08 43 13 - Aluminum-Framed Storefronts: Glazing furnished as part of storefront assembly.
G. Section 08 44 13 - Glazed Aluminum Curtain Walls: Glazing furnished as part of wall assembly.
H. Section 08 83 00 - Mirrors.
I. Section 13 49 13 - Integrated X-Ray Shielding Assemblies: Leaded glass.

1.03 REFERENCE STANDARDS
M. ITS (DIR) - Directory of Listed Products; current edition.
O. NFPA 257 - Standard on Fire Test for Window and Glass Block Assemblies; 2017.
S. UL (DIR) - Online Certifications Directory; Current Edition.
V. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.
X. UL 752 - Standard for Bullet-Resisting Equipment; Current Edition, Including All Revisions.

1.04 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data on Glass Types: Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.
C. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements, and identify available colors.
D. Shop Drawings: Show details of each type of glazing system in conjunction with the framing system indicating type of glass, sizes, shapes, glazing material and quantity. Show details indicating glazing material, glazing thickness, bite on the glass and glass edge clearance.
E. Samples: Submit 12-inch long samples of each type of glass indicated except for clear monolithic glass products, and 12-inch long samples of each color required, except black, for each type of sealant or gasket exposed to view. Submit 12-inch long sample of aluminum frame.
F. Test and Evaluation Reports: Glazing contractor shall obtain compatibility and adhesion test reports from sealant manufacturer indicating that glazing materials were tested for compatibility and adhesion with glazing sealant as well as other glazing materials including insulating units.
G. Manufacturer Reports: Submit Glass Fabricator’s Shop Drawing Review indicating compliance with glazing standards established by the Glass Association of North America (GANA). Submittal to include thermal stress and structural load analysis of the proposed glass types, configuration and sizes.
H. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner’s name and registered with manufacturer.

1.05 QUALITY ASSURANCE
A. Perform Work in accordance with GANA (GM) and FGMA Sealant Manual for glazing installation methods. Maintain one copy on site.
B. Qualifications:
   1. Manufacturers: Fabrication processes, including low emissivity and reflective coatings, insulating, laminated, silk-screening and tempering shall be manufactured by a single manufacturer with a minimum of ten (10) years of fabrication experience and meet ANSI / ASQC 9002 1994.
C. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience.
D. Pre-construction field adhesion testing:
   1. In jobsite field samples prior to general installation, conduct field-tests for adhesion of joint sealants to actual joint substrates using proposed joint preparation methods recommended by manufacturer.
   2. Conduct tests for each type of sealant and substrate.
3. Locate field-test joints where inconspicuous or as approved by Architect.
   a. Include areas typical of those requiring removal of existing sealants and utilize
      methods proposed for sealant removal that have been pre-approved by Architect.
4. Test method: Use manufacturer's standard field adhesion test methods and methods
   proposed for joint preparation to verify proper priming and joint preparation techniques
   required to obtain optimum adhesion of joint sealants to joint substrate.
5. Evaluate and report results of field adhesion testing.
6. Do not use joint preparation methods or sealants that produce less than satisfactory
   adhesion to joint substrates during testing.

E. Standard of acceptance:
   1. Joints installed during pre-construction field adhesion testing that are accepted by
      Architect shall be retained as standard of acceptability and incorporated into Work of that
      area during general installation.
   2. At least one such standard of minimum 5 feet in length shall be established for each type
      of sealant and substrate.

1.06  MOCK-UPS
A. See Section 01 40 00 - Quality Requirements, for additional mock-up requirements.
B. Provide on-site glazing mock-up with the specified glazing components.
C. Mock-ups may remain as part of the Work.

1.07  DELIVERY, STORAGE AND HANDLING
A. Storage and Handling Requirements:
   1. Protect glass from edge damage during handling. For insulating units exposed to
      substantial altitude changes, comply with insulating glass manufacturers written
      recommendations for venting and sealing to avoid hermetic seal ruptures.
   2. Storage and Protection: Protect glazing materials according to manufacturer’s written
      instructions and as needed to prevent damage to glass and glazing materials from
      condensation, temperature changes, direct exposure to sun or other causes.

1.08  FIELD CONDITIONS
A. Do not install glazing when ambient temperature is less than 40 degrees F.
B. Ambient Conditions: Do not proceed with glazing when ambient and substrate temperature
   conditions are outside limits permitted by the glazing material manufacturers and when glazing
   channel substrates are wet from rain, frost, condensation or other causes.
   1. Do not install liquid glazing sealants when ambient and substrate temperature conditions
      are outside limits permitted by glazing sealant manufacturer or below 40°F.

1.09  WARRANTY
A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
B. Insulating Glass Units: Provide a five (5) year manufacturer warranty to include coverage for
   seal failure, interpane dusting or misting, including providing products to replace failed units.
C. Laminated Glass: Provide a five (5) year manufacturer warranty to include coverage for
   delamination, including providing products to replace failed units.
D. Heat Soaked Tempered Glass: Provide a five (5) year manufacturer warranty to include
   coverage for spontaneous breakage of fully tempered glass caused by nickel sulfide (NiS)
   inclusions.
PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Float Glass Manufacturers:
   6. Oldcastle Building Envelope: www.oldcastle.com
   7. Substitutions: Refer to Section 01 60 00 - Product Requirements.

B. Laminated Glass Manufacturers:
   1. Oldcastle Building Envelope: www.oldcastle.com
   2. Global Security Glazing: security-glazing.com
   3. Armortex: www.armortex.com
   5. Substitutions: Refer to Section 01 60 00 - Product Requirements.

C. Fire-Protection-Rated Glass: Provide products as required to achieve indicated fire-rating period.
   1. SAFTIFIRST, a division of O'Keeffe's Inc; SuperClear 45-HS: www.safti.com/#sle.
   2. SCHOTT North America Inc; PYRAN Platinum 20: www.us.schott.com/#sle.
   5. Substitutions: Refer to Section 01 60 00 - Product Requirements.

D. Mirrored Glass Manufacturers:

E. Radiation Shielding Glass Manufacturers:

2.02 PERFORMANCE REQUIREMENTS - EXTERIOR GLAZING ASSEMBLIES

A. Provide type and thickness of exterior glazing assemblies to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of glass.
   1. Design Pressure: Calculated in accordance with ASCE 7.
   2. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.
   3. Seismic Loads: Design and size glazing components to withstand seismic loads and sway displacement in accordance with the requirements of ASCE 7.
   4. Provide glass edge support system sufficiently stiff to limit the lateral deflection of supported glass edges to less than 1/175 of their lengths under specified design load.
   5. Glass thicknesses listed are minimum.

B. Vapor Retarder and Air Barrier Seals: Provide completed assemblies that maintain continuity of building enclosure vapor retarder and air barrier.
   1. In conjunction with vapor retarder and joint sealer materials described in other sections.
   2. To utilize the inner pane of multiple pane insulating glass units for the continuity of the vapor retarder and air barrier seal.
   3. To maintain a continuous vapor retarder and air barrier throughout the glazed assembly from glass pane to heel bead of glazing sealant.
C. Thermal and Optical Performance: Provide exterior glazing products with performance properties as indicated. Performance properties are in accordance with manufacturer's published data as determined with the following procedures and/or test methods:

1. Center of Glass U-Value: Comply with NFRC 100 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
2. Center of Glass Solar Heat Gain Coefficient (SHGC): Comply with NFRC 200 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.

2.03 GLASS MATERIALS

A. Float Glass: Provide float glass based glazing unless otherwise indicated.

1. Annealed Type: ASTM C1036, Type I - Transparent Flat, Class 1 - Clear, Quality - Q3.
4. Fully Tempered Safety Glass: Complies with ANSI Z97.1 or 16 CFR 1201 criteria for safety glazing used in hazardous locations.
5. Heat-Soak Testing (HST): Provide HST of fully tempered glass used on canopy, point-supported, spider wall, high-risk, sloping overhead, horizontal overhead, free-standing glass protective barrier, or other demanding applications of project, to reduce risks of spontaneous breakage due to nickel sulfide (NiS) induced fractures in accordance with industry established testing requirements.
7. Thicknesses: As indicated; provide greater thickness as required for exterior glazing wind load design.

B. Laminated Glass: Float glass laminated in accordance with ASTM C1172.

1. Laminated Safety Glass: Complies with ANSI Z97.1 - Class B or 16 CFR 1201 - Category I impact test requirements.
2. Ionoplast Interlayer: 0.035 inch thick, minimum.

2.04 INSULATING GLASS UNITS

A. Manufacturers:


C. Other Acceptable Manufacturers:

4. Substitutions: Refer to Section 01 60 00 - Product Requirements.

D. Insulating Glass Units: Types as indicated.

1. Durability: Certified by an independent testing agency to comply with ASTM E2190.
2. Coated Glass: Comply with requirements of ASTM C1376 for pyrolytic (hard-coat) or magnetic sputter vapor deposition (soft-coat) type coatings on flat glass; coated vision glass, Kind CV; coated overhead glass, Kind CO; or coated spandrel glass, Kind CS.
4. Edge Seal:
   a. Dual-Sealed System: Provide polysisobutylene sealant as primary seal applied between spacer and glass panes, and silicone, polysulfide, or polyurethane sealant as secondary seal applied around perimeter.
5. Edge Spacer:
   a. Stainless Steel Warm Edge Spacer to meet the 2015 IECC Energy Code.
7. Purge interpane space with dry air, hermetically sealed.
E. Type G5 - Insulating Glass Units: Vision glass, double glazed.
   1. Applications: Exterior glazing unless otherwise indicated.
   2. Space between lites filled with air.
   3. Outboard Lite: Annealed float glass, 1/4 inch thick, minimum.
      a. Tint: Clear.
   4. Inboard Lite: Annealed float glass, 1/4 inch thick, minimum.
      a. Tint: Clear.
      b. Coating: PPG Solarban 60, on #2 surface.
   5. Total Thickness: 1 inch.
   6. Thermal Transmittance (U-Value), Summer - Center of Glass: .27, nominal.
   10. Visible Light Reflectance, Outside: 1 percent, nominal.

F. Type G6 - Insulating Glass Units: Vision glass, double glazed.
   1. Applications: Exterior glazing as indicated on drawings.
   2. Space between lites filled with air.
   3. Warm Edge Spacer
   4. Outboard Lite: Fully tempered float glass, 1/4 inch thick, minimum.
      a. Tint: Clear.
   5. Inboard Lite: Fully tempered float glass, 1/4 inch thick, minimum.
      a. Tint: Clear.
      b. Coating: PPG Solarban 60, on #2 surface.
   6. Total Thickness: 1 inch.
   7. Thermal Transmittance (U-Value), Summer - Center of Glass: .27, nominal.

G. Type G7 - Insulating Glass Units: Spandrel glazing.
   1. Applications: Exterior spandrel glazing unless otherwise indicated.
   2. Match the exterior insulated panels.
   3. Space between lites filled with air.
   4. Outboard Lite: Annealed float glass, 1/4 inch thick, minimum.
      a. Tint: Clear.
   5. Inboard Lite: Heat-strengthened float glass, 1/4 inch thick.
      a. Tint: Clear.
      b. Opacifier: Ceramic frit, on #4 surface.
      c. Opacifier Color: To be selected by the Architect from the manufacturers full range of colors.
   6. Total Thickness: 1 inch.
   7. Thermal Transmittance (U-Value), Summer - Center of Glass: .27, nominal.
   8. Stainless Steel Warm Edge Spacer to meet the 2015 IECC Energy Code.

H. Type G9 - Insulating Glass Units: Laminated bullet resistant glazing.
   1. Applications: Exterior bullet resistant glazing unless otherwise indicated. Locations as indicated on drawings.
   2. Thickness: As required to meet performance criteria.
   3. Outboard Lite: Annealed float glass, 1/4 inch thick, minimum.
      a. Tint: Clear.
4. Inboard Lite: Annealed float glass, 1/4 inch thick.
   a. Tint: Clear.
   b. Coating: [PPG Solarban 60], on #2 surface.
   c. Interlayer: Polyvinyl butyral (PVB), thickness as required to meet performance
      criteria, on #1 surface.
      1) Performance Criteria:
         (a) Bullet Resistance: Pass ASTM F1233 tests in compliance with ballistic
             criteria class and weapon description indicated; Class SMG - Submachine
             gun.

2.05 GLAZING UNITS

A. Type G1 - Monolithic Interior Vision Glazing:
   1. Applications: Interior glazing unless otherwise indicated.
   2. Glass Type: Annealed float glass.
   3. Tint: Clear.
   4. Thickness: 1/4 inch, nominal.

B. Type G-4 - Fire-Resistance-Rated Glazing: Type, thickness, and configuration as required to
   achieve indicated ratings.
   1. Applications: Use where indicated on the drawings.
   2. Glass Type: Multi-laminate annealed glass with intumescent fire retardant interlayers.
   3. Provide products listed by ITS (DIR) or UL (DIR) and approved by authorities having
      jurisdiction.
   4. Safety Glazing Certification: 16 CFR 1201 Category II.
   5. Glazing Method: As required for fire rating.
   7. Markings for Fire-Resistance-Rated Glazing Assemblies: Provide permanent markings on
      fire-resistance-rated glazing in compliance with ICC (IBC), local building code, and
      authorities having jurisdiction.
      a. "W" - meets wall assembly criteria of ASTM E119 or UL 263 fire test standards.
      b. "D" - meets fire door assembly criteria of NFPA 252, UL 10B, or UL 10C fire test
         standards.
      c. "H" - meets fire door assembly hose stream test of NFPA 252, UL 10B, or UL 10C fire
         test standards.
      d. "T" - meets temperature rise of not more than 450 degrees F above ambient at end of
         30 minutes fire exposure in accordance with NFPA 252, UL 10B, or UL 10C fire test
         standards.
      e. "XXX" - placeholder that represents fire-rating period, in minutes.
   8. Manufacturers:
      a. SAFTIFIRST, a division of O'Keeffe's Inc; SuperLite II-XLM 60: www.safti.com/#sle.
      c. Vetrotech North America; Contraflam 60: www.vetrotechusa.com/#sle.
      d. Substitutions: Refer to Section 01 60 00 - Product Requirements.

C. Type G2 - Monolithic Safety Glazing: Non-fire-rated.
   1. Applications:
      a. Glazed lites in doors, except fire doors.
      b. Glazed sidelights to doors, except in fire-rated walls and partitions.
      c. Other locations required by applicable federal, state, and local codes and regulations.
      d. Other locations indicated on drawings.
   2. Glass Type: Fully tempered safety glass as specified.
   3. Tint: Clear.
   4. Thickness: 1/4 inch, nominal.
D. Type G3 - Monolithic Safety Glazing: Non-fire-rated.
   1. Applications:
      a. Glazed lites in Decorative Railings.
      b. Glazed lites in All-Glass Entrances and Storefronts.
   2. Glass Type: Fully tempered safety glass as specified.
   3. Tint: Clear.
   4. Thickness: 1/2 inch, nominal.

E. Type G12 - Monolithic Safety Glazing: Non-fire-rated.
   1. Applications:
      a. Glazed lites in sliding windows.
      b. Other locations indicated on drawings.
   2. Glass Type: Fully tempered safety glass as specified.
   3. Tint: Clear.

F. Type G9 - Fire rated Ceramic glazing.
   1. Fire-Protection-Rating Period: 60 minutes.
   2. Tint: Clear.
   3. Thickness: As required to meet performance criteria.

G. Type G10 - Back-Painted Glass: Back-painted on one surface and highly opaque.
   1. Applications: Locations as indicated on drawings.
   2. Glazing Type: Monolithic; annealed glass; low iron.
   3. Thickness: As required for application.
   4. Size: As indicated on drawings
   5. Colors: As indicated on drawings.

H. Type G11 - Radiation Shielding Glazing: Transparent lead-bearing glass for gamma and/or X-ray protection.
   1. Applications: Vision panels located in lead-lined partitions and other locations indicated on drawings.

2.06 ACCESSORIES

A. Setting Blocks: Silicone, with 80 to 90 Shore A durometer hardness; ASTM C864 Option II.
   Length of 0.1 inch for each square foot of glazing or minimum 4 inch by width of glazing rabbet space minus 1/16 inch by height to suit glazing method and pane weight and area.

B. Glazing Materials: Select glazing sealants, tapes, gaskets and additional glazing materials of proven compatibility with other materials they will contact, including glass products, seals of insulating glass units and glazing channel substrates, under conditions of installation and service, as demonstrated by testing and field experience.
   1. Setting blocks to be 100% silicone.

C. Glazing Tape (for interior applications): Preformed butyl compound with intergral resilient tube spacing device; 10 to 15 Shore A durometer hardness; coiled on release paper; black color.

D. Glazing Tape: Closed cell polyvinyl chloride (PVC) foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume of 2 percent, designed for compression of 25 percent to effect an air barrier and vapor retarder seal.

E. Glazing Splines: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C864 Option II; color black.
PART 3 EXECUTION

3.01 VERIFICATION OF CONDITIONS

A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.

B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.

3.02 PREPARATION

A. Clean contact surfaces with appropriate solvent and wipe dry within maximum of 24 hours before glazing. Remove coatings that are not tightly bonded to substrates.

B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

3.03 INSTALLATION, GENERAL

A. Install glazing in compliance with written instructions of glass, gaskets, and other glazing material manufacturers, unless more stringent requirements are indicated, including those in glazing referenced standards.

B. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer’s instructions.

C. Do not exceed edge pressures around perimeter of glass lites as stipulated by glass manufacturer.

D. Set glass lites of system with uniform pattern, draw, bow, and similar characteristics.

E. Set glass lites in proper orientation so that coatings face exterior or interior as indicated.

F. Prevent glass from contact with any contaminating substances that may be the result of construction operations such as, and not limited to the following; weld splatter, fire-safing, plastering, mortar droppings, etc.

3.04 INSTALLATION - DRY GLAZING METHOD (GASKET GLAZING)

A. Application - Exterior and/or Interior Glazed: Set glazing infills from either the exterior or the interior of the building.

B. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.

C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.

D. Install removable stops without displacing glazing gasket; exert pressure for full continuous contact.

3.05 INSTALLATION - DRY GLAZING METHOD (TAPE AND TAPE)

A. Application - Interior Glazed: Set glazing infills from the interior of the building.

B. Cut glazing tape to length and set against permanent stops, projecting 1/16 inch above sight line.

C. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.

D. Rest glazing on setting blocks and push against tape for full contact at perimeter of pane or unit.

E. Place glazing tape on free perimeter of glazing in same manner described above.

F. Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.

G. Carefully trim protruding tape with knife.
3.06 FIELD QUALITY CONTROL
   A. See Section 01 40 00 - Quality Requirements, for additional requirements.
   B. Glass and Glazing product manufacturers to provide field surveillance of the installation of their products.
   C. Monitor and report installation procedures and unacceptable conditions.

3.07 CLEANING
   A. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.
   B. Remove non-permanent labels immediately after glazing installation is complete.
   C. Clean glass and adjacent surfaces after sealants are fully cured.
   D. Clean glass on both exposed surfaces not more than 4 days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

3.08 PROTECTION
   A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.
   B. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

END OF SECTION
SECTION 08 83 00
MIRRORS

PART 1  GENERAL
1.01  SECTION INCLUDES
   A. Glass mirrors.

1.02  RELATED REQUIREMENTS
   A. Section 10 28 00 - Toilet, Bath, and Laundry Accessories: Metal mirror frames.

1.03  REFERENCE STANDARDS

1.04  SUBMITTALS
   A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
   B. Product Data on Mirror Types: Submit structural, physical and environmental characteristics, size limitations, special handling and installation requirements.
   C. Samples: Submit two samples, 3 x 3 inch in size, illustrating mirrors design, edging, and coloration.
   D. Manufacturer's Certificate: Certify that mirrors, meets or exceeds specified requirements.
   E. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05  QUALITY ASSURANCE
   A. Fabricate, store, transport, receive, install, and clean mirrors in accordance with manufacturer's recommendations.

1.06  FIELD CONDITIONS
   A. Do not install mirrors when ambient temperature is less than 50 degrees F.
   B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.07  WARRANTY
   A. Provide five year manufacturer warranty for reflective coating on mirrors and replacement of same.

PART 2  PRODUCTS
2.01  MATERIALS
   A. Mirror Design Criteria: Select materials and/or provide supports as required to limit mirror material deflection to 1/200, or to the flexure limit of glass, with full recovery of glazing materials, whichever is less.
   B. Mirror Glass: ASTM C1036, Type 1 - Transparent Flat, Class 1 - Clear, Quality - Q1 (mirror select); silvering, protective coating, and quality requirements in compliance with ASTM C1503.
      1. Size: As indicated on drawings.

2.02  ACCESSORIES
   A. Mirror Adhesive: Silicone pre-polymer based, chemically compatible with mirror coating and wall substrate.

PART 3  EXECUTION
3.01  EXAMINATION
   A. Verify that openings for mirrored glazing are correctly sized and within tolerance.
3.02 PREPARATION
   A. Clean contact surfaces with solvent and wipe dry.

3.03 INSTALLATION
   A. Install mirrors in accordance with manufacturer's recommendations.
   B. Set mirrors plumb and level, and free of optical distortion.
   C. Set mirrors with edge clearance free of surrounding construction including countertops or backsplashes.
   D. Frameless Mirrors: Set mirrors in proper place with adhesive, applied in accordance with adhesive manufacturer's instructions.

3.04 CLEANING
   A. Remove labels after work is complete.
   B. Clean mirrors and adjacent surfaces.

END OF SECTION
SECTION 09 05 61
COMMON WORK RESULTS FOR FLOORING PREPARATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This section applies to all floors identified in the contract documents as to receive the following
types of floor coverings:
   1. Resilient tile and sheet.
   2. Broadloom carpet.
   3. Carpet tile.
   4. Thin-set ceramic tile and porcelain tile.

B. Preparation of new concrete floor slabs for installation of floor coverings.

C. Testing of concrete floor slabs for moisture and alkalinity (pH).

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.

E. Patching compound.

F. Remedial floor coatings.

1.02 RELATED REQUIREMENTS

A. Section 01 23 00 - Alternates: Bid pricing for remediation treatments if required.

B. Section 03 30 00 - Cast-in-Place Concrete: Limitations on curing requirements for new
   concrete floor slabs.

1.03 PRICE AND PAYMENT PROCEDURES

A. Alternates: See Section 01 23 00 - Alternates.

B. Alternate for Alternate Flooring Adhesive: Do not include the cost of the alternate adhesive in
   the base bid; state on the bid form the total additional cost for the alternate adhesive, installed,
   in the event such remediation is required.

C. Alternate for Remedial Floor Coating: Do not include the cost of floor coating in the base bid;
   state on the bid form the total additional cost for the floor coating, installed, in the event such
   remediation is required.

1.04 REFERENCES

   Mortars (Using 2-in. or (50-mm) Cube Specimens); 2016a.

B. ASTM C472 - Standard Test Methods for Physical Testing of Gypsum, Gypsum Plasters and
   Gypsum Concrete; 1999 (Reapproved 2014).

C. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring;
   2017.

D. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete
   Subfloor Using Anhydrous Calcium Chloride; 2016a.

E. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor
1.05 ADMINISTRATIVE REQUIREMENTS  
A. Coordinate scheduling of cleaning and testing, so that preliminary cleaning has been completed for at least 24 hours prior to testing.

1.06 SUBMITTALS  
A. Floor Covering and Adhesive Manufacturers' Product Literature: For each specific combination of substrate, floor covering, and adhesive to be used; showing:  
1. Moisture and alkalinity (pH) limits and test methods.  
2. Manufacturer's required bond/compatibility test procedure.  
B. Testing Agency's Report:  
1. Description of areas tested; include floor plans and photographs if helpful.  
2. Summary of conditions encountered.  
3. Moisture and alkalinity (pH) test reports.  
5. Recommendations for remediation of unsatisfactory surfaces.  
6. Submit report not more than two business days after conclusion of testing.  
C. Adhesive Bond and Compatibility Test Report.

1.07 QUALITY ASSURANCE  
A. Contractor may perform adhesive and bond test with his own personnel or hire a testing agency.  
B. 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.  
C. Contractor's Responsibility Relating to Independent Agency Testing:  
1. Provide access for and cooperate with testing agency.  
2. Confirm date of start of testing at least 10 days prior to actual start.  
3. Allow at least 4 business days on site for testing agency activities.  
4. Achieve and maintain specified ambient conditions.  
D. Remedial Coating Installer Qualifications: Company specializing in performing work of the type specified in this section, trained by or employed by coating manufacturer, and able to provide at least 3 project references showing at least 3 years' experience installing moisture emission coatings.

1.08 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.

1.09 FIELD CONDITIONS  
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

2.01 MATERIALS

A. Patching Compound: Floor covering manufacturer's recommended product, suitable for conditions, and compatible with adhesive and floor covering. In the absence of any recommendation from flooring manufacturer, provide a product with the following characteristics:
   1. Cementitious moisture-, mildew-, and alkali-resistant compound, compatible with floor, floor covering, and floor covering adhesive, and capable of being feathered to nothing at edges.
   2. Latex or polyvinyl acetate additions are permitted; gypsum content is prohibited.
   3. Compressive Strength: 3000 psi, minimum, after 28 days, when tested in accordance with ASTM C109/C109M or ASTM C472, whichever is appropriate.

B. Alternate Flooring Adhesive: Floor covering manufacturer's recommended product, suitable for the moisture and pH conditions present; low-VOC. In the absence of any recommendation from flooring manufacturer, provide a product recommended by adhesive manufacturer as suitable for substrate and floor covering and for conditions present.
   1. Products:
      a. Spralock, spraylock.com/9500-platinum
      b. Verashield or Verashield MBX, verashield4floors.com
      c. Substitutions: See Section 01 60 00 - Product Requirements

C. Remedial Floor Coating: Single- or multi-layer coating or coating/overlay combination intended by its manufacturer to resist water vapor transmission to degree sufficient to meet flooring manufacturer's emission limits, resistant to the level of alkalinity (pH) found, and suitable for adhesion of flooring without further treatment.
   1. Thickness: As required for application and in accordance with manufacturer's installation instruction.
   2. If testing agency recommends any particular products, use one of those.
   3. Products:
      a. ARDEX Engineered Cements; ARDEX MC ULTRA with ARDEX FEATHERFINISH: www.ardexamericas.com/#sle.
      c. UZIN, a division of UFLOOR Systems Inc; UZIN PE 460 with UZIN PE 280 and UZIN NC 170 LevelStar: www.ufloorsystems.com/#sle.
      d. Substitutions: See Section 01 60 00 - Product Requirements

PART 3 EXECUTION

3.01 CONCRETE SLAB PREPARATION

A. Perform following operations in the order indicated:
   1. Preliminary cleaning.
   2. Moisture vapor emission tests; 3 tests in the first 1000 square feet and one test in each additional 1000 square feet, unless otherwise indicated or required by flooring manufacturer.
   3. Internal relative humidity tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
   4. Alkalinity (pH) tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
   5. Specified remediation, if required.
   6. Patching, smoothing, and leveling, as required.
   7. Other preparation specified.
   9. Protection.
B. Remediations:
   1. Active Water Leaks or Continuing Moisture Migration to Surface of Slab: Correct this condition before doing any other remediation; re-test after correction.
   2. Excessive Moisture Emission or Relative Humidity: If an adhesive that is resistant to the level of moisture present is available and acceptable to flooring manufacturer, use that adhesive for installation of the flooring; if not, apply remedial floor coating over entire suspect floor area.
   3. Excessive Alkalinity (pH): If remedial floor coating is necessary to address excessive moisture, no additional remediation is required; if not, if an adhesive that is resistant to the level present is available and acceptable to the flooring manufacturer, use that adhesive for installation of the flooring; otherwise, apply a skim coat of specified patching compound over entire suspect floor area.

3.02 PRELIMINARY CLEANING
   A. Clean floors of dust, solvents, paint, wax, oil, grease, asphalt, residual adhesive, adhesive removers, film-forming curing compounds, sealing compounds, alkaline salts, excessive laitance, mold, mildew, and other materials that might prevent adhesive bond.
   B. Do not use solvents or other chemicals for cleaning.

3.03 MOISTURE VAPOR EMISSION TESTING
   A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.
   B. Where this specification conflicts with the referenced test method, comply with the requirements of this section.
   C. Test in accordance with ASTM F1869 and as follows.
   D. Plastic sheet test and mat bond test may not be substituted for the specified ASTM test method, as those methods do not quantify the moisture content sufficiently.
   E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if test values exceed 3 pounds per 1000 square feet per 24 hours.
   F. Report: Report the information required by the test method.

