PROJECT MANUAL

Volume 1

CITY OF NORTH LITTLE ROCK
NEW CONFERENCE CENTER
NORTH LITTLE ROCK, ARKANSAS

October XX, 2024

TAGGART
ARCHITECTS

600 Main Street, Suite 300
North Little Rock, Arkansas 72114
Phone – (501) 758-7443
Fax - (501) 753-7309

THE CONTRACT DOCUMENTS (DRAWINGS AND SPECIFICATIONS) ARE ISSUED AS PART OF A "SET" OF DOCUMENTS. THE GENERAL CONTRACTOR IS RESPONSIBLE FOR REVIEWING AND COORDINATING THE "WORK" OF ALL DISCIPLINES (CIVIL, ARCHITECTURAL, STRUCTURAL, MECHANICAL, ELECTRICAL PLUMBING, AND FIRE PROTECTION) DURING EACH PHASE OF CONSTRUCTION AND FOR INCURING THE INCLUSION OF ALL ITEMS, SYSTEMS, AND DEVICES THAT ARE REQUIRED IN ONE PART OF THE DOCUMENTS BUT NOT INDICATED IN ALL AREAS OF THE DOCUMENTS. IF A CONFLICT OR OMISSION IS DISCOVERED, CONTACT THE ARCHITECT IMMEDIATELY FOR CLARIFICATION PRIOR TO THE START OF "WORK". GENERAL CONTRACTOR SHALL NOTE THAT NO ADDITIONAL COST WILL BE INCURRED BY THE OWNER AFTER CONSTRUCTION STARTS.

Architect's Project #159722

CITY OF NORTH LITTLE ROCK
NEW CONFERENCE CENTER
NORTH LITTLE ROCK, ARKANSAS

GENERAL INDEX / VOLUME 1
October 31, 2024

CITY OF NORTH LITTLE ROCK
NEW CONFERENCE CENTER
NORTH LITTLE ROCK, ARKANSAS

GENERAL INDEX / VOLUME 2
October 31, 2024

DIVISION 33 – UTILITIES

DIVISION 34 – TRANSPORTATION

(NO WORK SPECIFIED IN THIS DIVISION)

DOCUMENT 001116 - INVITATION TO BID

PART 1 - GENERAL

1.1 PROJECT INFORMATION

A. Notice to Bidders: Qualified bidders are invited to submit bids for Project as described in this Document according to the Instructions to Bidders.

B. Project Identification: NORTH LITTLE ROCK COMMUNITY CENTER RENOVATION, North Little Rock, Arkansas

1. Project Location: 2700 Willow Street, North Little Rock, AR 72114

C. Owner: City of North Little Rock, 120 Main Street, North Little Rock, 72119

D. Architect: Taggart Architects, 600 Main Street, Suite 300, North Little Rock, Arkansas 72114.

E. Project Description: The Project consists of Interior Finish Renovations of existing Community Center spaces, plumbing renovations and upgrades, lighting upgrades, aluminum storefronts, exterior painting, paving renovations, and entry courtyard renovations and landscaping as described in the Construction Documents.

H. Construction Contract: Bids will be received for the following Work:

1. General Contract (all trades).

1.2 BID SUBMITTAL AND OPENING

A. Owner will receive sealed bids until the bid time and date at the location indicated below. Owner will consider bids prepared in compliance with the Instructions to Bidders issued by Owner, and delivered as follows:

1. Bid Date: **Thursday, May 30th, 2024**
2. Bid Time: **2:00 p.m.**, local time.
3. Location: North Little Rock City Services Building: 700 West 29th Street, North Little Rock, AR 72114 , First Floor Conference Room

B. Bids will be thereafter be publicly opened and read aloud. Any bids not submitted on time will be returned unopened.

1.3 BID