3.04 INTERNAL RELATIVE HUMIDITY TESTING
   A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.
   B. Where this specification conflicts with the referenced test method, comply with the requirements of this section.
   C. Test in accordance with ASTM F2170 Procedure A and as follows.
   D. Testing with electrical impedance or resistance apparatus may not be substituted for the specified ASTM test method, as the values determined are not comparable to the ASTM test values and do not quantify the moisture content sufficiently.
   E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if any test value exceeds 75 percent relative humidity.
   F. Report: Report the information required by the test method.
3.05 ALKALINITY TESTING
   A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.
   B. Note: This procedure is the equivalent of that described in ASTM F710, repeated here for the Contractor's convenience.
   C. Use a wide range pH paper, its associated chart, and distilled or deionized water.
   D. Place several drops of water on a clean surface of concrete, forming a puddle approximately 1 inch in diameter. Allow the puddle to set for approximately 60 seconds, then dip the alkalinity (pH) test paper into the water, remove it, and compare immediately to chart to determine alkalinity (pH) reading.
   E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if alkalinity (pH) test value is over 10.

3.06 PREPARATION
   A. See individual floor covering section(s) for additional requirements.
   B. Comply with requirements and recommendations of floor covering manufacturer.
   C. Fill and smooth surface cracks, grooves, depressions, control joints and other non-moving joints, and other irregularities with patching compound.
   D. Do not fill expansion joints, isolation joints, or other moving joints.

3.07 ADHESIVE BOND AND COMPATIBILITY TESTING
   A. Comply with requirements and recommendations of floor covering manufacturer.

3.08 APPLICATION OF REMEDIAL FLOOR COATING
   A. Comply with requirements and recommendations of coating manufacturer.

3.09 PROTECTION
   A. Cover prepared floors with building paper or other durable covering.

END OF SECTION
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SECTION 09 21 16
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. Acoustic insulation.
E. Gypsum sheathing.
F. Cementitious backing board.
G. Gypsum wallboard.
H. Joint treatment and accessories.

1.02 RELATED REQUIREMENTS
A. Section 05 40 00 - Cold-Formed Metal Framing: Exterior wind-load-bearing metal stud framing.
B. Section 06 10 00 - Rough Carpentry: Wood blocking product and execution requirements.
C. Section 07 26 50 - Fluid Applied Vapor Permeable Air Barrier: Water-resistive barrier over sheathing.
D. Section 07 84 00 - Firestopping: Top-of-wall assemblies at fire rated walls.
E. Section 07 92 00 - Joint Sealants: Sealing acoustical gaps in construction other than gypsum board or plaster work.

1.03 REFERENCE STANDARDS
A. AISI S100-12 - North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2012.
H. 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; 2015.
I. 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; 2016.
S. ASTM E413 - Classification for Rating Sound Insulation; 2016.
U. GA-226 - Application of Gypsum Board to Form Curved Surfaces; Gypsum Association; 2016.
V. UL 752 - Standard for Bullet-Resisting Equipment; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide data on metal framing.
C. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.
D. 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.
E. Test Reports: Bullet resistant shear and wallboard.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing gypsum board installation and finishing, with minimum three years of experience.

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.
B. Interior Partitions, Indicated as Acoustic: Provide completed assemblies with the following characteristics:
   1. Acoustic Attenuation: STC of 45-49 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.
C. Shaft Walls at HVAC Shafts: Provide completed assemblies with the following characteristics:
   1. Air Pressure Within Shaft: Sustained loads of 5 lbf/sq ft with maximum mid-span deflection of L/240.
   2. Acoustic Attenuation: STC of 35-39 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.
D. Shaft Walls at Elevator Shafts: Provide completed assemblies with the following characteristics:
   1. Air Pressure Within Shaft: Intermittent loads of 5 lbf/sq ft with maximum mid-span deflection of L/240.
   2. Acoustic Attenuation: STC of 35-39 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.
E. Fire Rated Assemblies: Provide completed assemblies as indicated on the drawings.
   1. UL Assembly Numbers: Provide construction equivalent to that listed for the particular
      assembly in the current UL (FRD).

2.02 METAL FRAMING MATERIALS

A. Manufacturers - Metal Framing, Connectors, and Accessories:
   4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Loadbearing Studs for Application of Gypsum Board: As specified in Section 05 40 00.

C. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel, of size
   and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum
   deflection of wall framing of L/120 at 5 psf.
   1. Studs: “C” shaped with flat or formed webs with knurled faces.
   2. Runners: U shaped, sized to match studs.
   3. Ceiling Channels: C-shaped.
   5. Resilient Furring Channels: Single or double leg configuration; 1/2 inch channel depth.

D. Shaft Wall Studs and Accessories: ASTM C645; galvanized sheet steel, of size and properties
   necessary to comply with ASTM C754 and specified performance requirements.
   1. Products:
      a. Same manufacturer as other framing materials.

E. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.

F. Partition Head to Structure Connections: Provide mechanical anchorage devices that
   accommodate deflection using slotted holes, screws and anti-friction bushings, preventing
   rotation of studs while maintaining structural performance of partition.
   1. Structural Performance: Maintain lateral load resistance and vertical movement capacity
      required by applicable code, when evaluated in accordance with AISI S100-12.
      galvanized coating.
   3. Provide components UL-listed for use in UL-listed fire-rated head of partition joint systems
      indicated on drawings.
   4. Deflection and Firestop Track:
      a. Provide mechanical anchorage devices as described above that accommodate
         deflection while maintaining the fire-rating of the wall assembly.
      b. Products:
         1) FireTrak Corporation; Posi Klip.
         2) Metal-Lite, Inc.; The System.
   5. Provide top track preassembled with connection devices spaced to fit stud spacing
      indicated on drawings; minimum track length of 12 feet.

G. Gypsum Board Ceiling Suspension System: Steel grid system of main tees and support bars
   connected to structure using hanging wire.
   1. Products:
      a. USG Corporation; Drywall Suspension System: www.usg.com/#sle.
      b. or equal.
2.03 BOARD MATERIALS

A. Manufacturers - Gypsum-Based Board:

B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
2. Glass mat faced gypsum panels as defined in ASTM C1658/C1658M, suitable for paint finish, of the same core type and thickness may be substituted for paper-faced board.
3. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
   a. Mold-resistant board is required whenever board is being installed before the building is enclosed and conditioned.
4. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
5. At Assemblies Indicated with Lead Lining: 5/8 inch type X fire code gypsum meeting classification ASTM C 36, with pure lead sheet meeting federal specification QQ-L-201 F, Grade C. Lead to be laminate on the back side of the board, with lead strips overlapping the seams. Lead Discs to be place over the head of screws.
6. Thickness:
7. Paper-Faced Products:
   a. Georgia-Pacific Gypsum; ToughRock.
8. Mold-Resistant Paper-Faced Products: For use in high humidity locations and as indicated on the drawings.
9. Glass Mat Faced Products:
   a. Georgia-Pacific Gypsum; DensArmor Plus.
   b. Georgia-Pacific Gypsum; DensArmor Plus Fireguard C.

C. Impact Resistant Wallboard:
1. Application: Where indicated on the drawings.
2. Surface Abrasion: Level 3, minimum, when tested in accordance with ASTM C1629/C1629M.
3. Soft Body Impact: Level 3, minimum, when tested in accordance with ASTM C1629/C1629M.
4. Paper-Faced Type: Gypsum wallboard as defined in ASTM C1396/C1396M.
5. Thickness: 5/8 inch.
7. Products:
   a. American Gypsum Company; M-Bloc IR Type X.
   b. National Gypsum Company; Gold Bond HI-Impact XP Gypsum Board.
   c. Substitutions: See Section 01 60 00 - Product Requirements.

D. Backing Board For Wet Areas:
1. Application: Surfaces behind tile in wet areas including tub and shower surrounds and behind tile and stone installation.
2. ANSI Cement-Based Board: Non-gypsum-based; aggregated Portland cement panels with glass fiber mesh embedded in front and back surfaces complying with ANSI A118.9 or ASTM C1325.
   a. Thickness: 1/2 inch.
   b. Products:
E. Ceiling Board: Special sag resistant gypsum ceiling board as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
1. Application: Ceilings, unless otherwise indicated.
2. Thickness: 5/8 inch.
4. Products:
   a. Georgia-Pacific Gypsum; ToughRock Span 24 Ceiling Board.

F. Bullet Resistant Sheathing and Wallboard: Woven roving, multi-ply, ballistic grade fiberglass cloth with thermoset polyester resin; comply with UL 752 Level 3.

G. Exterior Sheathing Board: Sizes to minimize joints in place; ends square cut.
1. See Structural Drawings for locations of exterior plywood sheathing as required for structural reasons.
2. Application: Exterior sheathing, unless otherwise indicated.
3. Glass Mat Faced Sheathing: Glass mat faced gypsum substrate as defined in ASTM C1177/C1177M.
4. Core Type: Type X, as indicated.
5. Type X Thickness: 5/8 inch.
6. Edges: Square, for vertical application.
7. Glass Mat Faced Products:
   a. Georgia-Pacific Gypsum; DensGlass Sheathing.
   b. National Gypsum Company; Gold Bond eXP Sheathing.

H. Shaftwall and Coreboard: Type X; 1 inch thick by 24 inches wide, beveled long edges, ends square cut.
1. Paper-Faced Type: Gypsum shaftliner board or gypsum coreboard as defined ASTM C1396/C1396M; water-resistant faces.
2. Glass Mat Faced Type: Glass mat shaftliner gypsum panel or glass mat coreboard gypsum panel as defined in ASTM C1658/C1658M.
3. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.

2.04 GYPSUM WALLBOARD ACCESSORIES

A. Water-Resistive Barrier: [See section 07 26 50].

B. Finishing Accessories: ASTM C1047, galvanized steel or rolled zinc, 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.
3. Products:
   a. Same manufacturer as framing materials.

C. Beads, Joint Accessories, and Other Trim: ASTM C1047, rigid plastic, galvanized steel, or rolled zinc, unless noted otherwise.
1. Corner Beads: Low profile, for 90 degree outside corners.
   a. Products:
      1) CertainTeed Corporation; No-Coat Drywall Corner: www.certainteed.com/#sle.
      2) ClarkDietrich; Strait-Flex Big-Stick: www.clarkdietrich.com/#sle.
2. L-Trim with Tear-Away Strip: Sized to fit 5/8 inch thick gypsum wallboard.
   a. Products:
      1) Phillips Manufacturing Co; gripSTIK L-Tear: www.phillipsmfg.com/#sle.
3. Architectural Reveal Beads:
   a. Reveal Depth: 1/2 inch.
   b. Reveal Width: 1/2 inch.
   c. Products:
      2) Trim-Tex, Inc: www.trim-tex.com/#sle.
D. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
   1. Tape: 2 inch wide, coated glass fiber tape for joints and corners, except as otherwise indicated.
   2. Paper Tape: 2 inch wide, creased paper tape for joints and corners, except as otherwise indicated.
   4. Chemical hardening type compound.

E. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inch in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion resistant.

PART 3 EXECUTION

3.01 EXAMINATION
   A. Verify that project conditions are appropriate for work of this section to commence.

3.02 SHAFT WALL INSTALLATION
   A. Shaft Wall Framing: Install in accordance with manufacturer's installation instructions.
      1. Fasten runners to structure with short leg to finished side, using appropriate power-driven fasteners at not more than 24 inches on center.
      2. Install studs at spacing required to meet performance requirements.
   B. Shaft Wall Liner: Cut panels to accurate dimension and install sequentially between special friction studs.
      1. On walls over sixteen feet high, screw-attach studs to runners top and bottom.
      2. Seal perimeter of shaft wall and penetrations with acoustical sealant.

3.03 FRAMING INSTALLATION
   A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.
   B. Suspended Ceilings and Soffits: Space framing and furring members as indicated.
      1. Level ceiling system to a tolerance of 1/1200.
      2. Laterally brace entire suspension system.
      3. Install bracing as required at exterior locations to resist wind uplift.
   C. Studs: Space studs at 16 inches on center.
      1. Extend partition framing to structure in all locations.
      2. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.
      3. Partitions Terminating at Structure: Attach top runner to structure, maintain clearance between top of studs and structure, and connect studs to track using specified mechanical devices in accordance with manufacturer's instructions; verify free movement of top of stud connections; do not leave studs unattached to track.
   D. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.
   E. Standard Wall Furring: Install at concrete walls scheduled to receive gypsum board, not more than 4 inches from floor and ceiling lines and abutting walls. Secure in place on alternate channel flanges at maximum 24 inches on center.
      1. Orientation: Horizontal.
      2. Spacing: As indicated.
   F. Acoustic Furring: Install resilient channels at maximum 24 inches on center. Locate joints over framing members.
   G. Low Height Walls: At partitions that do not extend to the structure above, provide tube steel with base plates adequately anchored to the floor system. Space tubes as required to resist lateral force of 75 lbs at any point without damage or permanent set.
H. Blocking: Install wood blocking for support of:
   1. Framed openings.
   2. Wall mounted cabinets.
   3. Plumbing fixtures.
   4. Toilet partitions.
   5. Toilet accessories.
   6. Wall mounted door hardware.

3.04 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. Acoustic Sealant: Install in accordance with manufacturer's instructions, and where indicated on the partition types.
   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.

3.05 BOARD INSTALLATION
A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.
B. Single-Layer Non-Rated: 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.
C. Double-Layer Non-Rated: Use gypsum board for first layer, placed parallel to framing or furring members, with ends and edges occurring over firm bearing. Use glass mat faced gypsum board at exterior walls and at other locations as indicated. Place second layer perpendicular to framing or furring members. Offset joints of second layer from joints of first layer.
D. Fire-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.
E. Exterior Sheathing: Comply with ASTM C1280. Install sheathing vertically, with edges butted tight and ends occurring over firm bearing.
   1. Seal joints, cut edges, and holes with water-resistant sealant.
F. Cementitious Backing Board: Install over steel framing members and plywood substrate where indicated, in accordance with ANSI A108.11 and manufacturer's instructions.
G. Installation on Metal Framing: Use screws for attachment of gypsum board except face layer of non-rated double-layer assemblies, which may be installed by means of adhesive lamination.
H. Moisture Protection: Treat cut edges and holes in moisture resistant gypsum board and exterior gypsum soffit board with sealant.
I. Bullet Resistant Sheathing and Wallboard:
   1. Install bullet resistant sheathing according to manufacturer's written recommendations and with manufacturer approved fasteners.
   2. Cover all joints between boards with a 4 inch strip of the same thickness material as the boards, centered on the joint.
3.06 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 or 90 square feet.
   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.

3.07 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.


C. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
   1. Level 5: Walls and ceilings to receive semi-gloss or gloss paint finish and other areas specifically indicated.
   2. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
   3. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
   4. Level 1: Fire rated wall areas above finished ceilings, whether or not accessible in the completed construction.

D. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
   1. Feather coats of joint compound so that camber is maximum 1/32 inch.
   2. Taping, filling, and sanding is not required at surfaces behind adhesive applied ceramic tile.

E. Where Level 5 finish is indicated, spray apply high build drywall surfacer over entire surface after joints have been properly treated; achieve a flat and tool mark-free finish.

3.08 TOLERANCES

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

END OF SECTION
SECTION 09 21 20
GLASS-FIBER REINFORCED GYPSUM COLUMNS

PART 1  GENERAL

1.01  SECTION INCLUDES
   A.  Architectural precast glass-fiber-reinforced gypsum interior columns.
   B.  Supports, anchors, and attachments.

1.02  SUBMITTALS
   A.  See Section 01 30 00 - Administrative Requirements, for submittal procedures.
   B.  Shop Drawings:  Indicate locations, fabrication details, reinforcement, framing details, connection details, dimensions, and relationship to adjacent materials. Provide erection drawings.
   C.  Samples:  Submit two samples 6 inch by 6 inch in size illustrating surface color, finish and texture.
   D.  Manufacturer's Installation Instructions:  Indicate surface cleaning instructions.
   E.  Fabricator Qualifications.
   F.  Installer Qualifications.

1.03  QUALITY ASSURANCE
   A.  Fabricator Qualifications:  Company specializing in performing the work of this section with minimum 10 years of documented experience in the manufacturing of column covers.
   B.  Erector Qualifications:  Company specializing in performing the work of this section with minimum 3 years of documented experience.
   C.  Manufacturer shall issue a one year limited warranty ensuring product defects in workmanship and materials.

1.04  DELIVERY, STORAGE, AND HANDLING
   A.  Handle units to position, consistent with their shape and design. Lift and support only from support points.
   B.  Lifting Device:  Capable of maintaining unit shape during manufacture, storage, transportation, erection, and in position for fastening.
   C.  Blocking and Lateral Support During Transport and Storage:  Clean, non-staining, without causing harm to exposed surfaces. Provide temporary lateral support to prevent bowing and warping. Place spacers in same location during transport and site storage.
   D.  Protect edges of units to prevent staining, chipping, or spalling of concrete.

PART 2  PRODUCTS

2.01  MANUFACTURERS
   A.  Glass-Fiber-Reinforced Gypsum:
      1.  Pittcon Industries; 6409 Rhode Island Ave.; Riverdale, MD 20737 (800) 637-7638. - round - non tapered GFRG columns - size as indicated on the drawings.
      2.  Substitutions:  See Section 01 60 00 - Product Requirements.

2.02  MATERIALS
   A.  Column covers shall be Glass-Fiber-Reinforced Gypsum Units:  Factory-fabricated.
      1.  Column covers shall be fabricated in two vertically divided sections with attachment provided through bent back installation fins.
PART 3 EXECUTION

3.01 EXAMINATION
A. Verify that building structure, anchors, devices, and openings are ready to receive work of this section.
B. Contractor to inspect column covers upon receipt to ensure that no damage has occurred during shipment.

3.02 PREPARATION
A. Provide for erection procedures and induced loads during erection. Maintain temporary bracing in place until final support is provided.

3.03 ERECTION
A. Coordinate installation with that of structural supports, backup, and opening framing, if any.
B. Erect units without damage to shape or finish. Replace or repair damaged panels.
C. Column cover to be correctly oriented and installed in accordance with manufacturer’s shop drawings and installation instructions to ensure proper installation.
D. Erect unit’s level and plumb within allowable tolerances.
E. Fasten units in place with mechanical connections.

3.04 TOLERANCES
A. Maximum Variation from Plane of Location: 1/4 inch in 10 feet and 3/8 inch in 100 feet, non-cumulative.
B. Maximum Offset from True Alignment Between Two Connecting Units: 1/4 inch.
C. Variation From Dimensions Indicated on Shop Drawings: Plus or minus 1/8 inch.
D. Bowing of Units: Length of Unit/360.
E. Exposed Joint Dimension: 1/2 inch plus or minus 1/4 inch.

3.05 PROTECTION & CLEANING
A. Contractor to remove protective material supplied by column cover manufacturer.
B. Contractor to clean all visible surfaces after installation.
C. Protect installed units from damage.

END OF SECTION
SECTION 09 30 00
TILING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Tile for floor applications.
B. Tile for wall applications.
C. Non-ceramic trim.

1.02 RELATED REQUIREMENTS

A. Section 07 92 00 - Joint Sealants: Sealing joints between tile work and adjacent construction and fixtures.
B. Section 09 21 16 - Gypsum Board Assemblies: Tile backer board.

1.03 REFERENCE STANDARDS

   4. ANSI A108.4 - American National Standard Specifications for Installation of Ceramic Tile with Organic Adhesives or Water Cleanable Tile-Setting Epoxy Adhesive; 2009 (Revised).
1.04 SUBMITTALS
   A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
   B. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories.
      Include instructions for using grouts and adhesives.
   C. Shop Drawings: Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions
      with dissimilar materials, control and expansion joints, thresholds, ceramic accessories, and
      setting details.
   D. Samples: Mount tile and apply grout on two plywood panels, minimum 18 by 18 inches in size
      illustrating pattern, color variations, and grout joint size variations.

1.05 QUALITY ASSURANCE
   A. Manufacturer Qualifications: Company specializing in manufacturing the types of products
      specified in this section, with minimum five years of documented experience.
   B. Installer Qualifications:
      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 of 50 degrees F during installation of mortar
      materials.

PART 2 PRODUCTS

2.01 TILE
   A. Manufacturers: All products by the same manufacturer.
      1. Use manufacturers and products listed in the Finish Schedule.

2.02 TRIM AND ACCESSORIES
   A. Non-Ceramic Trim: Finish, style and dimensions as indicated on drawings, for setting using tile
      mortar or adhesive.
      1. Applications:
         a. Open edges of wall tile.
         b. Open edges of floor tile.
         c. Wall corners, outside and inside.
         d. Transition between floor finishes of different heights.
         e. Borders and other trim as indicated on drawings.
      2. Manufacturers:
         a. As indicated on the drawings.
         b. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 SETTING MATERIALS
   A. Manufacturers:
      1. ARDEX Engineered Cements: www.ardexamericas.com/#sle.
      3. Substitutions: See Section 01 60 00 - Product Requirements.
2.04 ADHESIVE MATERIALS
A. Manufacturers:
   1. Laticrete; Product 254 Platinum: www.laticrete.com
   3. TEC; Product Full Flex Mortar or Ultimate Large Tile Mortar, depending on the size of tile being used: www.tecspecialty.com.
   4. Substitutions: See Section 01 60 00 - Product Requirements.
B. Manufacturers:
   3. Epoxy: ANSI A118.3.

2.05 GROUTS
A. Manufacturers:
   1. Mapei Corporation; Product as listed below for differing applications.
      a. Kerapoxy CQ - for all grout except expansion/control joints - colors as indicated on the drawings.
      b. or equal from other manufacturers of adhesives.
   2. Substitutions: See Section 01 60 00 - Product Requirements.

2.06 ACCESSORY MATERIALS
A. Waterproofing and crack isolation membrane.
   1. Laticrete, Product Hydroban waterproofing.
   2. TEC, Product HydraFlex Waterproofing Crack Isolation Membrane.
   3. Mapei Corporation; Product Mapelastic Aquadefense.
   4. Substitutions: See Section 01 60 00 - Product Requirements.

PART 3 EXECUTION
3.01 EXAMINATION
A. Verify that sub-floor 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 sub-floor surfaces are dust-free and free of substances that could impair bonding of setting materials to sub-floor 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.

3.02 PREPARATION
A. Protect surrounding work from damage.
B. Vacuum clean surfaces and damp clean.
C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.
D. Install cementitious backer board in accordance with ANSI A108.11 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of dry-set mortar to a feather edge.
E. Prepare substrate surfaces for adhesive installation in accordance with adhesive manufacturer's instructions.
3.03 INSTALLATION - GENERAL
A. Install tile and grout in accordance with applicable requirements of ANSI A108.1a through ANSI A108.19, manufacturer's instructions, and TCNA (HB) recommendations.
B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.
C. Where substrate contains an control or expansion joint, locate joint in tiling as close as possible to that joint.
D. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.
E. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.
F. Form internal angles square and external angles bullnosed.
G. Install non-ceramic trim in accordance with manufacturer's instructions.
H. Sound tile after setting. Replace hollow sounding units.
I. Keep control and expansion joints free of mortar, grout, and adhesive.
J. Prior to grouting, allow installation to completely cure; minimum of 48 hours.
K. Grout tile joints unless otherwise indicated. Use standard grout unless otherwise indicated.
L. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.

3.04 INSTALLATION - FLOORS - THIN-SET METHODS
A. Over interior concrete substrates, install in accordance with TCNA (HB) Method F113, dry-set or latex-Portland cement bond coat, with standard grout, unless otherwise indicated.
   1. Use waterproofing and crack isolation membrane under all ceramic tile installations.

3.05 INSTALLATION - WALL TILE
A. Over cementitious backer units on studs, install in accordance with TCNA (HB) Method W244, using membrane at toilet rooms.
B. Over coated glass mat backer board on studs, install in accordance with TCNA (HB) Method W245.
C. Over interior concrete and masonry install in accordance with TCNA (HB) Method W202, thin-set with dry-set or latex-Portland cement bond coat.

3.06 CLEANING
A. Clean tile and grout surfaces.

3.07 PROTECTION
A. Do not permit traffic over finished floor surface for 4 days after installation.

END OF SECTION
SECTION 09 51 00
ACOUSTICAL CEILINGS

PART 1 GENERAL
1.01 SECTION INCLUDES
A. Suspended metal grid ceiling system.
B. Acoustical units.

1.02 SYSTEM DESCRIPTION
A. Seismic Loads: Design and size components to withstand seismic loads in accordance with the International Building Code, Section 1621.2.5 for Category D.

1.03 REFERENCES

1.04 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Shop Drawings: Indicate grid layout and related dimensioning, junctions with other ceiling finishes, mechanical and electrical items installed in the ceiling, and special conditions required by International Building Code.
C. Product Data: Provide data on suspension system components and acoustical units.
D. Samples: Submit two samples 4” inch in size illustrating material and finish of acoustical units.
E. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

1.05 QUALITY ASSURANCE
A. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
B. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.06 FIELD CONDITIONS
A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

PART 2 PRODUCTS
2.01 MANUFACTURERS
A. Acoustic Tiles/Panels:
   4. Substitutions: See Section 01 60 00 - Product Requirements.
B. Suspension Systems:
   4. Substitutions: See Section 01 60 00 - Product Requirements.
2.02 ACOUSTICAL UNITS

A. Manufacturers:
   1. Basis of Design: Armstrong World Industries, Inc; Product as indicated on finish schedule.
      a. Acceptable Manufacturers: (products matching basis of design)
      b. Substitutions: See Section 01 60 00 - Product Requirements
   2. Metal Detention Ceilings: (ATC-4) Electrogalvanized steel with post production powder coated finish. Armstrong MetalWorks SecureLock Plus, basis of design with the following characteristics:
      a. System capable of withstanding 600 impacts with 200 ft lb of energy. Screw-in point load plank system tested to withstand 960 – 3,100 lbs of force.
      b. Protection against contraband concealment.
      c. Washable, scrubbable, soil resistant.
      d. Concealed locking
      e. Texture: Smooth.
      g. Size: 12 inch by 10 foot
      h. Perforated Panels with Acoustical infill.
      i. Edge Profile: Screw in concealed locking.
      j. Flame Spread: ASTM E 1264; class A
      k. Thickness: 16 ga min.
      l. NRC 80 (min)
      m. Provide mineral fiber infill in planks as required to achieve requested NRC
      n. Provide 24” wide sound batt insulation above the metal planks.
      o. Acceptable Manufacturers: (products matching basis of design)
         1) Trussbilt: trussbilt.com
         2) Kane Innovations; www.kaneinnovations.com
         3) GordonCorrections Division; www.gordon-inc.com
         4) Rockfon/Chicago Metallic: www.rockfon.com
      p. Substitutions: See Section 01 60 00 - Product Requirements

2.03 SUSPENSION SYSTEM(S)

A. Manufacturers:
   1. Armstrong World Industries, Inc; Product as indicated in the interior product schedule, utilizing the IBC approved Berc clip. 2 inch perimeter angle WILL NOT be accepted.
   2. Chicago Metallic Corporation; Product equivalent to Armstrong as approved by the Architect.

B. Suspension Systems - General: Comply with the requirements of 2003 International Building Code Seismic Design Category C and ASTM C 635; die cut and interlocking components, with stabilizer bars, clips, splices, perimeter moldings, and hold down clips as required.

C. Exposed Steel Suspension System: Formed steel, commercial quality cold rolled; heavy-duty.
   1. Profile: Tee; 15/16 inch wide face. See drawings for locations.
   2. Construction: Double web.
   3. Finish: As shown on the drawings.

2.04 ACCESSORIES

A. Support Channels and Hangers: Primed steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.

B. Perimeter Moldings: Same material and finish as grid.
   1. At Exposed Grid: Provide L-shaped molding for mounting at same elevation as face of grid.

C. Cloud Trim: Armstrong Axiom trim as indicated on the drawings, Classic 8 inch as indicated on the finish schedule.
PART 3 EXECUTION

3.01 EXAMINATION
   A. Verify existing conditions before starting work.
   B. Verify that layout of hangers will not interfere with other work.

3.02 INSTALLATION - SUSPENSION SYSTEM
   A. Install suspension system in accordance with International Building Code Seismic Design Category Indicated, ASTM C 636, ASTM E 580, and manufacturer's instructions and as supplemented in this section.
      1. Install suspension system and panels in accordance with the International Building Code, Section 1621.2.5 with the following exceptions that have been run in full-scale seismic tests in accordance with AC156 test protocol:
         a. Use of seismic clips which eliminates the need for stabilizer bars.
         b. 7/8 inch wall molding instead of 2 inch wall molding.
      2. For reveal edge panels: Cut and reveal or rabbet edges of ceiling panels at border areas and vertical surfaces.
      3. Install acoustical panels in coordination with suspended system, with edges resting on flanges of main runner and cross tees. Cut and fit panels neatly against abutting surfaces. Support edges by wall moldings.
   B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
   C. Locate system on room axis according to reflected plan.
   D. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.
   E. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
   F. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
   G. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
   H. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.
   I. Do not eccentrically load system or induce rotation of runners.
   J. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
      1. Use longest practical lengths.
      2. Overlap and rivet corners.
3.03 INSTALLATION - ACOUSTICAL UNITS

A. Install acoustical units in accordance with manufacturer's instructions.
B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
C. Fit border trim neatly against abutting surfaces.
D. Install units after above-ceiling work is complete.
E. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.
F. Cutting Acoustical Units:
   1. Make field cut edges of same profile as factory edges.
G. Install hold-down clips on each panel to retain panels tight to grid system; comply with fire rating requirements.
H. Install hold-down clips on panels within 20 ft of an exterior door.
I. Paint edges of cut tiles where exposed to view. Paint to match ceiling tile finish and color. Manufacturer makes a paint product.
   1. Edges cut: Tiles at wall, light fixtures, MEP grills/diffusers, and all other locations.

3.04 TOLERANCES

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.
B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

END OF SECTION
SECTION 09 64 29
WOOD STRIP AND PLANK FLOORING

PART 1  GENERAL
1.01 SECTION INCLUDES
   A. Wood strip and plank flooring, nailed.
   B. Secondary subflooring.
   C. Sleepers.

1.02 REFERENCE STANDARDS
   A. NWFA (IG) - Installation Guidelines; Current Edition.

1.03 SUBMITTALS
   A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
   B. Product Data: Provide data for flooring.
   C. Shop Drawings: Indicate floor joint pattern and termination details.
   D. Samples: Submit two samples 5 by 6 inch in size illustrating floor finish, color, and sheen.
   E. Installation Instructions: Indicate standard and special installation procedures.

1.04 QUALITY ASSURANCE
   A. Perform work of this section in accordance with NWFA (IG).
   B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
   C. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.05 FIELD CONDITIONS
   A. Do not install wood flooring until wet construction work is complete and ambient air at installation space has moisture content stabilized at maximum moisture content of 40 percent.
   B. Provide heat, light, and ventilation prior to installation.
   C. Store materials in area of installation for minimum period of 24 hours prior to installation.
   D. Maintain minimum room temperature of 65 degrees F for a period of two days prior to delivery of materials to installation space, during installation, and after installation.

PART 2  PRODUCTS
2.01 MANUFACTURERS
   A. Hardwood Strip and Plank Flooring:
      1. As indicated on the Finish Schedule.
      2. Substitutions: Section 01 60 00 - Product Requirements.

2.02 MATERIALS
   A. Wood Strip Flooring:
      1. Product: As indicated on the Finish Schedule.
   B. Flooring Nails: Type recommended by flooring manufacturer.
   C. Sleepers and Shims: Softwood lumber, pressure treated for moisture protection, 2 by 4 inch size.
   D. Secondary Subflooring: 23/32 inch thick plywood, APA Rated Sheathing, span rating of 48/24 with tongue and groove edges; Exposure 1, unsanded, preservative treated.
2.03 ACCESSORIES
   A. Adhesive - approved by flooring manufacturer.
   B. Stair tread nosing moulding trim and riser trim along open side of platform, full length. Same species and finish as flooring material.

2.04 SOURCE QUALITY CONTROL
   A. Inspect and stamp species and grade on underside of each piece of wood flooring at factory.

PART 3 EXECUTION

3.01 EXAMINATION
   A. Verify existing conditions before starting this work.
   B. Verify that concrete subfloor surface is smooth and flat to plus or minus 1/4 inch in 10 feet.
   C. Verify wood subfloor is properly secured, smooth and flat to plus or minus 1/4 inch in 10 feet.
   D. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION
   A. Sleepers and Shims:
      1. Place sleepers over subfloor; space sleepers at 12 inches on center.
      2. Shim underside of sleepers to achieve level line of plus or minus 1/4 inch in 10 feet.
      3. Anchor sleepers to concrete substrate with explosive driven concrete nails; place nails at 16 inches on center.
   B. Secondary Subflooring: Place plywood subflooring over framing.
      1. Provide 2x4 framing members @ 16" O.C. Anchor at every intersection.
      2. Lay perpendicular to the sleepers, with end joints over sleepers, and screw at 12 inches on center.
      3. Provide 2 rows of blocking with continuous header on each end.
      4. Glue and anchor.
   C. Prepare substrate to receive wood flooring in accordance with manufacturer's and NWFA instructions.
   D. Broom clean substrate.

3.03 INSTALLATION
   A. Sheathing Paper: Place over wood subfloor; lap edges and ends 2 inches, staple in place.
   B. Wood Flooring:
      1. Install in accordance with manufacturer's and NWFA instructions; blind nail to subfloor.
      2. Lay flooring in patterns indicated on drawings. Verify alignment as work progresses.
      3. Arrange flooring with end matched grain set flush and tight.
      4. Terminate flooring at centerline of door openings where adjacent floor finish is dissimilar; provide divider strips and transition strips in accordance with flooring manufacturer's recommendations and as indicated.
      5. Install edge strips at unprotected or exposed edges, and where flooring terminates.
      7. Install flooring tight to floor access covers.
      8. Provide 1/4 inch expansion space at fixed walls and other interruptions.
   C. Install base at floor perimeter to cover expansion space in accordance with manufacturer's instructions. Miter inside and outside corners.
   D. Install cover at round column to cover expansion space in accordance with manufacturer's instructions.
3.04 CLEANING
   A. Clean and polish floor surfaces in accordance with floor finish manufacturer's instructions.

3.05 PROTECTION
   A. Prohibit traffic on floor finish for 48 hours after installation.
   B. Place protective coverings over finished floors; do not remove coverings until Date of Substantial Completion.

END OF SECTION
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SECTION 09 65 00
RESILIENT FLOORING

PART 1 GENERAL
1.01 SECTION INCLUDES
A. Resilient base.
B. Resilient stair accessories.
C. Installation accessories.

1.02 RELATED REQUIREMENTS
A. Section 09 05 61 - Common Work Results for Flooring Preparation: Removal of existing floor coverings, cleaning, and preparation.

1.03 REFERENCE STANDARDS

1.04 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
C. Shop Drawings: Indicate floor patterns.
D. Verification Samples: Submit two samples, 12 by 12 inch in size illustrating color and pattern for each resilient flooring product specified.
E. Certification: Prior to installation of flooring, submit written certification by flooring manufacturer and adhesive manufacturer that condition of subfloor is acceptable.
F. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

1.05 QUALITY ASSURANCE
A. Manufacturer Qualifications: Company specializing in manufacturing specified flooring with minimum three years documented experience.
B. Installer Qualifications: Company specializing in installing specified flooring with minimum three years documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING
A. Store all materials off of the floor in an acclimatized, weather-tight space.
B. Protect roll materials from damage by storing on end.

1.07 FIELD CONDITIONS
A. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

PART 2 PRODUCTS
2.01 TILE FLOORING
A. Vinyl Enhanced Tile: As indicated on the Finish Schedule.
   1. Manufacturers:
      b. Substitutions: See Section 01 60 00 - Product Requirements.
2. Minimum Requirements: Comply with ASTM F1700, of Class corresponding to type specified.
3. Tile Size: 12 by 12 inch.
4. Total Thickness: 1/8 inch.
5. Pattern: As indicated on the Finish Schedule.

2.02 STAIR COVERING
A. Stair Treads with Integral Risers: Rubber; full height of riser, full width and depth of tread in one piece; tapered thickness.
   1. Manufacturers:
      b. Substitutions: See Section 01 60 00 - Product Requirements.
   4. Tread Pattern: As indicated on the Finish Schedule.
   5. Color: As indicated on the Finish Schedule.

2.03 RESILIENT BASE
A. Resilient Base: ASTM F1861, Type TV, vinyl, thermoplastic; top set Style A, Straight.
   1. Manufacturers:
      c. Substitutions: See Section 01 60 00 - Product Requirements.
   2. Height: 4 inch.
   3. Thickness: 0.125 inch thick.
   5. Length: Roll.
   6. Color: As indicated on drawings.
B. Resilient Base: ASTM F1861, Type TP, rubber, thermoplastic; top set Style A, Straight, Millwork Profile Base.
   1. Manufacturers:
      c. Substitutions: See Section 01 60 00 - Product Requirements.
   2. Height: 6 inch.
   3. Thickness: 0.250 inch thick.
   5. Length: 8 foot sections.
   6. Color: As indicated on drawings.

2.04 ACCESSORIES
A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.
B. Primers, Adhesives, and Seam Sealer: Waterproof; types recommended by flooring manufacturer.
C. Moldings, Transition and Edge Strips: Metal.
   1. Manufacturers:
      a. Schluter.
      b. Substitutions: See Section 01 60 00 - Product Requirements.
      c. Pattern: See Finish Schedule
      d. Color: See Finish Schedule
D. Moldings, Transitions and Edge Strips: Metal.
   1. Manufacturers:
      a. New York Metals
      b. Substitutions: See Section 01 60 00 - Product Requirements.
      c. Pattern: See Finish Schedule.
      d. Color: See Finish Schedule.

E. Transitions and edge strips: Rubber
   1. Manufacturers:
      a. Johnsonite.
      b. Substitutions: See Section 01 60 00 - Product Requirements.
      c. Pattern: See Finish Schedule.
      d. Color: See Finish Schedule.

PART 3 EXECUTION

3.01 EXAMINATION
   A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.
   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 resilient base.
   C. Cementitious Subfloor Surfaces: Verify that substrates are ready for resilient flooring installation by testing for moisture and alkalinity (pH).
      1. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.
   D. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION
   A. Remove subfloor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with subfloor filler to achieve smooth, flat, hard surface.
   B. Prohibit traffic until filler is fully cured.

3.03 INSTALLATION - GENERAL
   A. Starting installation constitutes acceptance of subfloor conditions.
   B. Install in accordance with manufacturer's written instructions.
   C. Spread only enough adhesive to permit installation of materials before initial set.
   D. Fit joints and butt seams tightly.
   E. Set flooring in place, press with heavy roller to attain full adhesion.
   F. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.
   G. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.
   H. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

3.04 INSTALLATION - TILE FLOORING
   A. Mix tile from container to ensure shade variations are consistent when tile is placed, unless otherwise indicated in manufacturer's installation instructions.
   B. Lay flooring with joints and seams parallel to building lines to produce symmetrical tile pattern.(See Finish Schedule for direction of tile installation.)
3.05 INSTALLATION - RESILIENT BASE
   A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.
   B. Miter internal corners. At external corners, 'V' cut back of base strip to 2/3 of its thickness and fold. At exposed ends, use premolded units.
   C. Install base on solid backing. Bond tightly to wall and floor surfaces.
   D. Scribe and fit to door frames and other interruptions.

3.06 INSTALLATION - STAIR COVERINGS
   A. Adhere over entire surface. Fit accurately and securely.

3.07 CLEANING
   A. Remove excess adhesive from floor, base, and wall surfaces without damage.
   B. Clean in accordance with manufacturer's written instructions.
   C. Contractor to provide initial floor cleaning and application of five (5) initial coats of floor polish, per the manufacturers instructions.

3.08 PROTECTION
   A. Prohibit traffic on resilient flooring for 48 hours after installation.

END OF SECTION
SECTION 09 65 66
RESILIENT ATHLETIC FLOORING

PART 1  GENERAL

1.01  SECTION INCLUDES
   A. Rubber tile.

1.02  RELATED REQUIREMENTS
   A. Section 09 05 61 - Common Work Results for Flooring Preparation: Removal of existing floor coverings, cleaning, and preparation.
   B. Section 09 65 00 - Resilient Flooring.

1.03  REFERENCE STANDARDS

1.04  SUBMITTALS
   A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
   B. Product Data: Manufacturer's printed data sheets for products specified.
   C. Shop Drawings: Fabrication and installation details, and layout.
   D. Verification Samples: Actual flooring material specified, not less than 12 inch square, mounted on solid backing.

1.05  QUALITY ASSURANCE
   A. Installer Qualifications: An experienced installer certified in writing by the flooring manufacturer to be qualified for installation of specified flooring system.

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. 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.

1.07  FIELD CONDITIONS
   A. Maintain temperature in spaces to receive adhesively installed resilient flooring within range of 70 to 95 degrees F for not less than 48 hours before the beginning of installation and for not less than 48 hours after installation has been completed. Subsequently, do not allow temperature in installed spaces to drop below 50 degrees F or to go above 100 degrees F.

PART 2  PRODUCTS

2.01  PREFORMED ATHLETIC FLOORING
   A. Manufacturers: All products by the same manufacturer.
      1. Use manufacturers and products listed in the finish schedule.
      2. Substitutions: See Section 01 60 00 - Product Requirements.
   B. Rubber Tile Flooring: Recycled SBR (styrene butadiene rubber) and colored EPDM granules with urethane binder.
      1. Thickness: Minimum 7.2 MM.
      2. Size: Nominal 48 inch roll.
      3. Color: As selected from manufacturer's standard range.

2.02  ACCESSORIES
   A. Leveling Compound: Latex-modified cement formulation as recommended by flooring manufacturer for substrate conditions.
PART 3 EXECUTION

3.01 EXAMINATION
   A. Examine substrates for conditions detrimental to installation of athletic flooring. Proceed with installation only after unsatisfactory conditions have been corrected.
   B. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of athletic flooring to substrate.
   C. Cementitious Subfloor Surfaces: Verify that substrates are ready for resilient flooring installation by testing for moisture and alkalinity (pH).
      1. Test in accordance with Section 09 05 61.
      2. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.

3.02 PREPARATION
   A. Prepare floor substrates for installation of flooring in accordance with Section 09 05 61.

3.03 INSTALLATION
   A. Starting installation constitutes acceptance of subfloor conditions.
   B. Install in accordance with manufacturer's written instructions.
   C. Rubber Tile Flooring:
      1. Lay tiles square with room axis, matching for color and pattern by selecting from cartons and mixing as recommended by manufacturer. Center in room and trim all sides.

3.04 CLEANING
   A. Clean flooring using methods recommended by manufacturer.

3.05 PROTECTION
   A. Protect finished athletic flooring from construction traffic to ensure that it is without damage upon Date of Substantial Completion.

END OF SECTION
SECTION 09 67 20
DECORATIVE EPOXY FLOOR COATING

PART 1 - GENERAL

1.01 DELIVERY AND STORAGE
   A. Material shall be delivered to project site in manufacturer’s original unopened containers.
   B. Materials shall be stored indoors, protected from damage, moisture, direct sunlight and temperatures below 40 degrees F. or above 90 degrees F.

1.02 ENVIRONMENTAL CONDITIONS
   A. Surface and surrounding air temperatures must exceed 55 degrees F. but must be less than 90 degrees F., with materials at not less than 70 degrees F. during application.

1.03 QUALIFICATIONS OF APPLICATOR
   A. Installation shall be performed by an applicator having satisfactory experience in the application of these or similar materials or with on-site consultation by a qualified field service representative of the manufacturer.

1.04 SUBMITTALS
   A. Prior to commencing work, submit to owner, manufacturer's technical information and installation details describing materials to be used.
   B. Owner, Contractor, and manufacturer shall review and mutually agree upon color, grade, and final texture of coating system before starting installation. The acceptance of a sample will constitute the job standard by which installation will proceed.

1.05 MOCK_UP PANEL
   A. Provide mock-up panel for approval.

PART 2 - PRODUCTS

2.01 MANUFACTURER
   A. Tnemec Company, Incorporated
      1. Stratashield Decofleck w/extra Coat Sealer
   B. As indicated in the Interior Finish Schedule.

2.02 OTHER ACCEPTABLE MANUFACTURERS
   A. Florock Polimer Flooring: 4165 S. Emerald, Chicago, IL 60609; www.florock.net ph. 1-800-356-7625
      1. Product: Floropoxy 4905, FloroChip - Epoxy Flake Flooring and FloroWear 7100 to match the manufacturer product above.
      2. Color: to match the color as indicated in the Finish Schedule.

2.03 MATERIALS
   A. As indicated in the Interior Finish Schedule.

PART 3 - EXECUTION

3.01 PREPARATION
   A. Follow the Manufacturer Installation Instructions.
   B. Allow new concrete to cure for 28 days. Verify dryness by testing for moisture with a "plastic film tape-down test". (Reference ASTM D 4263). Should moisture be detected, perform "Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride." (Reference ASTM F 1869) Moisture content not to exceed three pounds per 1,000 sq.ft. in a 24 hour period.
C. Mechanically abrade all concrete by means of self-contained, blasting equipment or equal, to remove all laitance and surface contaminants and provide a minimum profile similar to 60-80 grit sandpaper. (Reference ASTM D 4259, ICRI CSP 4-7)

D. After mechanically abrading, verify that all surfaces are clean, dry and free of any contaminants, which could adversely affect the adhesion of the flooring system.

3.02 INSTALLATION

A. Laminate Resinous Flooring: The material shall be mechanically mixed in accordance with manufacturer's printed instructions and applied to a minimum 1/8" thickness. It should be topcoated after 8 hours, and within 24 hours. Floor and wall transitions shall be formed to have a rolled radius cove.

B. Finish Coat: The 100% solids, epoxy glaze coat shall be mechanically mixed in accordance with manufacturer's printed instructions and applied at a thickness within the manufactures recommendations. Thickness and number of coats will vary depending on desired finish.

C. Joints: Active expansion joints shall be sawed through the floor topping system and filled with an appropriate flexible sealant.

3.03 JOB STANDARD

A. Prior to commencing the installation, the contractor shall install with the owner's approval, a mutually agreed upon test sample to show final color and appearance of the system. This test area shall serve as a job standard for the final installation.

3.04 CLEANUP

A. Remove waste materials, rubbish, and debris and dispose of them at the owner's direction. Leave work areas in a clean condition.

3.05 PROTECTION

A. Protect the completed work from water, airborne particles or other surface contaminants until cured for a minimum of 24 hours after application.

B. Protect from traffic, physical abuse, immersion and chemical exposure until the complete system has thoroughly cured for 24 hours at 75 degrees F. For different temperatures, consult the manufacturer's representative about curing times.

END OF SECTION
SECTION 09 68 13
TILE CARPETING

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Carpet tile, fully adhered.

1.02 RELATED REQUIREMENTS
A. Section 09 05 61 - Common Work Results for Flooring Preparation: Removal of existing floor coverings, cleaning, and preparation.

1.03 REFERENCE STANDARDS

1.04 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
C. Samples: Submit two carpet tiles illustrating color and pattern design for each carpet color selected.
D. Manufacturer's Installation Instructions: Indicate special procedures.
E. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.
F. Maintenance Materials: Furnish the following for Owner’s use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.
   2. Extra Carpet Tiles: Quantity equal to 5 percent of total installed of each color and pattern installed.

1.05 QUALITY ASSURANCE
A. Manufacturer Qualifications: Company specializing in manufacturing specified carpet tile with minimum three years documented experience.
B. Installer Qualifications: Company specializing in installing carpet tile with minimum three years documented experience and approved by carpet tile manufacturer.

1.06 FIELD CONDITIONS
A. Store materials in area of installation for minimum period of 24 hours prior to installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS
A. Use product and manufacturer indicated on the finish schedule.
B. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 MATERIALS
A. Tile Carpeting: Tufted, manufactured in one color dye lot.
   1. Tile Size: As indicated on the Finish Schedule, nominal.

2.03 ACCESSORIES
A. Edge Strips: Vinyl, as indicated on the drawings, including color.
B. Locate under center of doors.

PART 3 EXECUTION

3.01 EXAMINATION
A. Verify that subfloor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive carpet tile.
B. Verify that subfloor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to subfloor surfaces.

C. Cementitious Subfloor Surfaces: Verify that substrates are ready for flooring installation by testing for moisture and alkalinity (pH).
   1. Test in accordance with Section 09 05 61.
   2. Obtain instructions if test results are not within limits recommended by flooring material manufacturer and adhesive materials manufacturer.

D. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION
   A. Prepare floor substrates for installation of flooring in accordance with Section 09 05 61.

3.03 INSTALLATION
   A. Starting installation constitutes acceptance of subfloor conditions.
   B. Install carpet tile in accordance with manufacturer's instructions.
   C. Blend carpet from different cartons to ensure minimal variation in color match.
   D. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.
   E. Lay carpet tile in square pattern, with pile direction parallel to next unit, set parallel to building lines.
   F. Fully adhere carpet tile to substrate.
   G. Trim carpet tile neatly at walls and around interruptions.
   H. Complete installation of edge strips, concealing exposed edges.

3.04 CLEANING
   A. Remove excess adhesive without damage, from floor, base, and wall surfaces.
   B. Clean and vacuum carpet surfaces.

END OF SECTION
SECTION 09 72 00
WALL COVERINGS

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Surface preparation and prime painting.
B. Wall covering.

1.02 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide data on wall covering and adhesive.
C. Samples: Submit two samples of wall covering, 6 by 6 inch in size illustrating color, finish, and texture.
D. Manufacturer's Installation Instructions: Indicate special procedures.
E. Maintenance Data: Submit data on cleaning, touch-up, and repair of covered surfaces.

1.03 QUALITY ASSURANCE
A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years of documented experience.
B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.04 DELIVERY, STORAGE, AND HANDLING
A. Inspect roll materials at arrival on site, to verify acceptability.
B. Protect packaged adhesive from temperature cycling and cold temperatures.
C. Do not store roll goods on end.

1.05 FIELD CONDITIONS
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 MANUFACTURERS
A. Wall Coverings: Use product and manufacturer indicated on the finish schedule.

2.02 WALL COVERINGS
A. General Requirements:
   1. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84.
B. Wall Covering: Vinyl coated fabric roll stock, conforming to the following:
   1. Roll Width: 52 inches.
   2. Color: As indicated on the Finish Schedule.
C. Wall Covering: Wood stock, conforming to the following:
   1. Roll Width: 36 inches.
   2. Color: As indicated on the Finish Schedule.
D. Substrate Filler: As recommended by adhesive and wall covering manufacturers; compatible with substrate.
E. 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.

3.02 PREPARATION
   A. Fill cracks in substrate and smooth irregularities with filler; sand smooth.
   B. Wash impervious surfaces with tetra-sodium phosphate, rinse and neutralize; wipe dry.
   C. Surface Appurtenances: Remove or mask electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.
   D. Apply one coat of primer sealer to substrate surfaces. Allow to dry. Lightly sand smooth.
   E. Vacuum clean surfaces free of loose particles.

3.03 INSTALLATION
   A. Apply wall covering smooth, without wrinkles, gaps or overlaps. Eliminate air pockets and ensure full bond to substrate surface.
   B. Install wall covering before installation of bases and items attached to or spaced slightly from wall surface.
   C. Do not install wall covering more than 1/4 inch below top of resilient base.

3.04 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.

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

END OF SECTION
SECTION 09 80 00
INTERIOR CHAIN LINK FENCES AND GATES

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Posts, rails, and frames.
B. Wire fabric.
C. Manual gates with related hardware.
D. Accessories.

1.02 RELATED REQUIREMENTS
A. Section 03 30 00 - Cast-in-Place Concrete: Concrete anchorage for posts.
B. Section 08 71 00 - Door Hardware: Gate locking device.
C. Section 32 31 13 - Chain Link Fences and Gates: Exterior site fence and gates.

1.03 REFERENCE STANDARDS
E. CLFMI CLF-FIG0111 - Field Inspection Guide; 2014.

1.04 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide data on fabric, posts, accessories, fittings and hardware.
C. Design Calculations: For height of fencing, provide calculations for fence fabric and accessory selection as well as line post spacing and floor connection details. See CLFMI WLG 2445 for line post and spacing guidance.
D. Shop Drawings: Indicate plan layout, spacing of components, post foundation dimensions, hardware anchorage, and schedule of components. See CLFMI CLF-SFR0111 for planning and design recommendations.
E. Manufacturer's Installation Instructions: Indicate installation requirements and manufacture recommendations to frame around joist and girder above to provide a secured fence enclosure.

1.05 QUALITY ASSURANCE
A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
B. Fence Installer: Company with demonstrated successful experience installing similar projects and products, with not less than five years of documented experience.
1.06 WARRANTY
   A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
   B. Correct defective Work within a five year period after Date of Substantial Completion.
   C. Provide five year manufacturer warranty for fence materials.

PART 2 PRODUCTS

2.01 MANUFACTURERS
   A. Chain Link Fences and Gates:
      3. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 MATERIALS
   A. Posts, Rails, and Frames:
      1. Formed from hot-dipped galvanized steel sheet, ASTM A653/A653M, HSLAS, Grade 50, with G90 (Z275) zinc coating.
      2. Line Posts: Type I round.
      3. Terminal, Corner, Rail, Brace, and Gate Posts: Type I round.
      4. Comply with CLFMI CLF-PM0610.
   B. Wire Fabric:
      1. ASTM A392 zinc coated steel chain link fabric.
      2. Comply with CLFMI CLF-PM0610.

2.03 COMPONENTS
   A. Line Posts: 1.9 inch diameter.
   B. Corner and Terminal Posts: 2.38 inch diameter.
   C. Gate Posts: 3-1/2 inch diameter.
   D. Top and Brace Rail: 1.66 inch diameter, plain end, sleeve coupled.
   E. Gate Frame: 1.66 inch diameter for welded fabrication.
   F. Fabric: 2 inch diamond mesh interwoven wire, 6 gage, 0.1920 inch thick, top selvage knuckle end closed, bottom selvage knuckle end closed.
   G. Steel plate: Plate to be provided on gate and in fence panel adjacent to the gate, to protect the hardware from being manipulated, to keep the locking mechanism and locked gate secure. Thickness of panel, configuration and latchside jamb of gate and fence to be as needed to receive the locking hardware. Fencing to be secured to panel.
   H. Tension Wire: 6 gage, 0.1920 inch thick steel, single strand.
   I. Tie Wire: Aluminum alloy steel wire.

2.04 MANUAL GATES AND RELATED HARDWARE
   A. Hinges: Finished to match fence components.
      1. Swing Direction: One way.
      2. 180 degree hinges, 3 required.
      3. Secured type to not allow the gate to be removed.
      5. Mounting: Center.
      7. Mounting to Round Fence Post and Gate Frame: Integral clamp.
   B. Latches: Finished to match fence components.
      2. Locking: Mechanical.
2.05 ACCESSORIES
   A. Fittings: Sleeves, bands, clips, rail ends, tension bars, fasteners and fittings; steel.

2.06 FINISHES
   A. Components (Other than Fabric): Galvanized in accordance with ASTM A123/A123M, at 1.7 ounces per square foot.
   B. Accessories: Same finish as framing.

PART 3 EXECUTION

3.01 EXAMINATION
   A. Verification of Conditions: Verify that areas are clear of obstructions or debris.

3.02 INSTALLATION
   A. Design: Install fence system from floor up to bottom of roof structure above to provide a security fenceline between the two portions of the garage. Field verify height of fencing. Frame around all joist, structural steel framing/girder, MEPFP items as required to provide a secure fence line. Core drill concrete floor to receive bottom of post, set into the concrete floor 5" deep minimum and grout solid with non-shrink grout. Line post spacing and floor connection details to be designed by the fence manufacturer.
   B. Install framework, fabric, accessories and gates in accordance with ASTM F567.
   C. Place fabric on small vehicle parking bay side of posts and rails.
   D. Brace each gate and corner post to adjacent line post with horizontal center brace rail. Install brace rail one bay from end and gate posts.
   E. Provide top rail through line post tops and splice with 6 inch long rail sleeves.
   F. Stretch fabric between terminal posts or at intervals of 100 feet maximum, whichever is less.
   G. Fasten fabric to top rail, line posts, braces, and bottom tension wire with tie wire at maximum 15 inches on centers.
   H. Attach fabric to end, corner, and gate posts with tension bars and tension bar clips.
   I. Install bottom tension wire stretched taut between terminal posts.
   J. Peen all bolts upon installation.

3.03 TOLERANCES
   A. Maximum Variation From Plumb: 1/4 inch.

3.04 FIELD QUALITY CONTROL
   A. See Section 01 40 00 - Quality Requirements, for additional requirements.
   B. Gates: Inspect for level, plumb, and alignment.
   C. Workmanship: Verify neat installation free of defects. See CLFMI CLF-FIG0111 for field inspection guidance.

3.05 CLEANING
   A. Leave immediate work area neat at end of each work day.

END OF SECTION
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SECTION 09 84 15

ACOUSTIC STRETCHED-FABRIC WALL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Acoustic stretched-fabric wall system.
B. Tack boards above desk.
C. Accessories as required for complete installation.

1.02 REFERENCE STANDARDS


1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.
   4. Specimen warranty.
C. Shop Drawings: Details indicating typical transitions to other finish surfaces and elevations indicating proposed locations of fabric seams.
D. Verification Samples:
   1. For each fabric specified, minimum size 12 inch square, representing actual product in color, texture, and pattern.
   2. Tackable core backing material, minimum 12 inches square.
E. Test Reports: Certified test data from an independent test agency verifying that wall systems meet specified requirements for acoustical and fire performance.
F. Warranty Documentation: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with at least three years of documented experience.
B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience and approved by manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Protect fabric, acoustical backing, and track from excessive moisture in shipment, storage, and handling.
B. Store products in manufacturer's unopened packaging until ready for installation.
C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.
1.06 FIELD CONDITIONS
   A. Do not begin installation until interior conditions have reached temperature and humidity that will be maintained during occupancy.
   B. Do not install products under environmental conditions outside manufacturer’s absolute limits.

1.07 WARRANTY
   A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
   B. Correct defective work within five year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS
   A. Acoustic Stretched-Fabric Wall Systems:
   B. Tackboard Systems:
      4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 ACOUSTIC STRETCHED-FABRIC SYSTEM
   A. Acoustic Stretched-Fabric Wall System:
      B. Model: AP 1.5 Ecocoustic 6-7 PCF Fiberglass, Adhesive Mount, Square Edges, Class A.
      1. Surface Burning Characteristics: Flame Spread Index of 25, maximum; Smoke Developed Index of 450, maximum; when whole system is tested in accordance with ASTM E84 using mounting specified in ASTM E2573 for stretched systems.
      2. Noise Reduction Coefficient (NRC): 0.80, minimum, when tested in accordance with ASTM C423, Type A mounting per ASTM E795.
      3. Seams in fabric are not permitted; adjust frame layouts to accommodate width of fabric; obtain written approval of frame layouts from Architect.
   D. Acoustic Stretched-Fabric Wall System: (Tack panels)
      1. Provide system comprising stretched fabric over tackable core and continuous perimeter and intermediate mounting extrusions applied directly to wall surface.
      a. Surface Burning Characteristics: Flame Spread Index of 25, maximum; Smoke Developed Index of 450, maximum; when whole system is tested in accordance with ASTM E84 using mounting specified in ASTM E2573.
      b. Prefabricated framed panels are not acceptable.
      c. Fabric must be installed over tackable substrate with spray on adhesive.
      d. System must be designed to permit removal and replacement of fabric from individual panels without affecting adjacent panels.
      e. No visible fasteners.

2.03 MATERIALS
   A. Frame: Extruded polymer framing system with serrated jaws of sufficient strength to hold fabric in place after repeated applications.
      1. Track Size: 3/8 inch protrusion from wall with minimum 1 inch base leg.
      2. Track Shape: Square at perimeter; square at intermediate abutting joints.
      3. Wall Thickness of Track: Minimum 0.062 inch.
      4. Color: As selected from manufacturer’s standards.
      5. Core: Same thickness as track.
      6. Tackable Core: As indicated on drawings.
B. Acoustic Material:
   1. Fiberglass; As indicated on the Finish Schedule.
   2. Style: As indicated on the Finish Schedule.

C. Fabric:
   1. Manufacturer: As indicated on the Finish Schedule. Michelle Land 800.366.6839 ext.845
   2. Style Number: As indicated on the Finish Schedule.
   3. Wall Color: As indicated of the Finish Schedule.
   4. Fabric: As indicated on finish schedule.

D. Fasteners: As recommended by manufacturer of acoustic stretched-fabric system in accordance with project requirements.

E. Adhesives: Low VOC or water-based, and approved by acoustic stretched-fabric system manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Begin installation only after substrates have been properly prepared.
B. Verify that casework, markerboards, door and window jambs, finished ceiling, and other finished items adjacent or abutting the acoustic stretched-fabric system have been properly installed.
C. When preparation of substrate is the responsibility of another installer, notify Architect of unsatisfactory preparation prior to proceeding with this work.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation of this work.
B. Prepare substrate surfaces using methods as recommended by the manufacturer for achieving acceptable result as required for this work.
C. Remove wall plates and other obstacles, and properly prepare substrates to receive frames and acoustic material in accordance with manufacturer's instructions.

3.03 INSTALLATION

A. Install acoustic stretched-fabric system at locations indicated in accordance with approved shop drawings and manufacturer's instructions.
B. Install tackable wall systems at locations indicated and in accordance with approved shop drawings, complying with manufacturer's instructions.
C. Frames: Install perimeter and intermediate frames using appropriate fasteners for prepared substrate, firmly secured to ensure frames do not separate from substrate.
   1. For tile or masonry substrates, apply continuous bead of adhesive along base of framing in addition to spacing of conical anchors and/or fasteners at 6 to 8 inches on center.
   2. Follow contours of wall and scribe to adjoining work at borders, penetrations, and imperfections.
   3. Install framing around openings and penetrations.
   4. Allow for spacing of framework to accommodate insertion of installation tool.
D. Acoustic Material: Cut and trim acoustic material to fit snugly within perimeter and intermediate framework.
   1. Apply adhesive and press acoustic material into place, maintaining constant plane.
   2. At fixtures mounted within areas of acoustic stretched-fabric system, install rigid blocking for backing and maintain plane of fixture surface flush with face of acoustic stretched-fabric system.
E. Fabric: Stretch fabric over acoustic material, locking edges of fabric into frame’s serrated jaws using manufacturer’s recommended tool. Maintain fabric weave plumb, level and true, in proper relation to building lines, without ripples, waviness, hourglass, or other deleterious effects.

1. Upon fabric installation, do not employ adhesives or mechanical fasteners of any type, and ensure fabric is free-floating and in contact with acoustic material as necessary.
2. Stapling or gluing of fabric to cores or channel framework is not permitted.
3. Provide tension in fabric sufficient to prevent sagging under anticipated changes in temperature and humidity.
4. At outside corners, wrap as single piece of fabric without joints or seams.

3.04 CLEANING

A. Clean exposed surfaces of acoustic stretched-fabric system in compliance with manufacturers instructions for cleaning and repair of minor damage to exposed surfaces.

3.05 PROTECTION

A. Protect installed materials upon completion of this work, using methods that will ensure that the finished work is without damage or deterioration upon Date of Substantial Completion.

END OF SECTION
SECTION 09 91 13
EXTERIOR PAINTING

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Surface preparation.
B. Field application of paints.
C. Scope: Finish exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.
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, and operating parts of equipment.
   5. Floors, unless specifically indicated.
   6. Ceramic and other types of tiles.
   7. Brick, glass unit masonry, architectural concrete, cast stone, integrally colored plaster and stucco.
   8. Glass.
   9. Concealed pipes, ducts, and conduits.

1.02 RELATED REQUIREMENTS
A. Section 09 91 23 - Interior Painting.

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

1.04 REFERENCE STANDARDS
B. ASTM D4258 - Standard Practice for Surface Cleaning Concrete for Coating; 2005 (Reapproved 2017).
D. SSPC-SP 1 - Solvent Cleaning; 2015, with Editorial Revision (2016).
E. SSPC-SP 6 - Commercial Blast Cleaning; 2007.
F. SSPC-SP 13 - Surface Preparation of Concrete; 1997 (Reaffirmed 2003).

1.05 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. 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.
C. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 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, discuss sheen options with Architect before preparing samples, to eliminate sheens definitely not required.
   3. Allow 30 days for approval process, after receipt of complete samples by Architect.

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 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.

1.07 FIELD CONDITIONS
A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
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 exterior paint and finishes during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.
D. Minimum Application Temperatures for Latex Paints: 50 degrees F for exterior; 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 MANUFACTURERS
A. Paints:
   2. PPG Paints: www.ppgpaints.com/#sle.

2.02 PAINTS AND FINISHES - GENERAL
A. Paints and Finishes: Ready mixed, unless required 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. Supply each paint material in quantity required to complete entire project's work from a single production run.
   3. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.

2.03 PAINT SYSTEMS - EXTERIOR
A. Paint CE-OP-3L - Masonry/Concrete, Opaque, Latex, 3 Coat:
   1. Semi-Gloss Finish Concrete
      a. Sherwin Williams
      b. 1st Coat: S-W Loxon® Exterior Acrylic Masonry Primer, A24W300
         1) (8 mils wet, 3.2 mils dry)
      c. 2nd Coat: C14W251 DuraCraft Exterior Latex Acrylic Gloss (2-4 mils per coat)
      d. 3rd Coat: C14W251 DuraCraft Exterior Latex Acrylic Gloss
         1) (2-4 mils per coat)
e. PPG Paints
   1) 1st Coat: PPG Paints 4-2 Perma-Crete High Build 100% Acrylic Primer
      (a) (8 mils wet, 3.2 mils dry)
   2) 2nd Coat: PPG Paints 6-900XI Series Speedhide Ext. Semi-Gloss Acrylic
   3) 3rd Coat: PPG Paints 6-900XI Series Speedhide Ext. Semi-Gloss Acrylic
      (a) (2-4 mils per coat)

f. Rust-Oleum
   1) 1st Coat: Rust-Oleum Zinsser Water-Tite Flexible Primer/Finish
      (a) 5-6 mils DFT.
   2) 2nd Coat: Rust-Oleum Zinsser Perma White Exterior Acrylic Semi Gloss Coating
   3) 3rd Coat: Rust-Oleum Zinsser Perma White Exterior Acrylic Semi Gloss Coating
      (a) (2-3 mils per coat)

2. Semi-Gloss Finish Masonry
   a. Sherwin Williams
      1) 1st Coat:S-W Loxon® Block Surfacer, A24W200
         (a) (50-100 sq ft/gal)
      2) 2nd Coat:C14W251 DuraCraft Exterior Latex Acrylic Gloss
      3) 3rd Coat:C14W251 DuraCraft Exterior Latex Acrylic Gloss
         (a) (A surface with 10 or less pinholes per square foot.)

   b. PPG Paints
      1) 1st Coat: PPG Paints 4-100 Perma-Crete Concrete Block & Masonry Surfacer/Filler
         (a) (50-100 sq ft/gal)
      2) 2nd Coat: PPG Paints 6-900XI Series Speedhide Ext. Semi-Gloss Acrylic
      3) 3rd Coat: PPG Paints 6-900XI Speedhide Ext. Semi-Gloss Acrylic
         (a) (A surface with 10 or less pinholes per square foot.)

   c. Rust-Oleum
      1) 1st Coat: Rust-Oleum Zinsser Water-Tite Flexible Primer/Finish
         (a) 5-6 mils DFT.
      2) 2nd Coat: Rust-Oleum Zinsser Perma White Exterior Acrylic Semi Gloss Coating
      3) 3rd Coat: Rust-Oleum Zinsser Perma White Exterior Acrylic Semi Gloss Coating
         (a) (A surface with 10 or less pinholes per square foot.)

B. Paint ME-OP-2L - Ferrous Metals, Primed, Latex, 2 Coat:
   1. Semi-Gloss Finish (Water Base)
      a. Sherwin Williams
         1) 1st Coat:S-W Pro-Cryl® Universal W/B Primer, B66-310 Series
            (a) (5-10 mils wet, 2-4 mils dry)
         2) 2nd Coat: B66W1151 Pro Industrial DTM Acrylic Semi-Gloss
         3) 3rd Coat: B66W1151 Pro Industrial DTM Acrylic Semi-Gloss
            (a) (2.5-4 mils dry per coat)

      b. PPG Paints
         1) 1st Coat: PPG Paints 90-912 Pitt-Tech Plus Int/Ext DTM Industrial Primer
            (a) (5-10 mils wet, 2-4 mils dry)
         2) 2nd Coat: PPG Paints 90-1210 Series Pitt-Tech Plus Int/Ext DTM Semi-Gloss Industrial Enamel
         3) 3rd Coat: PPG Paints 90-1210 Series Pitt-Tech Plus Int/Ext DTM Semi-Gloss Industrial Enamel
            (a) (2-4 mils dry per coat)

      c. Rust-Oleum
         1) 1st Coat: Rust-Oleum 3700 Series DTM W/B Primer
            (a) (5-10 mils wet, 2-4 mils dry)
         2) 2nd Coat: Rust-Oleum 3700 Series DTM W/B SG Ind Enamel
         3) 3rd Coat: Rust-Oleum 3700 Series DTM W/B SG Ind Enamel
            (a) (2-4 mils dry per coat)
C. Paint MgE-OP-3L - Galvanized Metals, Latex, 3 Coat:
   1. Gloss Finish (Water Base)
      a. Sherwin-Williams
         1) 1st Coat: S-W Pro-Cryl® Universal W/B Primer, B66-310 Series
            (a) (5-10 mils wet, 2-4 mils dry)
         2) 2nd Coat: B66W1051 Pro Industrial DTM Acrylic Gloss
         3) 3rd Coat: B66W1051 Pro Industrial DTM Acrylic Gloss
            (a) (2.5-4 mils dry per coat)
      b. PPG Paints
         1) 1st Coat: PPG Paints 90-912 Pit-Tech Plus Int/Ext DTM Industrial Primer
            (a) (5-10 mils wet, 2-4 mils dry)
         2) 2nd Coat: PPG Paints 90-1310 Series Pitt-Tech Plus Int/Ext High Gloss DTM Industrial Enamel
         3) 3rd Coat: PPG Paints 90-1310 Series Pitt-Tech Plus Int/Ext High Gloss DTM Industrial Enamel
            (a) (2-4 mils dry per coat)
      c. Rust-Oleum
         1) 1st Coat: Rust-Oleum 3700 Series DTM W/B Primer
            (a) (5-10 mils wet, 2-4 mils dry)
         2) 2nd Coat: Rust-Oleum 3700 Series DTM W/B Gloss Ind Enamel
         3) 3rd Coat: Rust-Oleum 3700 Series DTM W/B Gloss Ind Enamel
            (a) (2-4 mils dry per coat)

D. Paint E-Pav - Pavement Marking Paint:
   1. Flat Finish
      a. Sherwin Williams
         1) 1st Coat: S-W Setfast® Acrylic Water Borne Zone Marking Paint
            (a) (320 linear feet of 4-inch stripe per gallon)
            (b) TM-226, TM-227

PART 3 EXECUTION
3.01 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 mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces for finishing.
D. Seal surfaces that might cause bleed through or staining of topcoat.
E. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
F. Concrete:
   1. Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
   2. Clean concrete according to ASTM D4258. Allow to dry.
   3. Prepare surface as recommended by top coat manufacturer and according to SSPC-SP 13.
G. Masonry:
   1. Remove efflorescence and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces or if alkalinity of mortar joints exceed that permitted in manufacturer's written instructions. Allow to dry.
   2. Prepare surface as recommended by top coat manufacturer.
H. Galvanized Surfaces:
   1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.

I. Ferrous Metal:
   1. Solvent clean according to SSPC-SP 1.
   3. Remove rust, loose mill scale, and other foreign substances using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.

J. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

3.02 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.
   D. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
   E. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

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

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

END OF SECTION
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SECTION 09 91 23
INTERIOR PAINTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.
B. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.
   1. Mechanical and Electrical:
      a. In finished areas, paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment, unless otherwise indicated.
C. 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. Floors, unless specifically indicated.
   6. Ceramic and other tiles.
   7. Glass.
   8. Concealed pipes, ducts, and conduits.

1.02 RELATED REQUIREMENTS

A. Section 09 91 13 - Exterior Painting.

1.03 REFERENCE STANDARDS

A. ASTM D4258 - Standard Practice for Surface Cleaning Concrete for Coating; 2005 (Reapproved 2017).
D. SSPC-SP 1 - Solvent Cleaning; 2015, with Editorial Revision (2016).
E. SSPC-SP 6 - Commercial Blast Cleaning; 2007.
F. SSPC-SP 13 - Surface Preparation of Concrete; 1997 (Reaffirmed 2003).

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. 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.
C. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 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, discuss sheen options with Architect before preparing samples, to eliminate sheens definitely not required.
   3. Allow 30 days for approval process, after receipt of complete samples by Architect.

D. Manufacturer's Instructions: Indicate special surface preparation procedures.

E. Maintenance Data: Submit data including product technical data sheets, material safety data sheets (MSDS), care and cleaning instructions, touch-up procedures, and repair of painted and finished surfaces.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.
   2. Extra Paint and Finish Materials: 1 gallon of each color; from the same product run, store where directed.
   3. Label each container with color in addition to the manufacturer's label.

1.05 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.

1.06 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Provide paints and finishes from the same manufacturer.
   1. In the event that a single manufacturer cannot provide specified products, minor exceptions will be permitted provided approval by Architect is obtained using the specified procedures for substitutions.

B. Paints:

2.02 PAINTS AND FINISHES - GENERAL

A. Paints and Finishes: 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. Supply each paint material in quantity required to complete entire project's work from a single production run.
3. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.

2.03 PAINT SYSTEMS - INTERIOR

A. Paint CI-OP-3L - Concrete/Masonry, Opaque, Latex, 3 Coat:

1. Semi-Gloss Finish Concrete
   a. Sherwin Williams
      1) 1st Coat: A24W8300 Loxon Concrete And Masonry Interior/Exterior Latex Primer
         (a) (7 mils wet, 3 mils dry)
      2) 2nd Coat: B31W2651 ProMar 200 Zero VOC Interior Latex Semi-Gloss
      3) 3rd Coat: B31W2651 ProMar 200 Zero VOC Interior Latex Semi-Gloss
         (a) (4 mils wet, 1.6 mils dry per coat)
   b. PPG Paints
      1) 1st Coat: PPG Paints 4-603 Perma-Crete Int/Ext Alkali Resistant Primer
         (a) (4 mils wet, 1.5 mils dry)
      2) 2nd Coat: PPG Paints 6-500 Speedhide Interior Semi-Gloss
      3) 3rd Coat: PPG Paints 6-500 Speedhide Interior Semi-Gloss
         (a) (4 mils wet, 1.4 mils dry per coat)
   c. Rust-Oleum
      1) 1st Coat: Rust-Oleum Zinsser Bulls Eye 1 2 3 WB Primer
      2) 2nd Coat: Rust-Oleum Zinsser Perma White Interior Latex, Semi Gloss
      3) 3rd Coat: Rust-Oleum Zinsser Perma White Interior Latex, Semi Gloss
         (a) (4 mils wet, 1.4 mils dry per coat)

2. Semi-Gloss Finish Masonry
   a. Sherwin Williams
      1) 1st Coat: S-W Heavy Duty Block Filler, B42W46
         (a) (18 mils wet, 10 mils dry)
      2) 2nd Coat: B31W2651 ProMar 200 Zero VOC Interior Latex Semi-Gloss
      3) 3rd Coat: B31W2651 ProMar 200 Zero VOC Interior Latex Semi-Gloss
         (a) (total dry film thickness of 12-15 mils of topcoat and a surface with 10 or less pinholes per square foot.)
   b. PPG Paints
      1) 1st Coat: PPG Paints 16-90 Pitt-Glaze Int/Ext Latex Block Filler
         (a) (18 mils wet, 10 mils dry)
      2) 2nd Coat: PPG Paints 6-500 Speedhide Interior Semi-Gloss
      3) 3rd Coat: PPG Paints 6-500 Speedhide Interior Semi-Gloss
         (a) (total dry film thickness of 12-15 mils of topcoat and a surface with 10 or less pinholes per square foot.)
   c. Rust-Oleum
      1) 1st Coat: Rust-Oleum Zinsser Water Tite Flexible Primer/Finish
         (a) @ 5-6 mils DFT
      2) 2nd Coat: Rust-Oleum Zinsser Perma White Interior Latex, Semi Gloss
         (a) @ 2-3 mils DFT
      3) 3rd Coat: Rust-Oleum Zinsser Perma White Interior Latex, Semi Gloss
         (a) @ 2-3 mils DFT

3. Eg-Shel / Satin Finish Concrete
   a. Sherwin Williams
      1) 1st Coat:A24W8300 Loxon Concrete And Masonry Interior/Exterior Latex Primer
         (a) (7 mils wet, 3 mils dry)
      2) 2nd Coat: B20W2651 ProMar 200 Zero VOC Interior Latex Eg-Shel
      3) 3rd Coat: B20W2651 ProMar 200 Zero VOC Interior Latex Eg-Shel
         (a) (4 mils wet, 1.7 mils dry per coat)
b. PPG Paints
   1) 1st Coat: PPG Paints 4-603 Perma-Crete Int/Ext Alkali Resistant Primer
      (a) (4 mils wet, 1.4 mils dry)
   2) 2nd Coat: PPG Paints 6-411 Speedhide Interior Eggshell
   3) 3rd Coat: PPG Paints 6-411 Speedhide Interior Eggshell
      (a) (4 mils wet, 1.5 mils dry per coat)

   c. Rust-Oleum
      1) 1st Coat: Rust-Oleum Zinsser Bulls Eye 1 2 3 WB Primer
      2) 2nd Coat: Rust-Oleum Zinsser Perma White Interior Latex, Satin
      3) 3rd Coat: Rust-Oleum Zinsser Perma White Interior Latex, Satin
         (a) (4 mils wet, 1.5 mils dry per coat)

4. Eg-Shel / Satin Finish Masonry
   a. Sherwin Williams
      1) 1st Coat: S-W PrepRite® Block Filler, B25W25
         (a) (75-125 sq ft/gal)
      2) 2nd Coat: B20W2651 ProMar 200 Zero VOC Interior Latex Eg-Shel
      3) 3rd Coat: B20W2651 ProMar 200 Zero VOC Interior Latex Eg-Shel
         (a) (A surface with 10 or less pinholes per square foot.)

   b. PPG Paints
      1) 1st Coat: PPG Paints 6-15 Speedhide Int/Ext Hi Fill Latex Block Filler
         (a) (75-125 sq ft/gal)
      2) 2nd Coat: PPG Paints 6-411 Speedhide Interior Eggshell
      3) 3rd Coat: PPG Paints 6-411 Speedhide Interior Eggshell
         (a) (total dry film thickness of 12-15 mils of topcoat and a surface with 10 or less pinholes per square foot.)

   c. Rust-Oleum
      1) 1st Coat: Rust-Oleum Zinsser Water Tite Flexible Primer/Finish
      2) @ 5-6 mils DFT
      3) 2nd Coat: Rust-Oleum Zinsser Perma White Interior Latex, Satin
         (a) (2-3 mils DFT)
      4) 3rd Coat: Rust-Oleum Zinsser Perma White Interior Latex, Satin
         (a) (2-3 mils DFT)
         (b) (total dry film thickness of 9-12 mils of topcoat and a surface with 10 or less pinholes per square foot.)

B. Paint MI-OP-3E - Ferrous Metals, Epoxy, 3 Coat:
   1. Sherwin Williams
      a. 1st Coat: S-W Pro Industrial Pro-Cryl Primer, B66-310 Series
         1) (2-4 mils dry)
      b. 2nd Coat: S-W Pro Industrial Pre-Catalyzed Waterbased Epoxy, K46 Series
      c. 3rd Coat: S-W Pro Industrial Pre-Catalyzed Waterbased Epoxy, K46 Series
         1) (4 mils wet, 1.5 mils dry per coat)

   2. PPG Paints
      a. 1st Coat: PPG Paints Pitt-Tech Plus DTM Industrial Primer
      b. 2nd Coat: PPG Paints 16-510 Pitt-Glaze WB1 Pre-Catalyzed Acrylic Epoxy
      c. 3rd Coat: PPG Paints 16-510 Pitt-Glaze WB1 Pre-Catalyzed Acrylic Epoxy

   3. Rust-Oleum
      a. 1st Coat: Rust-Oleum Universal Acrylic WB Primer
      b. 2nd Coat: Rust-Oleum Sierra Performance No VOC Metal Max Acrylic Urethane
      c. 3rd Coat: PPG Paints 16-510 Pitt-Glaze WB1 Pre-Catalyzed Acrylic Epoxy
C. Paint MI-OP-3L - Ferrous Metals, Unprimed, Latex, 3 Coat:
   1. Gloss Finish
      a. Sherwin Williams
         1) 1st Coat: S-W Pro Industrial Pro-Cryl Primer, B66-310
            (a) (2-4 mils dry per coat)
         2) 2nd Coat: B31W2651 ProMar 200 Zero VOC Interior Latex Semi-Gloss
         3) 2nd Coat: B31W2651 ProMar 200 Zero VOC Interior Latex Semi-Gloss
            (a) (4 mils wet, 1.5 mils dry per coat)
      b. PPG Paints
         1) 1st Coat: PPG Paints 90-912 Pitt-Tech Plus DTM Acrylic Primer
            (a) (2-4 mils dry per coat)
         2) 2nd Coat: PPG Paints 6-500 Speedhide Interior Semi-Gloss
         3) 3rd Coat: PPG Paints 6-500 Speedhide Interior Semi-Gloss
            (a) (4 mils wet, 1.5 mils dry per coat)
      c. Rust-Oleum
         1) 1st Coat: Rust-Oleum Universal Acrylic W/B Primer
            (a) (5-10 mils wet, 2-4 mils Dry)
         2) 2nd Coat: Rust-Oleum Zinsser Perma White Interior Latex, Semi Gloss
         3) 3rd Coat: Rust-Oleum Zinsser Perma White Interior Latex, Semi Gloss
            (a) (4 mils wet, 1.5 mils dry per coat)

D. Paint CI-OP-3E - Concrete/Masonry, Epoxy Enamel, 3 Coat:
   1. Semi-Gloss Finish Concrete
      a. Sherwin Williams
         1) 1st Coat: B73W311 Pro Industrial Waterbased Catalyzed Epoxy
         2) 2nd Coat: B73W311 Pro Industrial Waterbased Catalyzed Epoxy
            (a) (4-6 mils dry per coat)
      b. PPG Paints
         1) 1st Coat: PPG Paints 98-1 Aquapon WB Water Based Polyamide Epoxy
         2) 2nd Coat: PPG Paints 98-1 Aquapon WB Water Based Polyamide Epoxy
      c. Rust-Oleum
         1) 1st Coat: Rust-Oleum 5300 Series Water Borne Epoxy
         2) 2nd Coat: Rust-Oleum 5300 Series Water Borne Epoxy
            (a) (2.0-3.0 mils dry per coat)
   2. Semi-Gloss Finish Masonry
      a. Sherwin Williams
         1) 1st Coat: S-W Heavy Duty Block Filler, B42W46
            (a) (18 mils wet, 10 mils wet)
         2) 2nd Coat: S-W Pro Industrial Pre-Catalyzed Waterbased Epoxy, K46 Series
         3) 3rd Coat: S-W Pro Industrial Pre-Catalyzed Waterbased Epoxy, K46 Series
            (a) (4 mils wet, 1.5 mils dry per coat)
      b. PPG Paints
         1) 1st Coat: PPG Paints 4-100 Perma-Crete Concrete Block & Masonry
            Surfacer/Filler
            (a) (50-100 sq ft/gal)
         2) 2nd Coat: PPG Paints 16-310 Pitt-Glaze WB1 Pre-Catalyzed Acrylic Epoxy
         3) 3rd Coat: PPG Paints 16-310 Pitt-Glaze WB1 Pre-Catalyzed Acrylic Epoxy
            (a) (total dry film thickness of 12-15 mils of topcoat and a surface with 10 or
            less pinholes per square foot.)
c. Rust-Oleum
   1) 1st Coat: Rust-Oleum Zinsser Water Tite Flexible Primer/Finish
   2) @ 5-6 mils DFT.
   3) 2nd Coat: Rust-Oleum Sierra Performance No VOC Beyond Acrylic Urethane @ 2-3 mils DFT
   4) 3rd Coat: Rust-Oleum Sierra Performance No VOC Beyond Acrylic Urethane @ 2-3 mils DFT
      (a) (total dry film thickness of 9-12 mils of topcoat and a surface with 10 or less pinholes per square foot.)

E. Paint GI-OP-3E - Gypsum Board/Plaster, Epoxy, 3 Coat:
   1. Semi-Gloss Finish
      a. Sherwin Williams
         1) 1st Coat: B28W2600 ProMar 200 Zero VOC Interior Latex Primer
            (a) (4 mils wet, 1.2 mils dry)
         2) 2nd Coat: S-W Water Based Catalyzed Epoxy B70/B60V25 Series
         3) 3rd Coat: S-W Water Based Catalyzed Epoxy B70/B60V25 Series
         4) (2.5-3 mils dry per coat)
      b. PPG Paints
         1) 1st Coat: PPG Paints 6-2 Speedhide Interior Quick Drying Latex Sealer
            (a) (4 mils wet, 1.2 mils dry)
         2) 2nd Coat: PPG Paints 6-8534 Speedhide Int/Ext Gloss Acrylic
         3) 3rd Coat: PPG Paints 6-8534 Speedhide Int/Ext Gloss Acrylic
            (a) (4 mils wet, 1.2 mils dry per coat)
      c. Rust-Oleum
         1) 1st Coat: Rust-Oleum Zinsser Dry Wall Latex Primer
            (a) (4 mils wet, 1.2 mils dry)
         2) 2nd Coat: Rust-Oleum Sierra Performance Beyond No VOC Acrylic Urethane Gloss
         3) 3rd Coat: Rust-Oleum Sierra Performance Beyond No VOC Acrylic Urethane Gloss
         4) (4 mils wet, 1.5 mils dry per coat)

F. Paint GI-OP-3L - Gypsum Board/Plaster, Latex, 3 Coat:
   1. Gloss Finish
      a. Sherwin Williams
         1) 1st Coat: B28W2600 ProMar 200 Zero VOC Interior Latex Primer
            (a) (2-4 mils dry per coat)
         2) 2nd Coat: S-W ProMar 200 Latex Gloss, B21-200 Series
         3) 3rd Coat: S-W ProMar 200 Latex Gloss, B21-200 Series
            (a) (4 mils wet, 1.5 mils dry per coat)
      b. PPG Paints
         1) 1st Coat: PPG Paints 6-2 Speedhide Interior Quick Drying Latex Sealer
            (a) (4 mils wet, 1.2 mils dry)
         2) 2nd Coat: PPG Paints 6-8534 Speedhide Int/Ext Gloss Acrylic
         3) 3rd Coat: PPG Paints 6-8534 Speedhide Int/Ext Gloss Acrylic
            (a) (4 mils wet, 1.2 mils dry per coat)
c. Rust-Oleum
   1) 1) 1st Coat: Rust-Oleum Zinsser Dry Wall Latex Primer
      (a) (4 mils wet, 1.2 mils dry)
   2) 2nd Coat: Rust-Oleum Sierra Performance Beyond No VOC Acrylic Urethane Gloss
   3) 3rd Coat: Rust-Oleum Sierra Performance Beyond No VOC Acrylic Urethane Gloss
      (a) (4 mils wet, 1.5 mils dry per coat)

2. Semi-Gloss Finish
   a. Sherwin Williams
      1) 1st Coat: B28W2600 ProMar 200 Zero VOC Interior Latex Primer
         (a) (4 mils wet, 1.5 mils dry)
      2) 2nd Coat: B31W2651 ProMar 200 Zero VOC Interior Latex Semi-Gloss
      3) 3rd Coat: B31W2651 ProMar 200 Zero VOC Interior Latex Semi-Gloss
         (a) (4 mils wet, 1.6 mils dry per coat)
   b. PPG Paints
      1) 1st Coat: PPG Paints 6-2 Speedhide Interior Quick Drying Latex Sealer
         (a) (4 mils wet, 1.2 mils dry)
      2) 2nd Coat: PPG Paints 6-500 Speedhide Interior Semi-Gloss
      3) 3rd Coat: PPG Paints 6-500 Speedhide Interior Semi-Gloss
         (a) (4 mils wet, 1.5 mils dry per coat)
   c. Rust-Oleum
      1) 1st Coat: Rust-Oleum Zinsser Dry Wall Latex Primer
         (a) (4 mils wet, 1.2 mils dry)
      2) 2nd Coat: Rust-Oleum Zinsser Perma White Interior Latex, Semi Gloss
      3) 3rd Coat: Rust-Oleum Zinsser Perma White Interior Latex, Semi Gloss
         (a) (4 mils wet, 1.5 mils dry per coat)

3. Eg-Shel / Satin Finish
   a. Sherwin Williams
      1) 1st Coat: B28W2600 ProMar 200 Zero VOC Interior Latex Primer
         (a) (4 mils wet, 1.5 mils dry)
      2) 2nd Coat: B20W2651 ProMar 200 Zero VOC Interior Latex Eg-Shel
      3) 3rd Coat: B20W2651 ProMar 200 Zero VOC Interior Latex Eg-Shel
         (a) (4 mils wet, 1.6 mils dry per coat)
   b. PPG Paints
      1) 1st Coat: PPG Paints 6-2 Speedhide Interior Quick Drying Latex Sealer
         (a) (4 mils wet, 1.2 mils dry)
      2) 2nd Coat: PPG Paints 6-411 Speedhide Interior Eggshell
      3) 3rd Coat: PPG Paints 6-411 Speedhide Interior Eggshell
         (a) (4 mils wet, 1.5 mils dry per coat)
   c. Rust-Oleum
      1) 1) 1st Coat: Rust-Oleum Zinsser Dry Wall Latex Primer
         (a) (4 mils wet, 1.2 mils dry)
      2) 2nd Coat: Rust-Oleum Zinsser Perma White Interior Latex, Satin
      3) 3rd Coat: Rust-Oleum Zinsser Perma White Interior Latex, Satin
         (a) (4 mils wet, 1.5 mils dry per coat)

4. Flat Finish
   a. Sherwin Williams
      1) 1st Coat: B28W2600 ProMar 200 Zero VOC Interior Latex Primer
         (a) (4 mils wet, 1.5 mils dry)
      2) 2nd Coat: B30W2651 ProMar 200 Zero VOC Interior Latex Flat
      3) 3rd Coat: B30W2651 ProMar 200 Zero VOC Interior Latex Flat
         (a) (4 mils wet, 1.8 mils dry per coat)
b. PPG Paints
   1) 1st Coat: PPG Paints 6-2 Speedhide Interior Quick Drying Latex Sealer  
      (a) (4 mils wet, 1.2 mils dry)  
   2) 2nd Coat: PPG Paints 6-70 Speedhide Interior Flat  
   3) 3rd Coat: PPG Paints 6-70 Speedhide Interior Flat  
      (a) (4 mils wet, 1.6 mils dry per coat)  

  c. Rust-Oleum  
   1) 1st Coat: Rust-Oleum Zinsser Dry Wall Latex Primer  
      (a) (4 mils wet, 1.2 mils dry)  
   2) 2nd Coat: Rust-Oleum Zinsser Perma White Interior Latex, Eggshell  
   3) 3rd Coat: Rust-Oleum Zinsser Perma White Interior Latex, Eggshell  
      (a) (4 mils wet, 1.5 mils dry per coat)  

   5. One coat of alkyd primer sealer.

2.04 ACCESSORY MATERIALS  
   A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding  
      materials, and clean-up materials as required for final completion of painted surfaces.  
   B. Patching Material: Latex filler.  
   C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION  
3.01 EXAMINATION  
   A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.  
   B. Examine surfaces scheduled to be finished prior to commencement of work.  Report any  
      condition that may potentially effect proper application.  
   C. Test shop-applied primer for compatibility with subsequent cover materials.

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 mask surface appurtenances, including electrical plates, hardware, light fixture trim,  
      escutcheons, and fittings, prior to preparing surfaces or finishing.  
   D. Seal surfaces that might cause bleed through or staining of topcoat.  
   E. Concrete:  
      1. Remove release agents, curing compounds, efflorescence, and chalk.  Do not coat  
         surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in  
         manufacturer's written instructions.  
      2. Clean surfaces with pressurized water.  Use pressure range of 1,500 to 4,000 psi at 6 to 12  
         inches.  Allow to dry.  
      3. Clean concrete according to ASTM D4258.  Allow to dry.  
      4. Prepare surface as recommended by top coat manufacturer and according to SSPC-SP 13.
F. Masonry:
   1. Remove efflorescence and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces or if alkalinity of mortar joints exceed that permitted in manufacturer's written instructions. Allow to dry.
   2. Prepare surface as recommended by top coat manufacturer.
   3. Clean surfaces with pressurized water. Use pressure range of 600 to 1,500 psi at 6 to 12 inches. Allow to dry.

G. Concrete Floors and Traffic Surfaces: Remove contamination, acid etch, and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.

H. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.

I. Plaster: Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.

J. Galvanized Surfaces:

K. Ferrous Metal:
   1. Solvent clean according to SSPC-SP1.
   2. Remove rust, loose mill scale, and other foreign substances using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.

3.03 APPLICATION
A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
D. Apply each coat to uniform appearance in thicknesses specified by manufacturer.
E. Sand wood and metal surfaces lightly between coats to achieve required finish.
F. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
G. Wood to Receive Transparent Finishes: Tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.
H. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

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
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SECTION 10 21 13.17
PHENOLIC TOILET PARTITIONS

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Toilet compartments.
B. Urinal screens.

1.02 RELATED REQUIREMENTS
A. Section 06 10 00 - Rough Carpentry: Blocking required for mounting brackets.
B. Section 10 28 00 - Toilet, Bath, and Laundry Accessories: Toilet room accessories.

1.03 REFERENCE STANDARDS
A. ANSI A117.1-1998; Specifications for making buildings and facilities accessible to and usable by physically handicapped people.
B. ADA; Accessibility Guidelines for Buildings and Facilities, Federal Register Volume 56, Number 44.

1.04 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide product data sheets, installation instructions, cleaning and maintenance instructions and replacement parts information.
C. Shop Drawings: Indicate fabrication and erection of compartment assemblies, to extent not fully described by manufacturer's data sheets, anchorage, accessory items and finishes and location drawings for bolt hole locations in supporting members for attachment of compartments.
D. Samples: Furnish scale model of compartments, including stile, shoe, door, door hardware, divider panel, and mounting brackets.
E. Certificate: Certify that products of this section meet or exceed specified requirements.

1.05 QUALITY ASSURANCE
A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
B. Installer Qualifications: Company specializing in performing the work of this section with minimum three years of experience.

1.06 DELIVERY, STORAGE, AND HANDLING
A. Deliver items in manufacturer's original unopened protective packaging.
B. Store materials in original protective packaging to prevent physical damage or wetting.
C. Handle to prevent damage to finished surfaces.

1.07 WARRANTY
A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
B. Furnish ten year limited warranty for panels, doors, and stiles against breakage, corrosion, delamination, and defects in factory workmanship.
C. Furnish one year guarantee against defects in material and workmanship for stainless steel door hardware and mounting brackets.
PART 2 PRODUCTS

2.01 BASE BID MANUFACTURER

A. ASI Global Partitions; www.globalpartitions.com Model floor mounted - overhead braced toilet compartments.

B. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 PERFORMANCE REQUIREMENTS:

A. Graffiti Resistance: Partition material shall meet or exceed graffiti removal characteristics when tested in accordance with ASTM D 6578 - Standard Practice for Determination of Graffiti Resistance, Section 9, "Graffiti Removal Procedure Using Manual Solvent Rubs."

   1. Scratch resistance: Maximum load value shall exceed 10 kilograms.

   1. Impact Resistance: Maximum impact force value shall exceed 30 inch pounds.

   1. Flame Spread: Not to exceed 75.
   2. Smoke Developed: Not to exceed 450.
   3. Material Fire Ratings:
      a. National Fire Protection Association (NFPA): Class B.
      b. International Code Council (ICC): Class B.

2.03 MATERIALS:

A. Stiles, Panels, Doors, and Screens
   1. Stiles, panels, doors and screens shall be manufactured from Solid Phenolic core (black) and Decorative surface sheet on both faces.

B. Toilet Partition Material
   1. Toilet partitions shall be constructed of solid color reinforced composite material, which is composed of dyes, organic fibrous material, and polycarbonate/phenolic resins. Material shall have a non-ghosting, graffiti resistant surface integrally bonded to core through thermal and mechanical pressure. Edges of material shall be the same color as the surface.
   2. Toilet partitions constructed of high density polyethylene (HPDE) or high density polypropylene will not be acceptable.

C. Thickness:
   1. Stiles and doors shall be 3/4 inch.
   2. Panels shall be 1/2 inch.

D. Hardware:
   1. All hardware to be 18-8, type 304 satin stainless steel.
   2. Chrome plated materials will not be accepted.

E. Latches:
   1. Sliding door latch shall be 14 gauge and shall slide on nylon track.
   2. Sliding door latch shall require less than 5 pound force to operate. Twisting latch operation will not be accepted.
   3. Latch track shall be attached to door by machine screws into factory-installed threaded brass inserts.
4. Threaded brass inserts shall be factory installed for door hinge and latch connections and shall withstand a direct pull exceeding 1,500 pounds per insert.
5. Through bolted, stainless steel, pin-in-head Torx sex bolt fasteners shall be used at the latch keeper to stile connections and shall withstand direct pull force exceeding 1,500 pounds per fastener.

F. Hinges:
1. Cam hinges shall be adjustable in the field to permit door to be fully closed or partially open when compartment is unoccupied.
2. Hinges shall be attached to door and stile by theft-resistant, pin-in-head Torx stainless steel machine screws into factory-installed, threaded brass inserts.
3. Fasteners secured directly into the core are not acceptable.
4. Door shall be furnished with two 11 gauge stainless steel door stop plates with attached rubber bumpers to resist door from being kicked in/out beyond stile.
5. Door stops and hinges shall be secured with stainless steel, pin-in-head Torx machine screws into threaded brass inserts.
6. Threaded brass inserts shall withstand a direct pull force exceeding 1,500 pounds per insert.

G. Clothes Hook:
1. Clothes hook shall be constructed of stainless steel and shall protect no more than 1-1/8 inch from face of door.
2. Clothes hook shall be secured to door by through-bolt, theft-resistant, pin-in-head Torx stainless steel screws. Through-bolted fasteners shall withstand a direct pull force exceeding 1,500 pounds per fastener.

H. Mounting Brackets:
1. Brackets shall be constructed of stainless steel and shall be mounted inside compartment.
2. Fasteners at locations connecting panels-to-stiles shall utilize through-bolted, stainless steel, pin-in-head Torx sex bolt fasteners. Through-bolted fasteners shall withstand direct pull force exceeding 1,500 pounds per fastener.
3. Wall mounted urinal screens shall be 11 gauge double thickness.
4. Leveling device shall be 7 gauge, 3/16 inch hot rolled steel bar; chromate-treated and zinc-plated; through-bolted to base of solid color reinforced composite stile.
5. Stile shoe shall be one-piece, 4 inch high, type-304, 22 gauge stainless steel with satin finish. Top shall have 90 degree return to stile. Shoe will be composed of one-piece of stainless steel and capable of being fastened (by clip) to stiles starting at wall line.
6. Headrail shall be satin-finished, extruded anodized aluminum with anti-grip profile.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Verify that dimensions, walls and surfaces are ready to receive work of this section and that plumbing fixtures are as indicated.

B. Do not begin work until all conditions are satisfactory. Promptly report conditions adversely affecting work of this section.

3.02 ERECTION

A. Install components rigidly, straight, plumb, and level in accordance with manufacturer's instructions.
B. Installation methods shall conform to manufacturer's recommendation for backing and proper support.
C. Conceal evidence of drilling, cutting, and fitting to room finish.
D. Maintain uniform clearance at vertical edge of door.

3.03 ADJUSTING

A. Adjust hardware for proper operation after installation.
B. Set cam hinge on inswinging doors to hold open when unlatched.
C. Set cam hinge on outswinging doors to hold closed when unlatched.

3.04 CLEANING
A. Clean exposed surfaces of compartments, hardware, and fittings.

3.05 PROTECTION
A. Protect installed toilet compartments from subsequent construction operations.

END OF SECTION
SECTION 10 21 13.18
SOLID SURFACE SHOWER SURROUNDS AND WINDOW SILLS

PART 1 GENERAL

1.01 SECTION INCLUDES
   A. Shower Surrounds - Vertical, solid surface wall cladding for wet applications.
   B. Shower Bases.
   C. Window Sills.
   D. Accessories.

1.02 RELATED REQUIREMENTS
   A. Section 06 10 00 - Rough Carpentry: Blocking and supports.
   B. Section 09 21 16 - Gypsum Board Assemblies: Cement backer board.
   C. Section 10 28 00 - Toilet, Bath, and Laundry Accessories.

1.03 REFERENCE STANDARDS
   B. ASTM D570 - Water Absorption of Plastics.
   C. ASTM D638 - Tensile Properties of Plastics.
   D. ASTM D696 - Coefficient of Linear Thermal Expansion of Plastics.
   F. ASTM D2583 - Indentation Hardness of Rigid Plastics by Means of a Barcol Impresser.
   H. ANSI A137.1 - Tile Slip Test
   I. IAPMO/ANSI - Standard Z124.1.2: Plastic Bathtub and Shower Units

1.04 ADMINISTRATIVE REQUIREMENTS
   A. Coordination: Coordinate the work with placement of support framing and anchors in walls and ceilings.

1.05 SUBMITTALS
   A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
   B. Product Data: Provide data on panel construction, hardware, and accessories.
      1. Submit manufacturer's current product literature for each product indicated.
   C. Shop Drawings: Indicate partition plan, elevation views, dimensions, and attachments to other work.
      1. Submit shop drawings showing seams, termination points, and details of edges.
      2. Submit coordination drawings indicating electrical and plumbing work.
   D. Samples: Submit two samples of partition panels, 3 by 3 inch in size illustrating panel finish, color, and sheen.
   E. Manufacturer's Installation Instructions: Provide manufacturer's written installation instructions.
   F. Installer Certification: Submit a signed copy of the installer's certificate, acknowledging the employee has been trained and approved by manufacturer.
1.06 QUALITY ASSURANCE
A. Installer Qualifications: Manufacturer authorized installer shall fabricate and install solid surface products, and demonstrate successful experience in installing finished carpentry items similar in type and quality to those required for this project.

1.07 DELIVERY, STORAGE AND HANDLING
A. See Section 01 60 00 Product Requirements,
B. Deliver sheets, fabricated items, materials and components in manufacturer’s original, unopened, undamaged containers with identification labels intact.
C. Store solid surface products and accessories as recommended by manufacturer.

1.08 WARRANTY
A. Provide manufacturer’s limited ten-year warranty against defective material and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS
A. Solid Surface Shower Surrounds and Window Sills:
   2. Substitutions: Section 01 60 00 - Product Requirements.

2.02 SOLID SURFACE SHOWER SURROUNDS
A. Shower Surrounds: Factory fabricated panels made of solid surface material finish, wall mounted with adhesive.
   1. Description: Non-porous, homogeneous material maintaining the same composition throughout the part with a composition of polyester or acrylic polymer, aluminum trihydrate filler and pigment.
   2. Sheet Size: [36” x 96”] [48” x 96”] [60” x 96”] - as indicated on the drawings.
   3. Color: as indicated in the finish schedule.
   4. Vertical Wet Wall Characteristics: (solid colors)
      a. Thickness: 6mm
      b. Barcol Hardness: 59, when tested in accordance with ASTM D2583
      c. Elongation: 2.2%, when tested in accordance with ASTM D638
      d. Tensile strength: 3,800psi, when tested in accordance with ASTM D638
      e. Tensile Modulus: 11 x 105, when tested in accordance with ASTM D638
      f. Water Absorption after 24 hours: .07%, when tested in accordance with ASTM D570
      g. Charpy Impact (Foot Pounds/Inch): 1.5, when tested in accordance with ASTM D6110
      h. Impact Resistance 1/2 Pound: No Fracture, when tested in accordance with NEMA LD3-3.8
      i. Linear Thermal Expansion: 2.0 x 10-5, when tested in accordance with ASTM D696
      j. High Temperature Resistance: Slight Effect, when tested in accordance with NEMA LD3-3.6
      k. Boiling Water Resistance: No Effect, when tested in accordance with ISFA 2-01
      l. Stain Resistance: No Effect, when tested in accordance with NEMA LD3-3.4
      m. Weight per sq. ft., 6mm thickness: 2.2 pounds
   5. Cast Shower Bases
      a. Basis of Design: Aristech Acrylics
      b. Description: Solid cast polyester / acrylic blend homogeneous resin base with side walls and drain. Specified drain location possible on fabricated models. Non-skid floor surface with water channels directing water to the drain at a 2- degree slope (1/4” per foot).
      c. Conform to the requirements of IAPMO/ANSI Standard Z124.1.2
      d. Slip Resistance Coefficient: 0.65 minimum as tested in accordance with ANSI A137.1
6. Shower Base Characteristics:
   a. Tensile Strength: 4,800 psi, when tested in accordance with ASTM D638
   b. Flexural strength: 8,300 psi, when tested in accordance with ASTM D790
   c. Modulus of Elasticity: 1.2 x 10^7 psi per ASTM D790
   d. High Temperature Resistance: No Effect, when tested in accordance with NEMA LD3-3.6
   e. Stain Resistance: Passes, when tested in accordance with ANSI Z124
   f. Flame Spread: Class A, when tested in accordance with ASTM E84

2.03 WINDOW SILLS
A. Window Sills: Factory fabricated panels made of solid surface material finish, sill mounted with adhesive.
   1. Thickness: 1/2 inch.
   2. Size: as indicated on drawings.
   3. Color: as indicated in the finish schedule.

2.04 ACCESSORIES
A. Adhesive: Use manufacturer recommended adhesives for type of application.
B. Joint Sealant: Use manufacturer recommended sealants.
   1. Silicone Sealant: Mildew-resistant, FDA compliant, 100% clear silicone sealant.
C. Provide matching inside corner trim and outside finish trim to conceal corner sealant and provide transition from shower to wall covering.
D. Optional Soap/Shampoo Components
   1. Provide matching multi-level solid cast corner shampoo and soap holder.

2.05 FABRICATION
A. Solid surface shall be factory fabricated by an authorized fabricator.
B. Solid surface paneling and shower/tub enclosures shall be fabricated of 6mm (~1/4") thick material unless otherwise indicated.
C. Solid surface shall be fabricated to field measurements.
D. Cut and finish component edges with clean, sharp returns.
E. Finished edges shall have a 1/16" radius.

PART 3 EXECUTION
3.01 GENERAL
A. Install solid surfaces in accordance with manufacturer’s installation guidelines and recommendations.

3.02 EXAMINATION
A. Verify that field measurements are as indicated.
B. Verify correct location of built-in framing, anchorage, and bracing.
C. Inspect materials and location of installation for conditions affecting performance of work in accordance with shop drawings.
D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.03 INSTALLATION
A. Install shower pan, plumb and level. Coordinate plumbing with work of Division 22.
B. Install panels, secure, rigid, plumb, and level in accordance with manufacturer’s instructions.
   1. Panels shall be provided to heights shown on the drawings with no horizontal seaming.
   2. Panels shall utilize the maximum panel dimension available to minimize vertical seams.
   3. Panels shall be full width and height with seams only at inside corners of enclosure.
   4. Field cut panels as required for plumbing fixtures and bath accessories.
5. Apply quarter size dots of silicone adhesive approximately 1” inside of perimeter of solid surface panels. Apply additional dots of silicone every 8-10” apart over remaining surface. Apply hot melt glue to back of panel for temporary adhesion of panels to substrate while adhesive cures.
6. Allow panels to cure for 24 hours, minimum, before exposure to moisture or pressure.
7. Corner and vertical joints: Form 1/8-inch-wide joints, sealed with clear 100% silicone sealant.
   
C. Install window sills, secure, rigid, plumb, and level in accordance with manufacturer's instructions.
D. Maintain equal butt-seam between panels.

3.04 TOLERANCES
   A. Maximum Variation From True Position: 1/16 inch.
   B. Maximum Variation From Plumb: 1/16 inch.

3.05 CLEANING AND PROTECTION
   A. Remove adhesives, sealants and other stains.
   B. Protect shower enclosure from damage. Repair or replace damaged work, to Architect’s satisfaction.

END OF SECTION
SECTION 10 21 23
CUBICLE CURTAINS AND TRACK

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Suspended overhead curtain track and guides.
B. Surface mounted overhead curtain track and guides.

1.02 RELATED REQUIREMENTS
A. Section 06 10 00 - Rough Carpentry: Blocking and supports for track.

1.03 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide data for curtain fabric characteristics.
C. Shop Drawings: Indicate a reflected ceiling plan view of curtain track, hangers and suspension points, attachment details, schedule of curtain sizes.
D. Samples: Submit 12 by 12 inch sample patch of curtain cloth with representative top, bottom, and edge hem stitch detail, heading with reinforcement and carrier attachment to curtain header.
E. Samples: Submit 12 inch sample length of curtain track including typical splice, wall and ceiling hanger, and escutcheon.
F. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention.
G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

PART 2 PRODUCTS

2.01 MANUFACTURERS
A. Cubicle Track and Curtains:
   1. Arcom; www.arcom.com
      a. Product as indicated on Finish Schedule.
   2. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 TRACKS AND TRACK COMPONENTS
A. Tracks: Extruded aluminum sections; one piece per track run.
   1. Profile: I-beam.
   3. Structural Performance: Capable of supporting vertical test load of 50 lbs without visible deflection of track or damage to supports, safely supporting moving loads, and sufficiently rigid to resist visible deflection and without permanent set.
   4. Track End Stop, Tees, and Y's: To fit track section.
   5. Track Bends: Minimum 12 inch radius; fabricated without deformation of track section or impeding movement of carriers.
   6. Suspension Rods: Tubular aluminum sections, sized to support design loads and designed to receive attachment from track and ceiling support.
   7. Escutcheons: Where suspension rod meets finished ceiling or structure, provide escutcheons to match rod finish.
B. Curtain Carriers: Nylon slider, size and type compatible with track; designed to eliminate bind when curtain is pulled; fitted to curtain to prevent accidental curtain removal.
   1. Provide 3 carriers per foot of track length
C. Wand: Aluminum, attached to lead carrier, for pull-to-close action.
D. Installation Accessories: Types required for specified mounting method and substrate conditions.

PART 3 EXECUTION

3.01 EXAMINATION
   A. Verify that surfaces and supports above ceiling are ready to receive work of this Section.
   B. Verify that field measurements are as indicated.

3.02 INSTALLATION
   A. Install curtain track to be secure, rigid, and true to ceiling line.
   B. Install end cap and stop device.
   C. Install curtains on carriers ensuring smooth operation.

END OF SECTION
SECTION 10 22 39
FOLDING PANEL PARTITIONS

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Top-supported folding panel partitions, horizontal opening.
B. Ceiling track, ceiling guards, and operating hardware.

1.02 RELATED REQUIREMENTS
A. Section 05 12 00: Overhead track structural support framing.
B. Section 06 10 00 - Rough Carpentry: Wood blocking and track support shimming.

1.03 REFERENCE STANDARDS
F. ASTM E413 - Classification for Rating Sound Insulation; 2016.
H. ASTM F793/F793M - Standard Classification of Wall Coverings by Use Characteristics; 2015.

1.04 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide data on partition materials, operation, hardware and accessories, track switching components, and colors and finishes available.
C. Shop Drawings: Indicate opening sizes, track layout, details of track and required supports, static and dynamic loads, location and details of pass door and frame, adjacent construction and finish trim, and stacking depth.
D. Samples for Selection: Submit two samples of full manufacturer's color range for selection of colors.
E. Samples for Review: Submit two samples of surface finish, 12 by 12 inches size, illustrating quality, colors selected, texture, and weight.
F. Manufacturer's Instructions: Indicate special procedures.
G. Maintenance Data: Include recommended cleaning methods, cleaning materials, and stain removal methods. Describe cleaning materials detrimental to finish surfaces and hardware finish.

1.05 QUALITY ASSURANCE
A. Manufacturer Qualifications: Company specializing in manufacturing products specified this section with minimum three years of documented experience.
B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING
A. Store products in manufacturer's unopened packaging until installation.
1.07 WARRANTY  
A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.  
B. Provide two year manufacturer warranty against defects in material and workmanship, excluding abuse.

PART 2 PRODUCTS

2.01 MANUFACTURERS
A. Folding Panel Partitions - Horizontal Opening:  
   4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 FOLDING PANEL PARTITIONS - HORIZONTAL OPENING
A. Folding Panel Partitions: Side opening; paired panels; side stacking; motor operated.  
B. Panel Construction:  
   1. Frame: 16 gage, 0.0598 inch thick formed sheet steel frame top, bottom, jambs, and intermediates; welded construction, with acoustical insulation fill.  
   2. Substrate: Gypsum board.  
   4. Hinges: Continuous piano type, 18 gage, 0.05 inch stainless steel.  
   5. Hardware: Latching door handles of cast steel, satin chrome finish; lock cylinder keyed to building keying system; pull bars.  
   6. Panel Properties:  
      a. Thickness With Finish: 3 1/2 inches.
C. Panel Finishes:  
      a. Type II vinyl face.  
   2. Trim: Trimless.  
D. Panel Seals:  
   1. Panel to Panel Seals: Grooved and gasketed astragals, with continuous flexible ribbed vinyl seal fitted to panel edge construction; color to match panel finish.  
   2. Acoustic Seals: Flexible acoustic seals at jambs, meeting mullions, ceilings, retractable floor and ceiling seals, and above track to structure acoustic seal.  
E. Suspension System:  
   1. Track: Formed steel; 1-1/4 by 1-1/4 inch size; thickness and profile designed to support loads, steel sub-channel and track connectors, and track switches.  
   2. Carriers: Nylon wheels on trolley carrier at top of every second panel, sized to carry imposed loads, with threaded pendant bolt for vertical adjustment.  
F. Performance:  
   1. Acoustic Performance:  
      a. Sound Transmission Class (STC): 48 to 52 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90, on panel size of 100 sq ft.  
   2. Surface Burning Characteristics of Panel Finish: Flame spread/smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84.  
   3. Installed partition system track capable of supporting imposed loads, with maximum deflection of 1/360 of span.  
G. Carriers: Steel, ball bearing wheels on trolley carrier at top of every second panel, sized to carry imposed loads, with threaded pendant bolt for vertical adjustment.
H. Accessories:
   1. Ceiling Closure: White enameled ceiling closure; aluminum jamb and head molding, fittings and attachments, locking expandable mechanism.

2.03 MATERIALS
   A. Aluminum Extrusions: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper.
   B. Standard Gypsum Board: ASTM C1396/C1396M, 3/8 inch thick, maximum permissible length; ends square cut, square edges.
   C. Vinyl Coated Fabric: ASTM F793, Category VI, polyvinyl fluoride (PVC) finish for washability and improved flame retardance; color as selected by Architect from manufacturer's standard range.

PART 3 EXECUTION

3.01 EXAMINATION
   A. Verify that field measurements are as indicated.
   B. Verify track supports are laterally braced and will permit track to be level within 1/4 inch of required position and parallel to the floor surface.
   C. Verify floor flatness of 1/8 inch in 10 feet, non-cumulative.
   D. Verify wall plumbness of 1/8 inch in 10 feet, non-cumulative.

3.02 INSTALLATION
   A. Install partition in accordance with manufacturer's instructions and ASTM E557.
   B. Fit and align partition assembly level and plumb.
   C. Lubricate moving components.
   D. Install acoustic sealant to achieve required acoustic performance.
   E. Coordinate electrical connections.

3.03 ADJUSTING
   A. Adjust partition assembly to provide smooth operation from stacked to full open position. Do not over-compress acoustic seals.
   B. Visually inspect partition in full extended position for light leaks to identify a potential acoustical leak.
   C. Adjust partition assembly to achieve lightproof seal.

3.04 CLEANING
   A. Clean finish surfaces and partition accessories.

3.05 CLOSEOUT ACTIVITIES
   A. Demonstrate operation of partition and identify potential operational problems.

END OF SECTION
SECTION 10 26 01
WALL AND CORNER GUARDS

PART 1 GENERAL

1.01 SECTION INCLUDES
   A. Corner guards.

1.02 RELATED REQUIREMENTS
   A. Section 06 10 00 - Rough Carpentry: Blocking for wall and corner guard anchors.

1.03 REFERENCE STANDARDS

1.04 SUBMITTALS
   A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
   B. Product Data: Indicate physical dimensions, features, anchorage details, and rough-in measurements.
   C. Samples: Submit samples illustrating component design, configurations, joinery, color and finish.
      1. Submit two sections of corner guards, 24 inches long.
   D. Manufacturer's Instructions: Indicate special procedures, perimeter conditions requiring special attention.

PART 2 PRODUCTS

2.01 MANUFACTURERS
   A. Corner Guards:

2.02 PRODUCT TYPES
   A. Corner Guards - Flush Mounted:
      1. Material: Type 304 stainless steel, No. 4 finish, 25 gage, 0.20 inch thick.
         a. Extruded one-piece unit without splices, installed with adhesive.
      2. Width of Wings: 3/4 inches.
      3. Corner: Square.
      5. Length: One piece - Full Height.
   B. Corner Guards - Surface Mounted:
      1. Material: High impact vinyl.
      2. Surface Burning Characteristics: Provide assemblies with flame spread index of 25 or less and smoke developed index of 450 or less, when tested in accordance with ASTM E84.
      3. Width of Wings: 1 1/2 inches.
      5. Color: As indicated in the Finish Schedule.

2.03 FABRICATION
   A. Fabricate components with tight joints, corners and seams.
   B. Pre-drill holes for attachment.
   C. Form end trim closure by capping and finishing smooth.
PART 3 EXECUTION

3.01 EXAMINATION
   A. Verify that rough openings, concealed blocking, and anchors are correctly sized and located.
   B. Verify that field measurements are as indicated on drawings.

3.02 INSTALLATION
   A. Install components in accordance with manufacturer's instructions, level and plumb, secured rigidly in position to supporting construction.
   B. Position corner guard on top of base. Height as indicated on the Finish Schedule.

3.03 CLEANING
   A. Clean wall and door protection items of excess adhesive, dust, dirt, and other contaminants.

END OF SECTION
SECTION 10 28 00
TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1  GENERAL

1.01  SECTION INCLUDES
   A. Commercial toilet accessories.
   B. Commercial shower and bath accessories.
   C. Under-lavatory pipe supply covers.
   D. Utility room accessories.
   E. Grab bars.
   F. Back-lit mirrors - see electrical drawings.

1.02  RELATED REQUIREMENTS
   A. Section 06 10 00 - Rough Carpentry: Concealed supports for accessories, including in wall framing and plates and above ceiling framing.
   B. Section 08 83 00 - Mirrors: Other mirrors.

1.03  REFERENCE STANDARDS
   A. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.

1.04  ADMINISTRATIVE REQUIREMENTS
   A. Coordinate the work with the placement of internal wall reinforcement and reinforcement of toilet partitions to receive anchor attachments.

1.05  SUBMITTALS
   A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
   B. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.
   C. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.

PART 2  PRODUCTS

2.01  MANUFACTURERS
   A. Provide products listed on the drawings.
      1. Substitutions: Section 01 60 00 - Product Requirements.
   B. Provide products of each category type by single manufacturer.

2.02  MATERIALS
   A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
      1. Grind welded joints smooth.
      2. Fabricate units made of metal sheet of seamless sheets, with flat surfaces.
B. Keys: Provide 2 keys for each accessory to Owner; master key lockable accessories.
C. Stainless Steel Sheet: ASTM A666, Type 304.
D. Fasteners, Screws, and Bolts: Hot dip galvanized; tamper-proof; security type.
E. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

2.03 FINISHES
A. Stainless Steel: Satin finish, unless otherwise noted.
B. Back paint components where contact is made with building finishes to prevent electrolysis.

2.04 COMMERCIAL TOILET ACCESSORIES
A. See drawings for accessories schedule.
B. Mirrors: Stainless steel framed, 1/4 inch thick annealed float glass; ASTM C1036.
   1. Frame: 0.05 inch angle shapes, with mitered and welded and ground corners, and tamperproof hanging system; No.4 finish.
   2. Backing: Full-mirror sized, minimum 0.03 inch galvanized steel sheet and nonabsorptive filler material.
C. Back-lit Mirrors:
   1. Tech Lighting.
         1) M Restroom #1012: 2 - 2'-0" x 3'-4" high
         2) W Restroom #1013: 2 - 2'-0" x 3'-4" high
         3) M Locker #1201: 2 - 2'-0" x 3'-4" high
         4) W Locker #1202: 2 - 2'-0" x 3'-4" high
         5) M Restroom #1432: 2 - 2'-0" x 3'-4" high
         6) W Restroom #1433: 2 - 2'-0" x 3'-4" high
         7) W Locker #1610: 2 - 2'-0" x 3'-4" high
         8) M Locker #1611: 2 - 2'-0" x 3'-4" high
         9) M Restroom #2009: 2 - 2'-0" x 3'-4" high
        10) W Restroom #2010: 2 - 2'-0" x 3'-4" high
D. Grab Bars: Stainless steel, 1-1/4 inches outside diameter, minimum 0.05 inch wall thickness, nonslip grasping surface finish, concealed flange mounting; 1-1/2 inches clearance between wall and inside of grab bar.
   1. Length: 36 inches, 42 inches and 18 inches in configurations shown on drawings.

2.05 COMMERCIAL SHOWER AND BATH ACCESSORIES
A. Shower Curtain Rod: Stainless steel tube, 1 inch outside diameter, 0.04 inch wall thickness, satin-finished, with 3 inch outside diameter, minimum 0.04 inch thick satin-finished stainless steel flanges, for concealed mounting.
   1. Products:
      a. As indicated on the drawings.
B. Shower Curtain:
   1. Curtain as indicated on the finish schedule.
   2. Shower Curtain Hooks: Chrome-plated or stainless steel spring wire designed for snap closure.
   3. Shower curtain hooks, B-204-1 manufactured by Bobrick.

2.06 UNDER-LAVATORY PIPE AND SUPPLY COVERS
A. Specified in 22 08 40 - Plumbing Pipe Insulation.
PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.
B. Verify exact location of accessories for installation.
C. See Section 06 10 00 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 the drawings.
B. Install plumb and level, securely and rigidly anchored to substrate.
C. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.
D. Mounting Heights and Locations: As required by accessibility regulations and as indicated on drawings.

3.04 PROTECTION

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

END OF SECTION
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SECTION 10 44 00
FIRE PROTECTION SPECIALTIES

PART 1 GENERAL
1.01 SECTION INCLUDES
A. Fire extinguishers.
B. Fire extinguisher cabinets.
C. Knox-Box.

1.02 RELATED REQUIREMENTS
A. Section 06 10 00 - Rough Carpentry: Wood blocking product and execution requirements.

1.03 REFERENCE STANDARDS

1.04 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide extinguisher operational features and color and finish.
C. Shop Drawings: Indicate locations of cabinets and cabinet physical dimensions.
D. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.
E. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

1.05 FIELD CONDITIONS
A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 PRODUCTS
2.01 MANUFACTURERS
A. Fire Extinguisher Cabinets and Accessories:
   1. JL Industries, Inc.
   4. Or Architect approved equal:
      a. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 FIRE EXTINGUISHERS
A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
   1. Provide extinguishers labeled by UL (DIR) or FM (AG) for purpose specified and as indicated.
B. Multipurpose Dry Chemical Type Fire Extinguishers: Carbon steel tank, with pressure gauge.
   2. Size: 10 pound.
   3. Finish: Baked polyester powder coat, red color.
C. Wet Chemical Type: Cast Steel tank, with pressure gage.
   1. Class K.
   2. Size 6 liters
   3. Finish: Polished chrome.
D. Carbon Dioxide Type Fire Extinguishers: Aluminum tank, with pressure gauge.
   1. Class: B:C type.
   2. Size: 20 pound.

2.03 FIRE EXTINGUISHER CABINETS
A. Basis of Design:
   1. Larson's, semi-recessed aluminum cabinets located in gypsum board and stud partitions.
      Notify the Architect and Fire Marshall when metal stud framing is in place for locating
cabinets. Model numbers to be determined by wall thickness and locations determined by
the fire marshal.
   2. Larson's, surface mounted aluminum cabinets located on masonry partitions.
   3. Both shall be Aluminum with clear satin anodized finish, vertical duo with clear acrylic
      glazing and vertical red letters.
B. Metal: Formed aluminum; .128 inch thick.
C. Cabinet Configuration: Semi-recessed and surface mount types as indicated on the drawings.
D. Door: 0.036 inch metal thickness, reinforced for flatness and rigidity with nylon catch. Hinge
doors for 180 degree opening with two butt hinge.

2.04 KNOX-BOX
A. Recessed mount with lift off door, with UL listed tamper switches. 1/4" plate steel housing. 1/2" thick steel door with interior gasket seal. Box and lock UL listed. Lock has 1/8" thick stainless
   steel dust cover with tamper seal mounting capability.
   1. Exterior Dimensions: 7"H x 7"W x 4 1/2"D.
   2. Recessed Mount Flange: 9 1/2"H x 9 1/2"W.
   3. Lock: UL listed. Double-action rotating tumblers and hardened steel pins accessed by a
      biased cut key.
   5. Color: Aluminum.
   6. P/N: 4400 Series Knox-Box (model no. 4444)

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. Install cabinets plumb and leveling wall openings, 60 inches from finished floor to top of the
   cabinet.
C. Secure rigidly in place.
D. Place extinguishers in cabinets.

3.03 SCHEDULES
A. Miscellaneous locations: Fire Marshall to determine final locations. Contractor to provide
   number of fire extinguisher cabinets indicated on the drawings, dry chemical type 4A-80B:C
   (Larson's model number MP10). Placed in fire extinguisher cabinets. (See the plans for the
   quantity of recessed units and surface mounted fire cabinets in the buildings.)
B. Break Room #2: Provide one (1) wet chemical type 2A:K (Larson's model number WC-6L).
   Placed in fire extinguisher cabinet.

END OF SECTION
SECTION 10 51 13
METAL LOCKERS

PART 1 GENERAL

1.01 SECTION INCLUDES
   A. Metal lockers.

1.02 REFERENCE STANDARDS

1.03 SUBMITTALS
   A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
   B. Product Data: Manufacturer's published data on locker construction, sizes and accessories.
   C. Shop Drawings: Indicate locker plan layout, numbering plan and combination lock code.
   D. Samples: Submit two samples 3 by 3 inches in size showing color and finish of metal locker material.
   E. Manufacturer's Installation Instructions: Indicate component installation assembly.

1.04 DELIVERY, STORAGE, AND HANDLING
   A. Protect locker finish and adjacent surfaces from damage.

PART 2 PRODUCTS

2.01 MANUFACTURERS
   A. Metal Lockers:
      1. Global Industrial; Infinity: www.globalindustrial.com
      2. or equal.

2.02 LOCKER APPLICATIONS
   A. Athletic Lockers: Metal lockers, wall mounted with matching closed base.
      1. Width: 12 inch.
      2. Depth: 24 inches.
      3. Height: 72 inches.
      5. Trim: 3" wide recess trim at the top and sides w/ 3/8" return.
      6. Shelves: One shelf - 12" from top.
      7. Hooks: One single prong each side.
      9. Fittings: Size and configuration as indicated on drawings.
      10. Ventilation: Door louvers top and bottom.
      11. Handle: Recessed.
      13. Locking: Padlock hasps, for padlocks provided by Owner.
      14. Number Plates. Owner will designate locker numbers.
      15. Color: TBD

2.03 METAL LOCKERS
   A. Lockers: Factory assembled, made of formed sheet steel, ASTM A653/A653M SS Grade 33/230, with G60/Z180 coating, stretcher leveled; metal edges finished smooth without burrs; baked enamel finished inside and out.
      1. Color: To be selected by Architect.
   B. Locker Body: Formed and flanged; with steel stiffener ribs; electric spot welded.
      1. Body and Shelves: 16 gage, 0.0598 inch.
C. Frames: Formed channel shape, welded and ground flush, welded to body, resilient gaskets and latching for quiet operation.
   1. Door Frame: 16 gage, 0.0598 inch, minimum.

D. Doors: Channel edge; welded construction, manufacturer's standard stiffeners, grind and finish edges smooth.
   1. Door Thickness: 14 gage, 0.0747 inch, minimum.
   2. Form recess for operating handle and locking device.

E. Hinges: Heavy duty, 5-knuckle type; two for doors under 42 inches high; three for doors over 42 inches high.

F. Trim: 20 gage, 0.0359 inch.

G. Coat Hooks: Stainless steel or zinc-plated steel.

H. Number Plates: Provide oval shaped aluminum plates. Form numbers 3/8 inch high of block font style with ADA designation, in contrasting color.

PART 3 EXECUTION

3.01 EXAMINATION
   A. Verify that prepared bases are in correct position and configuration.
   B. Verify bases and embedded anchors are properly sized.

3.02 INSTALLATION
   A. Install in accordance with manufacturer's instructions.
   B. Place and secure on prepared base.
   C. Install lockers plumb and square.
   D. Secure lockers with anchor devices to suit substrate materials. Minimum Pullout Force: 100 pounds.
   E. Bolt adjoining locker units together to provide rigid installation.
   F. Install fittings if not factory installed.
   G. Replace components that do not operate smoothly.

3.03 CLEANING
   A. Clean locker interiors and exterior surfaces.

END OF SECTION
SECTION 10 51 30
PHENOLIC BENCHES

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Phenolic locker benches.

1.02 RELATED REQUIREMENTS
A. Section 06 10 00 - Rough Carpentry: Wood blocking and nailers.

1.03 REFERENCE STANDARDS

1.04 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Manufacturer's published data on locker construction, sizes and accessories.
C. Shop Drawings: Indicate locker plan layout, numbering plan and combination lock code.
D. Samples: Submit two samples 6 by 6 inches in size, of each color scheduled.
E. Manufacturer's Installation Instructions: Indicate component installation assembly.

1.05 DELIVERY, STORAGE, AND HANDLING
A. Protect bench finish and adjacent surfaces from damage.

PART 2 PRODUCTS

2.01 MANUFACTURERS
A. Phenolic Benches:
   1. Wilsonart Compact Laminate, LLC: www.wilsonart.com
   2. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 BENCH APPLICATIONS
A. Locker Benches: Stationary type; bench top and back of phenolic material; painted steel pedestals and back support brackets.
   1. Accessibility: Comply with ICC A117.1 and ADA Standards.
   2. Height: 17 inch.
   3. Depth: 20 inch.
   4. Length: 54 inch.
   5. Load Capacity per Pedestal: 400 pounds.
   8. Bracket Spacing: Provide 2 pedestals per bench. Location as recommended by pedestal manufacturer.
   9. Back Support Brackets: Provide 3 brackets per bench. Location as recommended by pedestal manufacturer. All exposed edges shall be finished and smooth. Finish to match pedestals.
   10. Back of Bench: The bench shall provide for back support. Back support shall be 42 inches long minimum and shall extend from a point 2 inches maximum above the seat surface to a point 18 inches minimum above the seat surface. Back support shall be 2 1/2 inches maximum from the rear edge of the seat measured horizontally.
   11. Anchors: Stainless steel anchors and washers. Anchors at base shall include round head nuts or decorative covers.
B. Locker Bench and Support Brackets: Bench top of phenolic material; welded structural steel wall concealed bench support brackets; pre-drilled for bench top material attachment and for wall anchorage.
   1. Accessibility: Comply with ICC A117.1 and ADA Standards.
   2. Height: 17 inch.
   3. Depth: 20 inch.
   4. Length: 48 inch - 57 inch. As indicated on the drawings.
   5. Load Capacity per Bracket: 400 pounds.
   7. Bracket: Concealed Floating Hybrid Bracket HYB (1.5) 21 manufactured by A&M Hardware, Inc.
   8. Bracket Spacing: 24 inches on center, maximum. Project-specific spacing to be determined based on field measurements.

2.03 PHENOLIC BENCHES

A. Benches: Factory Assembled, made of one piece phenolic core panels and stainless steel mechanical fasteners; fully finished all sides; each bench capable of standing alone.
   1. Panel Core Exposed at Edges: Machine polished, without chips or tool marks; square edge unless otherwise indicated.
   2. Color: As indicated on the drawings.
   3. Fasteners for Accessories: Tamperproof type.

B. Component Thicknesses:
   1. Bench Panels: 1/2 inch minimum thickness.

C. Phenolic Core Panels: Nonporous phenolic resin and paper core formed under high pressure, with natural colored finished edges, matte finish, and uniform surface appearance; glued laminated panels not acceptable.
   1. Surface Burning Characteristics: Flame spread index of 75 or less, and smoke developed index of 450 or less; when tested in accordance with ASTM E84.

PART 3 EXECUTION

3.01 EXAMINATION
   A. Verify that prepared bases are in correct position and configuration.
   B. Verify location with the owner before anchorage.

3.02 INSTALLATION
   A. Install in accordance with manufacturer's instructions.
   B. Install benches plumb and square.
   C. Install accessories.
   D. Replace components that are damaged.

3.03 CLEANING
   A. Clean bench surfaces.

END OF SECTION
SECTION 10 56 13
METAL STORAGE SHELVING

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Four post shelving.
B. Shelving accessories.

1.02 REFERENCE STANDARDS

1.03 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Rated uniform shelf loads.
   2. Details of shelving assemblies, including reinforcement.
   3. Accessories.
C. Test Reports: Provide independent agency test reports documenting compliance with specified structural requirements.
D. Shop Drawings: Indicate location, type, and layout of shelving, including lengths, heights, and aisle layout, and relationship to adjacent construction.
E. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.04 DELIVERY, STORAGE, AND HANDLING
A. Inspect for dents, scratches, or other damage. Replace damaged units.
B. Store in manufacturer's unopened packaging until ready for installation.
C. Store under cover and elevated above grade.

1.05 WARRANTY
A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
B. Provide one year manufacturer warranty covering defects of manufacturing and workmanship and rust and corrosion.

PART 2 PRODUCTS

2.01 MANUFACTURERS
A. Four Post Shelving:
   3. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 SHELVING - GENERAL

2.03 FOUR POST SHELVING
A. Four Post Shelving: Steel post-and-beam type with sway bracing, shelving brackets, shelving surfaces, and accessories as specified.
   1. Unit Width: 96 inches, center to center of posts.
   2. Shelf Capacity: Uniform distributed load of 100 psf, minimum.
   3. Adjustability of Shelving: At intervals of 3 inches on center, minimum.
   4. Shelf Depth: 24 inches, minimum.
   5. Unit Height: 72 inches, overall, maximum.
   6. Shelf Supports: Metal brackets at corner post.
B. Four Post Shelving: Steel post-and-shelf type with sway bracing, shelving brackets, shelving surfaces, and accessories as specified.
   1. Unit Width: 48 inches, center to center of posts.
   2. Shelf Capacity: Uniform distributed load of 50 psf, minimum.
   3. Adjustability of Shelving: At intervals of 1 inch on center, minimum.
   4. Shelf Depth: 18 inches, minimum.
   5. Unit Height: 72 inches, overall, maximum.
   6. Shelf Supports: Metal slider block with chrome plated wire, sliding along corner post.
   7. Finish: Stainless Steel.

PART 3 EXECUTION

3.01 EXAMINATION
   A. Verify that substrate is level and that clearances are as specified.
   B. Do not begin installation until substrates have been properly prepared.
   C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION
   A. Clean surfaces thoroughly prior to installation.
   B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION
   A. Install in accordance with manufacturer's instructions.
   B. Install shelving with shelf surfaces level and vertical supports plumb; adjust feet and bases as required.
   C. Out-Of-Square Tolerance - Four Post Shelving: Maximum of 1/8 inch difference in distance between bottom shelf and canopy top, measured along any post in any direction.

3.04 CLEANING
   A. Clean shelving and surrounding area after installation.

3.05 PROTECTION
   A. Protect installed products until completion of project.
   B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION
SECTION 10 56 17
WALL MOUNTED STANDARDS AND SHELVING

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Steel shelf standards, brackets, and accessories.
B. Shelves.

1.02 RELATED REQUIREMENTS
A. Section 06 10 00 - Rough Carpentry: Wood blocking in walls for attachment of standards.

1.03 REFERENCE STANDARDS
A. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.

1.04 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Manufacturer's data sheets on each product to be used.

1.05 DELIVERY, STORAGE, AND HANDLING
A. Store products under cover and elevated above grade.
B. Store products in manufacturer's unopened packaging until ready for installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS
A. Steel Shelf Standards and Brackets:
   2. Substitutions: See Section 01 60 00 - Product Requirements.
B. Shelving:
   1. Plastic Laminate - As indicated on the Finish Schedule.

2.02 COMPONENTS
A. Steel Shelf Standards, Brackets, and Accessories:
   1. Heavy-Duty Shelf Standards and Brackets: Double-slotted channel standards for brackets adjustable in 1 inch increments along entire length of standard, drilled and countersunk for screws.
      b. Load Capacity: Recommended by manufacturer for loading of 300 to 680 pounds per pair of standards.
      c. Material: Steel.
      d. Lengths: As indicated on drawings.
      e. Finish: Powder-coated.
      1) Provide screws with matching heads.
      g. Brackets: Double tab type, locking into slots; size to suit shelves; same finish as standards.
      h. Bracket Quantity: Provide one bracket for each 12 inches of standard length.
B. Shelving:
   1. Laminate Faced Shelves: Particleboard or medium density fiberboard covered with high pressure decorative laminate on both sides.
      a. Edge Finish: Matching laminate, all four edges.
      b. Substrate Thickness: 3/4 inch, nominal.
      c. Length: As indicated on drawings.
      d. Laminate: NEMA LD 3 Type HGL.
C. Fasteners: Screws as recommended by manufacturer for intended application or as otherwise required by project conditions. Finish of exposed to view fasteners to match finish of standards and other components.

PART 3 EXECUTION

3.01 EXAMINATION
A. Do not begin installation until substrates have been properly prepared.
B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION
A. Clean surfaces thoroughly prior to installation.
B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION
A. Install in accordance with manufacturer's instructions.
B. Mount standards to solid backing capable of supporting intended loads.
C. Install brackets, shelving, and accessories.

3.04 PROTECTION
A. Protect installed products until completion of project.
B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION
SECTION 10 75 00
FLAGPOLES

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Aluminum Flagpoles.

1.02 RELATED REQUIREMENTS
A. Section 03 30 00 - Cast-in-Place Concrete: Concrete base and foundation construction.

1.03 REFERENCE STANDARDS

1.04 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide data on pole, accessories, and configurations.
C. Shop Drawings: Indicate detailed dimensions, base details, anchor requirements, and imposed loads.

1.05 QUALITY ASSURANCE
A. Designer Qualifications: Design flagpole foundation under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed Missouri.

1.06 DELIVERY, STORAGE, AND HANDLING
A. Spiral wrap flagpole with protective covering and pack in protective shipping tubes or containers.

PART 2 PRODUCTS

2.01 MANUFACTURERS
A. Flagpoles:
   4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 FLAGPOLES
A. Flagpoles: Designed in accordance with NAAMM FP 1001.
   1. Material: Aluminum.
   2. Design: Cone tapered.
   3. Mounting: Ground mounted type.
   4. Outside Butt Diameter: 5 inches.
   5. Outside Tip Diameter: 3 inches.
   6. Nominal Wall Thickness: 0.156 inches.
   7. Nominal Height: 25 and 30 ft; measured from nominal ground elevation.

2.03 POLE MATERIALS
A. Aluminum: ASTM B241/B241M, 6063 alloy, T6 temper.
2.04 ACCESSORIES
   A. Finial Ball: Aluminum, 6 inch diameter.
   B. Cleats: 9 inch size, aluminum with stainless steel fastenings, two per halyard.
   C. Halyard: 5/16 inch diameter polypropylene, braided, white.

2.05 MOUNTING COMPONENTS
   A. Foundation Tube Sleeve: AASHTO M 36, corrugated 16 gage, 0.0598 inch steel, galvanized, depth of 42 inches.
   B. Lighting Ground Rod: 18 inch long copper rod, 3/4 inch diameter.

2.06 FINISHING
   A. Metal Surfaces in Contact With Concrete: Asphalitic paint.
   B. Concealed Steel Surfaces: Prime painted.
   C. Aluminum: Mill finish.
   D. Finial: Clear anodized finish.

PART 3 EXECUTION
3.01 EXAMINATION
   A. Verify that concrete foundation is ready to receive work and dimensions are as instructed by the manufacturer.

3.02 PREPARATION
   A. Coat metal sleeve surfaces below grade and surfaces in contact with dissimilar materials with asphalitic paint.

3.03 INSTALLATION
   A. Install flagpole, base assembly, and fittings in accordance with manufacturer's instructions.

3.04 TOLERANCES
   A. Maximum Variation From Plumb: 1 inch.

3.05 ADJUSTING
   A. Adjust operating devices so that halyard and flag function smoothly.

END OF SECTION
SECTION 10 82 13
ROOF TOP EQUIPMENT SCREENS

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Pre-formed thermoplastic panel for enclosing roof top mechanical equipment.
B. Aluminum assembly framing for direct attachment of screening panels to mechanical equipment; no base or curb required unless shown otherwise on drawings.
C. Sliding panels to permit easy access to mechanical equipment for servicing.

1.02 REFERENCE STANDARDS
A. ASTM B 221-96 - Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire Profiles, and Tubes.

1.03 SYSTEM DESCRIPTION
A. Design Criteria:
   1. Manufacturer is responsible for the structural design of all materials, assembly and attachments to resist snow, wind, suction and uplift loading at any point without damage or permanent set.
   2. Framing shall be designed in accordance with the Aluminum Design Manual to resist the following loading:
      a. ASCE 7-95 - Minimum Design Loads for Buildings and Other Structures; American Society of Civil Engineers.

1.04 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Submit manufacturer's catalog data, detail sheets, specification and other data sufficient to indicate compliance with these specifications.
C. Shop Drawings: Indicate layouts heights, component connection details, and details of interface with adjacent construction. Mark data to indicate:
   1. Roof top mechanical equipment to be enclosed.
D. Samples:
   1. Samples of Materials: Thermoplastic panels.
   2. Color Selection: Submit paint chart with full range of colors available for Architect's selection.
E. Certification: Manufacturer's Certificate of Compliance certifying that thermoplastic panels supplied meet or exceed requirements specified.
F. Closeout Submittals: Warranty documents, issued and executed by manufacturer, countersigned by Contractor.

1.05 QUALITY ASSURANCE
A. Regulatory Requirements: Comply with requirements of building authorities having jurisdiction in Project location.
B. Manufacturer Qualifications: Minimum five (5) years documented experience producing systems specified in this section.
C. Pre-Installation Meeting:
   1. Convene at job site seven (7) calendar days prior to scheduled beginning of construction activities of this section to review requirements of this section.
   2. Require attendance by representatives of the installing subcontractor, (who will represent the system manufacturer) and other entities directly affected by construction activities of this section.
   3. Notify Architect four (4) calendar days in advance of scheduled meeting date.

1.06 DELIVERY, STORAGE, AND HANDLING
A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly indicating manufacturer and material.
B. Storage and Handling: Protect materials and finishes during handling and installation to prevent damage.

1.07 PROJECT CONDITIONS
A. Field Measurements: Take measurements of actual roof top unit for fit without gaps. Indicate measurements on shop drawings fully documenting any field condition that may interfere with the screen system installation.

1.08 COORDINATION
A. Installer for work under this Section shall be responsible for coordination of panel and framing sizes and required options with the Contractor's requirements.
   1. Request information on sizes and options required from the Contractor.
B. Submit shop drawings to the Contractor and obtain written approval of shop drawing from the Contractor prior to fabrication.

1.09 WARRANTY
A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
B. If any part of the rooftop equipment screen fails because of a manufacturing defect within one year from the date of substantial completion, the manufacturer will furnish without charge the required replacement part(s). Any local transportation, related service labor or diagnostic call charges are not included.
C. This warranty does not cover failure of your rooftop equipment screen if it is damaged by the Owner, or if the failure is caused by improper installation. In no event shall Warrantor be liable for incidental or consequential damages.

PART 2 PRODUCTS

2.01 MANUFACTURERS
A. Envisor Screening System by CityScapes Inc.; www.cityscapesinc.com
B. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 MATERIALS
A. Thermoformed Plastic Panels: Fabricated from rigid medium impact thermo-formed ABS (Acrylic Butylene Styrene) sheets.
   1. Minimum thickness: 3/16 inch (18 mm).
B. Framing: Aluminum Plate, Shapes and Bar: ASTM B 221, alloy 6061-T5 or 6063-T5.
C. Threaded Fasteners: All screws, bolts, nut and washers shall be Stainless steel.
   1. Corner assembly fasteners shall be #10-16 x stainless steel TEK screws. Length as required to develop full holding capacity of screw when fastened to Mechanical Equipment.
   2. Provide lock washer or other locking device at all bolted connections.
2.03 FABRICATION
A. Provide factory-formed panel systems with continuous interlocking panel connections and indicated or necessary components: Form all components true to shape, accurate in size, square and free from distortion or defects. Cut panels to precise lengths indicated on approved shop drawings.
B. Fabricate all panels to slide horizontally to allow access to unit access panels behind.
C. Panel Design, Style, Trim:
   3. Decorative Top Trim Profile: Band
D. Trim and Closures: Fabricated from 24 gage metal, and finished with the manufacturers standard coating system, unless shown otherwise on drawings.
   1. Manufacturers Standard.
E. Framing: Fabricate and assemble components in largest practical sizes, for delivery to the site.
   1. Construct corner assemblies to required shape with joints tightly fitted.
   2. Supply components required for anchorage of framing. Fabricate anchors and related components of material and finish as required, or as specifically noted.

2.04 FINISHES
A. Aluminum Framing: See drawings.
B. ABS Panel: See drawings.
   1. Color: As indicated on the drawings.

PART 3 EXECUTION
3.01 EXAMINATION
A. Installer's Examination: Examine conditions under which construction activities of this section are to be performed.
   1. Submit written notification to Architect and Screen manufacturer if such conditions are unacceptable.
   2. Beginning erection constitutes installer's acceptance of conditions.

3.02 INSTALLATION
A. Install units in accordance with the manufacturer's instructions and approved shop drawings. Keep perimeter lines straight, plumb, and level. Provide brackets, anchors, and accessories necessary for a complete installation.
B. Fasten structural supports to HVAC units without damaging operation of the unit.
   1. Provide corner and mid-span assemblies as required by approved shop drawings so that the panels are supported uniformly.
   2. Fastening bottom rail using bolts to permit ease of access to HVAC units.
C. Insert thermoplastic panels into structural supports, except where fixed attachment points are indicated. Butt thermoplastic panels to adjacent panels for uniform fit. Fasten fixed panels in accordance with the shop drawings.
D. Metal Separation: Where aluminum materials would contact dissimilar materials, insert rubber grommets at attachment points, thus eliminating where dissimilar metals would otherwise be in contact.
E. Do not cut or abrade finishes which cannot be restored. Return items with such finishes to shop for required alterations.

3.03 TOLERANCES
A. Maximum misalignment from true position: 1/4 inch.
3.04 CLEANING AND PROTECTION

A. Remove all protective masking from material immediately after installation.

B. Protection:
   1. Ensure that finishes and structure of installed systems are not damaged by subsequent construction activities.
   2. If minor damage to finishes occurs, repair damage in accordance with manufacturer's recommendations; provide replacement components if repaired finishes are unacceptable to Architect.

C. Prior to Substantial Completion: Remove dust or other foreign matter from component surfaces; clean finishes in accordance with manufacturer's instructions.
   1. Clean units in accordance with the manufacturer's instructions.

END OF SECTION
SECTION 11 13 13
LOADING DOCK BUMPERS

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Loading dock bumpers of reinforced rubber pads with attachment frame.

1.02 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Submit data on unit dimensions, method of anchorage, and details of construction.
C. Manufacturer's Installation Instructions: Submit installation requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS
A. Loading Dock Bumpers:
   4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 COMPONENTS
A. Loading Dock Bumpers: Fabric reinforced rubber pads, ozone resistant, laminated and compressed in position using two galvanized steel rods with threaded ends, washers, and nuts between 3 inch high by 2-1/2 inch wide by 1/4 inch thick galvanized steel angle end plates.
   1. Projection From Wall: 4-1/2 inches.
   2. Vertical Height: 10 inches.
   3. Width: 15 inches.
   4. Profile: Rectangular.
B. Attachment Hardware: 3/4 inches diameter galvanized bolts with expansion shields.
C. Touch-up Primer: Zinc rich type.

PART 3 EXECUTION

3.01 EXAMINATION
A. Verify that anchor placement is acceptable.

3.02 INSTALLATION
A. Install dock bumpers in accordance with manufacturer's instructions.
B. Set plumb and level.

END OF SECTION
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SECTION 11 13 16
LOADING DOCK SEALS AND SHELTERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Compression door seals.

1.02 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: For each type of product.
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

C. Shop Drawings: Indicate framed wall opening, dimensions and tolerances, adjacent construction and fittings required for anchorages, and anchor points.
   1. Include plans, elevations, sections, details, and attachments to other work.
   2. Detail assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of anchors and field connection.

D. Manufacturer's Installation Instructions: Indicate special requirements.

E. Maintenance Data: Provide unit maintenance information, lubrication cycles, and spare parts manual.

1.03 FIELD CONDITIONS

A. Field Measurements: Verify actual dimensions of dock openings and contiguous construction by field measurements before fabrication.

PART 2 PRODUCTS

2.01 GENERAL

A. Dock seals consisting of fabric-covered foam pads designed to compress 4 to 5 inches under pressure of truck body to form an airtight seal at jambs and head of loading dock openings; of type, size, and construction indicated.

2.02 MANUFACTURERS

A. Loading Dock Seals and Shelters:
      a. Model 40-Vinyl, Subject to compliance with requirements, provide at dock doors 1600C and 1600D.
   5. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 COMPONENTS

A. Door Seal: Compressible construction:
      a. Steel Support Frame: Steel channel frame of manufacturer's standard weight, shape, and finish; with steel mounting hardware.
   2. Cushion: Closed cell foam for full depth of seal; straight jambs.
   3. Covering Material: Vinyl impregnated waterproof nylon fabric; with supplementary high abrasion resistant wear layer, to remain flexible to minus 65 degrees F.
   a. Provide 5 inch wide continuous yellow strip.
   a. Stationary Head Pad: 12 inches high and same depth as jamb pads; sized for opening width.
   a. Nominal Size: 10 inches wide and sized for opening height.
8. Seams: Molded without mechanical stitching; double ply at exposed face.
9. Bottom Door Seal: Same construction as above.
10. Steel Finish: Hot-dip galvanize components to comply with the following:
    a. ASTM A 123/A 123M for iron and steel support framing.
    b. ASTM A 153/A 153M or ASTM F 2329 for iron and steel hardware and anchors.

PART 3 EXECUTION

3.01 EXAMINATION
A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
B. Proceed with installation only after unsatisfactory conditions have been corrected.
C. Verify that rough-in wall opening and anchors are acceptable, correctly sized, and aligned to proper tolerances.
D. Verify that frames installed in concrete and masonry are correctly located.

3.02 INSTALLATION
A. Dock Seals: Attach dock-seal support frames securely to building structure in proper relation to openings, dock bumpers, and dock levelers to ensure compression of dock seals when trucks are positioned against dock bumpers.
B. Install seal and shelter components in accordance with manufacturer's instructions.
C. Set plumb and level.

3.03 ADJUSTING
A. After completing installation, inspect exposed factory finishes and repair damaged finishes.
B. Adjust installed unit for smooth and balanced operation.

END OF SECTION
SECTION 11 13 19.13
LOADING DOCK LEVELERS

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Prefabricated steel dock leveler with guard rails.
B. Manual operating hardware.
C. Mechanical vehicle restraint safety lock.

1.02 RELATED REQUIREMENTS
A. Section 03 30 00 - Cast-in-Place Concrete: Concrete pit.
B. Section 11 13 13 - Loading Dock Bumpers.
C. Section 11 13 16 - Loading Dock Seals and Shelters.

1.03 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide materials and finish, installation details, roughing-in measurements, and operation of unit and safety lock device.
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for stationary loading dock equipment.
   2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
C. Shop Drawings: Indicate required opening dimensions and tolerances, placement dimensions of safety lock device, and perimeter conditions of construction.
   1. Include plans, elevations, sections, details, and attachments to other work.
   2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of anchors and field connection.
D. Manufacturer's Installation Instructions: Indicate special requirements.
E. Operation Data: Provide operating instructions, and identify unit limitations.
F. Maintenance Data: Provide unit maintenance information, lubrication cycles, and provide spare parts manual.

1.04 FIELD CONDITIONS
A. Field Measurements: Verify actual dimensions of construction contiguous with stationary loading dock equipment, including recessed pit dimensions, slopes of driveways and heights of loading docks, by field measurements before fabrication.

1.05 WARRANTY
A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
B. Manufacturer's Special Warranty: Manufacturer agrees to repair or replace dock levelers that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures including cracked or broken structural support members, load-bearing welds, and front and rear hinges.
      b. Faulty operation of operators, control system, or hardware.
      c. Deck plate failures including cracked plate or permanent deformation in excess of 1/4 inch between deck supports.
      d. Hydraulic system failures including failure of hydraulic seals and cylinders.
   2. Warranty Period for Structural Assembly: 10 years from date of Substantial Completion.
   3. Warranty Period for Hydraulic System: Five years from date of Substantial Completion.
   4. Warranty shall be for unlimited usage of leveler for the specified rated capacity over the term of the warranty.
PART 2 PRODUCTS

2.01 MANUFACTURERS
A. Loading Dock Levelers:
      a. Model XDS2066-35, provide at dock doors 1600C and 1600D.
   4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 COMPONENTS
A. Loading Dock Leveler:
   2. Deck Width: 72 inch.
   3. Deck Length: 75.5 inch.
   5. Capacity: 3500 lbs.
      a. Capable of supporting total gross load weight without permanent deflection or distortion.
   6. Frame: Manufacturer's standard.
   7. Toe Guards: Equip open sides of dock leveler over range indicated with metal toe guards.
      a. Toe-Guard Range: Entire upper operating range.
B. Vehicle Restraint: Mechanical lock, fabricated and welded steel plate construction, spring loaded to automatically latch when activated, to comply with ICC-ES (Evaluation Service) reports for semitrailer vehicle bumper requirements for dimension and placement indicated.
C. Deck: 3/8 inch steel checker plate deck, reinforced on underside, welded to fabricated steel frame; counter balanced with 16 inches long automatically operated plate lip; lip to lock in downward vertical position when leveler is at rest at dock level.
D. Guard Railing: Steel pipe, 1-1/2 inch diameter, with top rail, three intermediate horizontal rails, and uprights at 48 inches on center, maximum; threaded joints; steel anchor plates.
E. Pit Frame: Steel angle, 3 by 3 by 1/4 inch; welded corners, fitted with anchors 12 inch on center for concrete embedment.
   1. Refer to Section 03 30 00 for concrete pit equipment pad related work.

2.03 FUNCTION
A. Function: Dock levelers shall compensate for differences in height between truck bed and loading platform.
   1. Vertical Travel: Operating range above platform level of sufficient height to enable lip to extend and clear truck bed before contact with the following minimum working range:
   2. Automatic Vertical Compensation: Floating travel of ramp with lip extended and resting on truck bed shall compensate automatically for upward or downward movement of truck bed during loading and unloading.
   3. Automatic Lateral Compensation: Tilting of ramp with lip extended and resting on truck bed shall compensate automatically for canted truck beds of up to 4 inches over width of ramp.
   4. Lip Operation: Manufacturer's standard mechanism, which automatically extends and supports hinged lip on ramp edge with lip resting on truck bed over dock leveler's working range, allows lip to yield under impact of incoming truck and automatically retracts lip when truck departs.
      a. Length of Lip Extension: 16 inches.
   5. Automatic Ramp Return: Automatic return of unloaded ramp, from raised or lowered positions to stored position, level with platform, as truck departs.
6. Interlock: Leveler does not operate while leveler night lock is engaged truck restraint is not engaged.

B. Construction: Fabricate dock-leveler frame, platform supports, and lip supports from structural- or formed-steel shapes. Weld platform and hinged lip to supports. Fabricate entire assembly to withstand deformation during both operating and stored phases of service. Chamfer lip edge to minimize obstructing wheels of material-handling vehicles.
   1. Cross-Traffic Support: Manufacturer's standard method of supporting ramp at platform level in stored position with lip retracted. Provide a means to release supports to allow ramp to descend below platform level.
   2. Maintenance Strut: Integral strut to positively support ramp in up position during maintenance of dock leveler.

C. Dock-Leveler Finish: Manufacturer's standard finish.
   1. Toe Guards: Paint toe guards to comply with ANSI Z535.1.

2.04 TRUCK RESTRAINTS

A. General: Manufacturer's standard device designed to engage truck's rear-impact guard and hold truck at loading dock. Restraint shall consist of an iron or steel restraining arm that raises until contacting rear-impact guard. Arm shall move vertically, automatically adjusting to varying height of truck due to loading and unloading operations.

B. Basis-of-Design Product: Subject to compliance with requirements, provide Blue Giant Model TL85, provide at dock

C. Standard: Comply with MH 30.3.

D. Rated Capacity: Capable of supporting total gross load of 32,000 lb without permanent deflection or distortion.

E. Operating Range: Capable of restraining rear-impact guards within a range from:
   1. Vertical: 12 inches to 26 inches above driveway.
   2. Horizontal: 0 inches to 12 inches in front of dock bumpers.

F. Power Operating System: Manufacturer's standard electromechanical or hydraulic unit.
   1. Remote-Control Station: Single-button station of the constant-pressure type, enclosed in NEMA ICS 6, Type 12 box. Restraint is engaged by depressing and holding button; restraint is released by releasing button.

G. Caution Signs: Exterior, surface mounted; designed to inform both dock attendant and truck driver; with sign copy as follows. Provide one sign at each truck-restraint location.
   1. Sign Copy in Forward and Reverse Text: Manufacturer's standard text permitting truck movement with green light.
   2. Interior Sign Copy: Manufacturer's standard text permitting truck movement with green light.

H. Light-Communication System: Red and green illuminated signal-light sets, with lens approximately 4 inches in diameter, designed to indicate status to both dock attendant and truck driver. Equip system with steel control panel located at interior of dock that includes illuminated lights indicating status of exterior signal lights. Provide signal-light set and control panel at each location indicated for light-communication system. Enclose exterior signal-light sets in steel or plastic housing with sunshade.
   1. Automatic Operation: System is activated automatically when device engages rear-impact guard. Provide on-off switch located on truck-restraint control panel.

I. Alarm: visual system indicating that rear-impact guard is not engaged, with manual reset.

J. Materials:
   1. Steel Plates, Shapes, and Bars: ASTM 36/A 36M.
   2. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from steel plate complying with ASTM A 572/A 572M, Grade 55.
4. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

K. Truck-Restraint Finish: Manufacturer's standard finish.

L. Accessories: Interlock to dock leveler.

2.05 FINISH REQUIREMENTS

A. Finish loading dock equipment after assembly and testing.

B. Galvanizing: Hot-dip galvanize components to comply with the following:
   1. ASTM A 123/A 123M for iron and steel loading dock equipment.
   2. ASTM A 153/A 153M or ASTM F 2329 for iron and steel hardware for loading dock equipment.

C. Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat in manufacturer's standard color.

2.06 FINISHES

A. Leveler Platform: Factory enameled finish.

B. Leveler Frame: Factory enameled finish.

C. Guard Railing: Factory enameled finish.

D. Pit Frame: Factory enameled finish.

E. Vehicle Restraint: Yellow painted hook, galvanized steel operating mechanism.

F. Provide galvanized finish at minimum of 1.25 oz/sq ft.

2.07 ACCESSORIES

A. Loading Dock Bumpers: Refer to Section 11 13 13.

B. Loading Dock Seals and Shelters: Refer to Section 11 13 16.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that rough-in openings are acceptable.

B. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

C. Examine walls and floors of pits for suitable conditions where recessed loading dock equipment is to be installed. Pits shall be plumb and square and properly sloped for drainage from back to front of loading dock.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Coordinate size and location of loading dock equipment indicated to be attached to or recessed into concrete or masonry, and furnish anchoring devices with templates, diagrams, and instructions for their installation.

B. Clean recessed pits of debris.

3.03 INSTALLATION

A. General: Install loading dock equipment as required for a complete installation.

B. Install dock leveler unit in prepared opening in accordance with manufacturer's instructions.

C. Recessed Dock Levelers: Attach dock levelers securely to loading dock platform, flush with adjacent loading dock surfaces and square to recessed pit.

D. Set square and level.

E. Anchor unit securely, flush with dock; weld back of leveling dock to pit frame, and touch-up welds with primer.
F. Anchor safety lock securely and flush with vertical dock face.

G. Truck Restraints: Attach truck restraints in a manner that complies with requirements for arrangement and height required for device to engage vehicle rear-impact guard. Interconnect control panel and signals with dock leveler.
   1. Wall-Mounted Units: Anchor truck restraints to face of loading dock with expansion anchors and bolts.

3.04 ADJUSTING
   A. Adjust loading dock equipment to function smoothly and safely, and lubricate as recommended by manufacturer.
   B. Test dock levelers for vertical travel within operating range indicated.
   C. After completing installation of exposed, factory-finished loading dock equipment, inspect exposed finishes and repair damaged finishes.

3.05 MAINTENANCE SERVICE
   A. Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months’ full maintenance by skilled employees of loading dock equipment Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper loading dock equipment operation at rated speed and capacity. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

3.06 DEMONSTRATION
   A. Engage a factory-authorized service representative to train Owner’s maintenance personnel to adjust, operate, and maintain loading dock equipment.

END OF SECTION
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SECTION 12 24 13
ROLLER WINDOW SHADES

PART 1 GENERAL

1.01 SECTION INCLUDES
   A. Manual Roller Shades.
   B. Motorized Roller Shades.

1.02 SUBMITTALS
   A. Product Data: Provide manufacturer's data sheets on each product to be used, including:
      1. Preparation instructions and recommendations.
      2. Styles, material descriptions, dimensions of individual components, profiles, features, finishes and operating instructions.
      3. Storage and handling requirements and recommendations.
      4. Mounting details and installation methods.
      5. Typical wiring diagrams including integration of motor controllers with building management system, audiovisual and lighting control systems as applicable.
   B. Shop Drawings: Plans, elevations, sections, product details, installation details, operational clearances, wiring diagrams and relationship to adjacent work.
   C. Window Treatment Schedule: For all roller shades. Use same room designations as indicated on the Drawings and include opening sizes and key to typical mounting details.
   D. Maintenance Data: Methods for maintaining roller shades, precautions regarding cleaning materials and methods, instructions for operating hardware and controls.
   E. Verification Samples: For each finish product specified, one complete set of shade components, unassembled, demonstrating compliance with specified requirements. Shadecloth sample and aluminum finish sample as selected. Mark face of material to indicate interior faces.

1.03 QUALITY ASSURANCE
   A. Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years of experience and approved by the manufacturer.

1.04 DELIVERY, STORAGE, AND HANDLING
   A. Product to be delivered to jobsite in manufacturer's original packaging.
   B. Products to be handled and stored to prevent damage to materials, finishes and operating mechanisms. Store in a clean, dry area, laid flat to prevent sagging and twisting or packaging.

1.05 WARRANTY
   A. Provide twenty five (25) year manufacturer warranty for against original defects in materials or workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURER
   A. See Interior finish schedule for additional information.
   B. Basis of Design: Springs Window Fashions.
      1. Springs Window Fashions.
   C. Other accepted manufacturers:
      1. MechoSystems: www.mechoshade.com
      2. Draper: www.draperinc.com
   D. Substitutions: See Section 01 60 00 - Product Requirements.
2.02 MATERIALS (MANUAL SHADES)

   1. Fabric Style: As indicated on the finish schedule.
   2. Color: As indicated on the finish schedule.

B. Roller Tube: Extruded aluminum engineered with a channel to accept fabric spline. The tube size will be determined by the manufacturer based on window size and fabric selection.

C. Clutch: Glass-reinforced, polyester thermopolymer (PBT) for wear resistance, smooth operation and corrosion resistance. The clutch is comprised of multi-banded, steel springs that lock the shade in any position when operating the control loop. Bi-directional mechanism with no required adjustment or lubrication.

D. Control Loop: #10 stainless steel bead chain. Bead stops attached to the chain protect the shade from over rotation.

E. Idler: High strength, glass-reinforced, polyester thermopolymer (PBT) for wear resistance, smooth operation and corrosion resistance.

F. Lift Assist: System shall be a heavy-duty torsion spring located inside the roller tube. The mechanism reduces the pull force allowing easy lifting of larger shades.

G. Spline: System shall consist of a PVC spline heat-welded to the shade fabric and inserted into a channel on the roller tube.


I. Battens: Enclosed in a heat-welded pocket providing additional stabilizing on large shades. Batten placement to be determined by the manufacturer based on window size and fabric selection.

J. Brackets: 0.125 inch thick steel and can accommodate overhead, side and face mounting. Optional dual shade brackets shall hold two shades in one bracket assembly. Coupled shades shall be connected with a linking bracket mechanism.

K. Fascia Panel: 0.062 inch thick extruded 6063 T-5 aluminum alloy with a powder-coated finish. Brackets shall be universal and painted to match the fascia panels.

L. Pocket: Powder-coated extruded 6065-aluminum alloy located at acoustical tile ceiling.

M. Pocket: Drywall encased pocket built into soffit. Add aluminum trim pieces as detailed.

N. Closure Plate: Exposed, flush mounted, powder-coated extruded 6065-aluminum alloy designed to provide access to shades when recessed in ceiling.

O. Fabricate shades to hang flat without buckling or distortion.

2.03 MATERIALS (MOTORIZED SHADES)

   1. Fabric Style: As indicated on the finish schedule.
   2. Color: As indicated on the finish schedule.

B. Motor: Somfy® tubular, asynchronous motor with built in reversible capacitor, totally enclosed, temperature Class A, thermally protected, maintenance free with line voltage power supply. Motor shall be concealed inside the roller tube. Motor size to be determined by shade manufacturer to insure proper operation based on window size and fabric selection and not to exceed 80 percent of the motor and tube assembly rated lift capacity. Shades in the same room must have motors rated at the same nominal speed.

C. Roller Tube: Extruded aluminum engineered with a channel to accept fabric spline. The tube size will be determined by the manufacturer based on window size and fabric selection.
D. Idler: High strength, glass-reinforced, polyester thermopolymer (PBT) for wear resistance, smooth operation and corrosion resistance.

E. Spline: System shall consist of a PVC spline heat-welded to the shade fabric and inserted into a channel on the roller tube.


G. Battens: Enclosed in a heat-welded pocket providing additional stabilizing on large shades. Batten placement to be determined by the manufacturer based on window size and fabric selection.

H. Brackets: 0.125 inch thick steel and can accommodate overhead, side and face mounting. Optional dual shade brackets shall hold two shades in one bracket assembly. Coupled shades shall be connected with a linking bracket mechanism.

I. Idle End Bracket: Adjustable, allowing shades to be leveled while in place.

J. Control: Group shall operate up to 12 motors with a key operated three position switch.

K. Fascia Panel: 0.062 inch thick extruded 6063 T-5 aluminum alloy with a powder-coated finish. Brackets shall be universal and painted to match the fascia panels.

L. Pocket: Drywall encased pocket built into soffit. Add aluminum trim pieces as detailed.

M. Closure Plate: Exposed, flush mounted, powder-coated extruded 6065-aluminum alloy designed to provide access to shades when recessed in ceiling.

N. Fabricate shades to hang flat without buckling or distortion.

PART 3 EXECUTION

3.01 EXAMINATION

A. Installer shall be responsible for inspection of jobsite, approval of mounting surfaces, blocking for shade brackets or pocket assemblies, suspended acoustical or gypsum ceiling for recessed shades, verification of field measurements and installation conditions. Installation shall commence when satisfactory conditions are met.

3.02 INSTALLATION

A. Install shades in accordance with manufacturer’s instructions including recommended support brackets and fasteners.

B. Install shades with adequate clearance to permit smooth operation of the shades throughout entire operational range. Installer will demonstrate shades to be in smooth, uniform working order.

C. Architectural and electrical drawings may or may not indicate the motor or motor controller wiring. All motors and controllers must be wired according to specifications and wiring diagrams prior to installation of motorized shades, as provided by installer/dealer, according to manufacturer’s product requirements.

3.03 SYSTEM STARTUP

A. Provide manufacturer’s field representative to instruct systems startup.

END OF SECTION
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SECTION 12 36 00
COUNTERTOPS

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Countertops for architectural cabinet work.
B. Countertops with metal angle bracing.
C. Countertops for manufactured casework.
D. Wall-hung counters and vanity tops.
E. Sinks molded into countertops.

1.02 RELATED REQUIREMENTS
A. Section 06 41 00 - Architectural Wood Casework.
B. Section 06 10 00 - Rough Carpentry.

1.03 REFERENCE STANDARDS
D. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
F. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014, with Errata (2016).
J. ISFA 3-01 - Classification and Standards for Quartz Surfacing Material; 2013.
L. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.
M. PS 1 - Structural Plywood; 2009.

1.04 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Specimen warranty.
C. Shop Drawings: Complete details of materials and installation; combine with shop drawings of cabinets and casework specified in other sections.
D. Verification Samples: For each finish product specified, minimum size 6 inches square, representing actual product, color, and patterns.
E. Test Reports: Chemical resistance testing, showing compliance with specified requirements.
F. Maintenance Data: Manufacturer's instructions and recommendations for maintenance and repair of countertop surfaces.
1.05 DELIVERY, STORAGE, AND HANDLING
   A. Store products in manufacturer's unopened packaging until ready for installation.
   B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

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

PART 2 PRODUCTS

2.01 COUNTERTOPS
   A. Plastic Laminate Countertops: High-pressure decorative laminate (HPDL) sheet bonded to substrate.
      1. Laminate Sheet, Unless otherwise indicated: NEMA LD 3, Grade HGS, 0.048 inch nominal thickness.
         a. Finish: As indicated on drawings.
         b. Surface Color and Pattern: As indicated on drawings.
      2. Exposed Edge Treatment: Molded rubber edge with T-spline, sized to completely cover edge of panel.
         a. Color: As indicated on drawings.
      3. Back and End Splashes: Same material, same construction.
      4. Fabricate in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 11 - Countertops, Custom Grade.
   B. Solid Surfacing Countertops: Solid surfacing sheet or plastic resin casting over continuous substrate.
      1. Flat Sheet Thickness: 1/2 inch, minimum.
      2. Solid Surfacing Sheet and Plastic Resin Castings: Complying with ISFA 2-01 and NEMA LD 3; acrylic or polyester resin, mineral filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness.
         a. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
         b. Sinks and Bowls: Integral castings; minimum 3/4 inch wall thickness; comply with IAPMO Z124.
         c. Finish on Exposed Surfaces: Use product indicated in finish schedule..
      3. Other Components Thickness: 1/2 inch, minimum.
      4. Back and End Splashes: Same sheet material, square top; minimum 4 inches high.
   C. Stainless Steel Backsplash: ASTM A666, Type 304, stainless steel sheet; 16 gage, 0.0625 inch nominal sheet thickness.
      1. Finish: 4B satin brushed finish.
   D. Stainless Steel Countertops: ASTM A666, Type 304, stainless steel sheet; 16 gage, 0.0625 inch nominal sheet thickness.
      1. Finish: 4B satin brushed finish.
      2. Edge and Backsplash Sink Details: As indicated on drawings.
      3. Exposed Edge Shape: Straight turndown with return; 1-1/2 inch high face, 1/2 inch return to face of case; reinforced with hardwood or steel.
      4. Back and End Splashes: Same material; welded 1/4 inch radius coved joint to countertop; square top edge with 1 inch wide top surface and minimum 1/2 inch turndown.
      5. Splash Dimensions: 4 inch high by 1 inch thick, unless otherwise indicated.
E. Natural Quartz and Resin Composite Countertops: Sheet or slab of natural quartz and plastic resin over continuous substrate.
   1. Flat Sheet Thickness: 1/2 inch and 3/4 inch, minimum.

2.02 MATERIALS
A. Plywood for Supporting Substrate: PS 1 Exterior Grade, A-C veneer grade, minimum 5-ply; minimum 3/4 inch thick; join lengths using metal splines.
B. Particleboard for Supporting Substrate: ANSI A208.1 Grade 2-M-2, 45 pcf minimum density; minimum 3/4 inch thick; join lengths using metal splines.
C. Medium Density Fiberboard for Supporting Substrate: ANSI A208.2.
D. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.
E. Cove Molding for Top of Splashes: Rubber with semi-gloss finish and T-spline to fit between splash and wall; 1/2 inch by 1/2 inch.
F. Bracing and Brackets: Provide A & M Hardware bracket AMHLWS18X24Black.
G. Brackets for floating vanity counters: Provide Federal Brace Titus Hardware brackets.
   1. Size: 10" x 18".
   2. Finish: Galvanized.
   3. Provide right and left hand brackets - anchor to stud per manufacturer recommendations.
H. Joint Sealant: Mildew-resistant silicone sealant, white.

2.03 FABRICATION
A. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
   1. Join lengths of tops using best method recommended by manufacturer.
   2. Fabricate to overhang fronts and ends of cabinets 1 inch except where top butts against cabinet or wall.
   3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.
B. Provide back/end splash wherever counter edge abuts vertical surface unless otherwise indicated.
   1. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof glue.
   2. Height: 4 inches, unless otherwise indicated.
C. Solid Surfacing: Fabricate tops and wall panels up to 144 inches long in one piece; join pieces with adhesive sealant in accordance with manufacturer's recommendations and instructions.
D. Stainless Steel: Fabricate tops up to 144 inches long in one piece including nosings and back and end splashes; accurately fitted mechanical field joints in lengths over that dimension are permitted.
   1. Weld joints; grind smooth and polish to match.
   2. Provide stainless steel hat channel stiffeners, welded or soldered to underside, where indicated on drawings.
   3. Provide wall clips for support of back/end splash turndowns.
   4. Sound Deadening: Apply water resistant, fire resistant sound deadening mastic to entire bottom surface.
E. Wall-Mounted Counters: Provide brackets and braces as indicated on drawings.
PART 3 EXECUTION

3.01 EXAMINATION
   A. Do not begin installation until substrates have been properly prepared.
   B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
   C. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.

3.02 PREPARATION
   A. Clean surfaces thoroughly prior to installation.
   B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION
   A. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.
   B. Attach plastic laminate countertops using screws with minimum penetration into substrate board of 5/8 inch.
   C. Attach stainless steel countertops using stainless steel fasteners and clips.
   D. Seal joint between back/end splashes and vertical surfaces.

3.04 TOLERANCES
   A. Variation From Horizontal: 1/8 inch in 10 feet, maximum.
   B. Offset From Wall, Countertops: 1/8 inch maximum; 1/16 inch minimum.
   C. Field Joints: 1/8 inch wide, maximum.

3.05 CLEANING
   A. Clean countertops surfaces thoroughly.

3.06 PROTECTION
   A. Protect installed products until completion of project.
   B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION
SECTION 12 48 13
ENTRANCE FLOOR MATS AND FRAMES

PART 1 GENERAL
1.01 SECTION INCLUDES
A. Carpet mat.
B. Recessed mat frames.

1.02 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide data indicating properties of walk-off surface, component dimensions and recessed frame characteristics.
C. Shop Drawings: Indicate dimensions and details for recessed frame.
D. Samples: Submit two samples, 3 by 3 inch in size illustrating pattern, color, finish, and edging.

PART 2 PRODUCTS
2.01 MANUFACTURERS
A. Floor Mats:

2.02 MATS
A. Carpet Mat: Cut nylon pile permanently bonded to vinyl backing; 36 inch wide by 48 inch long with one inch square end matching vinyl border on all edges.

2.03 FABRICATION
A. Fabricate mats in single unit sizes; fabricate multiple mats where indicated on drawings.

PART 3 EXECUTION
3.01 EXAMINATION
A. Verify that floor opening for mats are ready to receive work.

3.02 PREPARATION
A. Vacuum clean floor recess.

3.03 INSTALLATION
A. Install walk-off surface in floor recess flush with finish floor after cleaning of finish flooring.
B. Coordinate location of floor drain to be located in the center of the floor mat.

3.04 TOLERANCES
A. Maximum Gap Formed at Recessed Frame From Mat Size: 1/4 inch.

END OF SECTION
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SECTION 13 49 13
INTEGRATED X-RAY SHIELDING ASSEMBLIES

PART 1  GENERAL

1.01 SECTION INCLUDES
   A. Construction of lead enclosure around x-ray treatment rooms and control rooms.
   B. Lead sheet applied to gypsum board.
   C. Leaded glass.
   D. Film transfer cabinets.

1.02 RELATED REQUIREMENTS
   A. Section 08 11 13 - Hollow Metal Doors and Frames: Lead-lined hollow metal doors and frames.
   B. Section 08 14 16 - Flush Wood Doors: Lead-lined flush wood doors.
   C. Section 08 71 00 - Door Hardware: Lead-lined door hardware.
   D. Section 09 21 16 - Gypsum Board Assemblies: Joint taping over lead lined gypsum board.
   E. Section 09 91 23 - Interior Painting: Field painting.

1.03 REFERENCE STANDARDS

1.04 SYSTEM DESCRIPTION
   A. Protection: Walls, fixed control screens, ceiling, and floor, including wall interruptions for doors and glazing.
   B. Protection noted in the specification section shall be for bidding purpose only. An actual protection design report shall be acquired by the contractor from a Radiologist Engineer licensed in the State of Missouri.

1.05 SUBMITTALS
   A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
   B. Product Data: Provide data on leaded glass.
   C. Shop Drawings: Indicate layout, details, dimensions, interface with adjoining work.

1.06 QUALITY ASSURANCE
   A. Perform Work in accordance with NCRP Report 147.
   B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with at least three years documented experience.

1.07 REGULATORY REQUIREMENTS
   A. Conform to applicable health and occupation code for integrity of radiation protection and continuity of protected construction.
PART 2 PRODUCTS

2.01 MANUFACTURERS
A. Integrated X-Ray Shielding Assemblies:
   5. Substitutions:  See Section 01 60 00 - Product Requirements.

2.02 LEAD SHEET AND ASSOCIATED MATERIALS
A. Lead Sheet:  ASTM B749, UNS Number L50049, 1/16 inch minimum thickness.
B. Gypsum Board:  ASTM C1396/C1396M, paper faced, square edges and square ends; 48 inch by 96 inch size, 5/8 inch thick.
C. Nails:  Lead headed to twice thickness of sheet lead.
D. Tie Wire:  Leaded steel, annealed.

2.03 FABRICATION
A. Lead Laminated Gypsum Board:  Fabricate with monolithic sheet lead bonded to one surface of board, extend lead sheet 1 inch beyond one side and one end of board.
B. Lead Lined Wood Doors:  Specified in Section 08 14 16.
D. Hardware:  Specified in Section 08 71 00.
E. Leaded Glass:  Specified in Section 08 80 00.

2.04 COMPONENTS AND ACCESSORIES
A. Film Transfer Cabinets:  Provide with leaded flanges to permit lapping to adjacent construction.
   1. Products:
      a. As indicated on the drawings.
B. Control Windows:  Prefabricated lead frame, size as indicated, thickness to suit wall; included with lead glass glazing strips, anchors and fasteners.

2.05 FINISHES
A. Field Painted Surfaces:  As specified in Section 09 91 23.

PART 3 EXECUTION

3.01 EXAMINATION
A. Verify that existing surfaces are ready to receive work and opening dimensions are as indicated on shop drawings.

3.02 INSTALLATION - LEAD SHEETS
A. Install lead sheets to wall substrate by mechanical attachments; lead headed fasteners spaced at 4 inches to framing members.  Install lead laminated products with lead face against supports.
B. Extend lead protection from finished floor to to underside of structure.
C. Construct control screens as indicated.
D. Apply lead sheet patches around penetrations to sheet lead protection, extending 6 inches beyond penetration.
3.03 INSTALLATION - COMPONENTS AND ACCESSORIES
   A. Install components and accessories in accordance with manufacturer's instructions.
   B. Install lead lined glazed frames as specified in section where frames are specified and in accordance with lead lining fabricator's instructions.
   C. Install lead lined doors as specified in the section where the doors are specified; coordinate installation of door hardware.

3.04 FIELD QUALITY CONTROL
   A. Field inspection and testing will be performed under provisions of Section 01 40 00 - Quality Requirements.
   B. Inspection and testing will be performed by a licensed radiologist technician in coordination with regulatory agency requirements, to ascertain compliance of installation regarding radiation passage or leakage.

END OF SECTION
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SECTION 14 24 00
HYDRAULIC ELEVATORS

GENERAL

1.01 SUMMARY
A. This section specifies hydraulic elevators.
B. Work Required
1. The work required under this section consists of all labor, materials and services required for the complete installation (including operational verification) of all the equipment required for the elevator(s) as herein specified.
2. All work shall be performed in a first class, safe and workmanlike manner.
3. In all cases where a device or part of the equipment is herein referred to in the singular, it is intended that such reference shall apply to as many of such devices or parts as are required to make complete installation.

1.02 RELATED SECTIONS
A. The following sections contain requirements that relate to this section and are performed by trades other than the elevator manufacturer/installer.
1. Section 01 50 00 – Temporary Facilities and Controls: protection of floor openings and personnel barriers; temporary power and lighting.
2. Section 03 30 00 – Cast-In-Place Concrete: elevator pit, elevator motor and pump foundation, and grouting thresholds.
3. Section 04 20 00 – Unit Masonry: masonry hoistway enclosure, building-in and grouting hoistway doorframes, and grouting of sills.
4. Section 05 50 00 – Metal Fabrications: pit ladder, divider beams, supports for entrances and rails, and hoisting beam at top of elevator hoistway.
5. Section 07 14 00 – Fluid-Applied Waterproofing: waterproofing of elevator pit.
6. Section 23 34 23 – HVAC Fans and Power Ventilators: ventilation and temperature control of elevator equipment areas.
7. Section 21 05 49 – Fire Protection Systems, Supports, Bracing, and Seismic Requirements: fire and smoke detectors at required locations and interconnecting devices; fire alarm signal lines to contacts in the machine area.
8. Section 26 05 00 – Common Work Results for Electrical:
   a. Main disconnects for each elevator.
   b. Electrical power for elevator installation and testing.
   c. Disconnecting device to elevator equipment prior to activation of sprinkler system.
   d. The installation of dedicated GFCI receptacles in the pit and overhead.
   e. Lighting in controller area, machine area and pit.
   f. Wiring for telephone service to controller.
10. Section 27 05 28 – Pathways for Communications Systems: ADAAG-required emergency communications equipment.
11. Section 31 10 00 – Site Clearing: excavation for cylinder well casing.

1.03 REFERENCES
A. Comply with applicable building and elevator codes at the project site, including but not limited to the following:
3. ADAAG, American Disabilities Act Accessibility Guidelines.
7. ANSI/NFPA 80, Standard for Fire Doors and Other Opening Protectives.
8. Building Codes IBC
9. All Local Jurisdictional applicable codes.

1.04 SYSTEM DESCRIPTION FOR GROUP 1- UNIT 1

A. Equipment Description: Hole-less Hydraulic elevator with machine-room less application
B. Equipment Control: Elevonic® Control System.
C. Quantity of Elevators: 1 of 1
D. Elevator Stop Designations: 1, 2
E. Stops: 2
F. Openings: In-Line
G. Travel: 14 ft 0 in 0
H. Rated Capacity: 3500 lbs. (1588 kg)
I. Rated Speed: 100 fpm (0.51 mps)
J. Platform Size: 6'-6 3/4" W x 6'-1 1/8" D
K. Clear Inside Dimensions: 6'-5 9/16" W x 5'-5 9/16" D
L. Entrance Type and Width: Single-Slide Door- 42" (1067 mm)
M. Entrance Height: 7'-0" (2134 mm)
N. Main Power Supply: 480 volts ± 5% of normal, three-phase, with a separate equipment grounding conductor.
O. Car Lighting Power Supply: 120 volts, single-phase, 15 amps, 60 Hz.
P. Machine Location: No machine-room required, tank and controller in hoistway pit.
Q. Signal Fixtures:- Manufacturer’s standard with metal button targets
R. Controller Location: Inside hoistway, accessible by a door in a side hoistway wall on the 1st or 2nd landing. (1st landing only if rear entrance).
S. Stopping Accuracy: ± 1/4” (6.4 mm) under any loading condition or direction of travel.
T. Operation: Simplex Collective: Using a microprocessor-based controller, operation shall be automatic by means of the car and hall buttons. If all calls in the system have been answered, the car shall park at the last landing served.

U. Operation Features
1. Full Collective Operation
2. Anti-nuisance
3. Fan and Light Protection
4. Independent Service
5. Firefighters’ Service Phase I and Phase II
6. Top of Car Inspection
7. Zoned Access at Bottom Landing
8. Zoned Access at Upper Landing
9. Car Secure Access
11. Independent Service

V. Door Control Features:
1. Door control to open doors automatically when car arrives at a landing in response to a normal hall or car call.
2. Elevator doors shall be provided with a reopening device that will stop and reopen the car door(s) and hoistway door(s) automatically should the door(s) become obstructed by an object or person.
3. Door protection shall consist of a two dimensional, multi-beam array projecting across the car door opening.
4. Door nudging operation to occur if doors are prevented from closing for an adjustable period of time.

W. Provide equipment for seismic conditions.

1.05 SUBMITTALS
A. Product Data: Submit manufacturer’s product data for each system proposed for use. Include the following:
   1. Signal and operating fixtures, operating panels and indicators.
   2. Cab design, dimensions and layout.
   3. Hoistway-door and frame details.
   4. Electrical characteristics and connection requirements.
   5. Expected heat dissipation of elevator equipment in hoistway (BTU).
   6. Color selection chart for Cab and Entrances.
B. Shop Drawings: Submit approval layout drawings. Include the following:
   1. Car, guide rails, buffers, and other components in hoistway.
   3. Maximum loads imposed on guide rails requiring load transfer to building structure.
   4. Clearances and travel of car.
   5. Clear inside hoistway and pit dimensions.
   6. Location and sizes of access doors, hoistway entrances and frames.
C. Operations and Maintenance Manuals: Provide manufacturer’s standard operations and maintenance manual.

1.06 QUALITY ASSURANCE
A. Manufacturer: Elevator manufacturer shall be ISO 9001 certified.
B. Manufacturer shall have a minimum of fifteen years of experience in the fabrication, installation and service of elevators.
C. Installer: Elevators shall be installed by the manufacturer.
D. Permits, Inspections and Certificates: The Elevator Contractor shall obtain and pay for necessary Municipal or State Inspection and permit as required by the elevator inspection authority, and make such tests as are called for by the regulations of such authorities. These tests shall be made in the presence of such authorities or their authorized representatives.

1.07 DELIVERY, STORAGE, AND HANDLING
A. Should the building or the site not be prepared to receive the elevator equipment at the agreed upon date, the General Contractor will be responsible to provide a proper and suitable storage area on or off the premises.
B. Should the storage area be off-site and the equipment not yet delivered, then the elevator contractor, upon notification from the General Contractor, will divert the elevator equipment to the storage area. If the equipment has already been delivered to the site, then the General Contractor shall transport the elevator equipment to the storage area. The cost of elevator equipment taken to storage by either party, storage and redelivery to the job site shall not be at the expense of the elevator contractor.

1.08 WARRANTY
A. The elevator contractor’s acceptance is conditional on the understanding that their warranty covers defective material and workmanship. The warranty period shall not extend longer than one (1) year from the date of completion or acceptance thereof by beneficial use, whichever is earlier, of each elevator. The warranty excludes: ordinary wear and tear, improper use, vandalism, abuse, misuse, or neglect or any other causes beyond the control of the elevator contractor and this express warranty is in lieu of all other warranties, express or implied, including any warranty of merchantability or fitness for a particular purpose.
1.09 MAINTENANCE AND SERVICE

A. Maintenance service consisting of regular examinations and adjustments of the elevator equipment shall be provided by the elevator contractor for a period of 12 months after the elevator has been turned over for the customer's use. This service shall not be subcontracted but shall be performed by the elevator contractor. All work shall be performed by competent employees during regular working hours of regular working days. This service shall not cover adjustments, repairs or replacement of parts due to negligence, misuse, abuse or accidents caused by persons other than the elevator contractor. Only genuine parts and supplies as used in the manufacture and installation of the original equipment shall be provided.

B. The elevator control system must:
   1. Provide in the controller the necessary devices to run the elevator on inspection operation.
   2. Provide on top of the car the necessary devices to run the elevator in inspection operation.
   3. Provide in the controller an emergency stop switch. This emergency stop switch when opened disconnects power from the brake and prevents the motor from running.
   4. (Optional) Provide the means from the controller to reset elevator earthquake operation.

C. Provide system capabilities to enable a remote expert to create a live, interactive connection with the elevator system to enable the following functions:
   1. Remotely diagnose elevator issues with a remote team of experts
   2. Remotely return an elevator to service
   3. Provide real-time status updates via email
   4. Remotely make changes to selected elevator functions including:
      a. Control building traffic: Restrict floor access, remove car from group operation, shut down elevator, select up peak/down peak mode and activate independent service.
      b. Conserve energy: Activate cab light energy save mode, activate fan energy save mode, shut down car(s).
      c. Improve passenger experience: Extend door open times, change parking floor, activate auto car full, activate anti-nuisance, advance door opening, door nudging, extend specific floor extended opening time, release trapped passengers.

PRODUCTS

2.01 MANUFACTURER

A. Manufacturer: Basis of Design - Otis HydroFit™ machine room-less elevator system.

B. Hydraulic Elevators - Other Acceptable Manufacturers:

C. Substitutions: See Section 01 60 00 - Product Requirements.
   1. For any product not identified as Basis of Design, submit information as specified for substitutions.

2.02 DESIGN AND SPECIFICATIONS

A. Provide machine-roomless holeless hydraulic elevators from Otis Elevator Company. The control system and car design based on materials and systems manufactured by Otis Elevator Company. Specifically, the system shall consist of the following components:
   1. The entire hydraulic system and the controller shall be located inside the hoistway. No extra machine room or control closet space is required.
   2. LED lighting standard in ceiling lights and elevator fixtures.
   3. Sleep mode operation for LED ceiling lights and car fan.

B. Approved Installer: Otis Elevator Company
2.03 EQUIPMENT: MACHINE COMPONENTS

A. The hydraulic system shall be of compact design suitable for operation under the required pressure. The power component shall be mounted in the hydraulic-fluid storage tank. The control valve shall control flow for up and down directions hydraulically and shall include an integral check valve. A control section including control solenoids shall direct the main valve and control: up and down starting, acceleration, transition from full speed to leveling speed, up and down stops, pressure relief and manual lowering. All of these functions shall be fully adjustable for maximum smoothness and to meet contract conditions. System to be provided with a low-pressure switch and a shut-off valve.

B. The entire hydraulic system with hydraulic-fluid storage tank, power component and valves shall be located in the hoistway pit and be easily accessible for maintenance through an access door in the hoistway wall.

C. A microprocessor-based controller shall be provided, including necessary starting switches together with all relays, switches, solid-state components and hardware required for operation, including door operation, as described herein. A three (3) phase overload device shall be provided to protect the motor against overloading.

D. Controller Location: The controller shall be located together with the hydraulic system in the hoistway pit and be easily accessible for maintenance through the same access door that is also used for the hydraulic system.
   1. A manual lowering feature shall permit lowering the elevator at slow speed in the event of power failure or for adjusting purposes.

E. Pressure Switch

F. Low-oil control (where required)

2.04 EQUIPMENT: HOISTWAY COMPONENTS

A. Plunger(s) and Cylinder(s): Each cylinder shall be constructed of steel pipe of sufficient thickness and suitable for the operating pressure. The top of each cylinder shall be equipped with a cylinder head with a drip ring to collect any oil seepage as well as an internal guide ring and self-adjusting packing. Each plunger shall be constructed of selected steel tubing or pipe of proper diameter machined true and smooth with a fine polished finish. Each plunger shall be provided with a stop ring electrically welded to it to prevent the plunger from leaving the cylinder. Each plunger and cylinder shall be installed plumb and shall operate freely with minimum friction.

B. Car Guide Rails: Tee-section steel rails with brackets and fasteners.

C. Polyurethane type buffers shall be used.

D. Wiring: Wiring for hoistway electrical devices included in scope of the elevator system, hall panels, pit emergency stop switch, and the traveling cable for the elevator car.

E. Hoistway Entrances:
   1. Frames: Entrance frames shall be of bolted construction for complete one-piece unit assembly. All frames shall be securely fastened to fixing angles mounted in the hoistway and shall be of UL fire rated steel.
   2. Sills Shall Be: Extruded Aluminum Sills at: 1, 2
   3. Doors: Entrance doors shall be of metal construction with vertical channel reinforcements.
   4. Fire Rating: Entrance and doors shall be UL fire rated for 1-1/2 hour.
   5. Frame and Entrance Finishes:
   6. Brushed Stainless Steel Frames and Entrances at: 1, 2
   7. Entrance Marking Plates: Entrance jambs shall be marked with 4” x 4” (102 mm x 102 mm) plates having raised floor markings with Braille located adjacent to the floor marking. Marking plates shall be provided on both sides of the entrance.
   8. Sight Guards: Sight guards will be furnished with all doors painted to match with painted doors, painted black for stainless steel doors.
   9. Fascia: Galvanized sheet steel shall be provided at the front of the hoistway.
2.05 EQUIPMENT: CAR COMPONENTS

A. Cab: Premium, Steel Shell Cab with raised laminate wall panels
   1. Laminate to be selected from manufacturer’s catalog of choices.
B. Brushed Stainless Steel finished base plate located at top and bottom.
C. Car Front Finish: Satin Stainless Steel.
D. Car Door Finish: Satin Stainless Steel.
E. Ceiling Type: Drop Ceiling – Dropped Flat Steel Ceiling with 6 LED Lights
F. Ceiling Finish: Brushed Steel Finish
G. Emergency Car Lighting: An emergency power unit employing a 6-volt sealed rechargeable battery and totally static circuits shall be provided to illuminate the elevator car in the event of building power failure.
H. Fan: A one-speed 120 VAC fan will be mounted to the ceiling to facilitate in-car air circulation, meeting A17.1 code requirements. The fan shall be rubber mounted to prevent the transmission of structural vibration and will include a baffle to diffuse audible noise. A switch shall be provided in the car-operating panel to control the fan.
I. Handrail: 3/8” x 2” (9.5 mm x 51 mm) Flat Tubular Bar with Brushed Steel Finished handrails shall be provided on the rear wall.
J. Threshold: Extruded Aluminum
K. Emergency Exit Contact: An electrical contact shall be provided on the car-top exit.
L. Guides: Car roller type guides at the top and the bottom.
M. Platform: Car platform shall be constructed of metal.
N. The LED ceiling lights and the fan should automatically shut off when the system is not in use and be powered back up after a passenger calls the elevator and pushes a hall button.

2.06 EQUIPMENT: SIGNAL DEVICES AND FIXTURES

A. Car Operating Panel: A car operating panel shall be provided which contains all push buttons, key switches, and message indicators for elevator operation. The car operating panel shall have a satin stainless steel finish.
   1. A car operating panel shall be furnished. It shall contain a bank of round stainless steel, mechanical LED illuminated buttons. Flush mounted to the panel and marked to correspond to the landings served. All buttons to have raised numerals and Braille markings. The buttons shall be: Lexan 1/8” (3mm) projecting buttons, fully illuminated by a white LED.
   2. The car operating panel shall be equipped with the following features:
      a. Raised markings and Braille to the left hand side of each push-button.
      b. Car Position Indicator at the top of and integral to the car operating panel.
      c. Door open and door close buttons.
      d. Inspection key-switch.
      e. Elevator Data Plate marked with elevator capacity and car number.
      f. Help Button: The help button shall initiate two-way communication between the car and a location inside the building, switching over to another location if the call is unanswered, where personnel are available who can take the appropriate action. Visual indicators are provided for call initiation and call acknowledgement.
      g. Landing Passing Signal: A chime bell shall sound in the car to signal that the car is either stopping at or passing a floor served by the elevator.
      h. In car stop switch (toggle or key unless local code prohibits use)
      i. Firefighter’s hat
      j. Firefighter’s Phase II Key-switch
      k. Call Cancel Button
      l. No Logo
m. Firefighter's Phase II Emergency In-Car Operating Instructions: worded according to A17.1 2000, Article 2.27.7.2. - Optional
n. Please Exit Symbol: provided with emergency hospital service, Seismic Zones =2 or express priority in the hall. - Optional

B. Car Position Indicator: A digital, LED car position indicator shall be integral to the car operating panel.

C. Hall Fixtures: Hall fixtures shall be provided with necessary push buttons and key switches for elevator operation. All Hall fixtures shall have a Brushed Stainless Steel Finish.
   1. Hall Buttons:
      a. Flat Flush Mounted satin stainless steel button with blue or white LED illuminating halo

D. Car Lantern and Chime: A directional lantern visible from the corridor shall be provided in the car entrance. When the car stops and the doors are opening, the lantern shall indicate the direction in which the car is to travel and a chime will sound.

E. Access key-switch at top floor in entrance jamb.

F. Access key-switch at lowest floor in entrance jamb.

EXECUTION

3.01 PREPARATION
   A. Take field dimensions and examine conditions of substrates, supports, and other conditions under which this work is to be performed. Do not proceed with work until unsatisfactory conditions are corrected.

3.02 INSTALLATION
   A. Installation of all elevator components except as specifically provided for elsewhere by others.

3.03 DEMONSTRATION
   A. The elevator contractor shall make a final check of each elevator operation with the Owner or Owner’s representative present prior to turning each elevator over for use. The elevator contractor shall determine that control systems and operating devices are functioning properly.

END OF SECTION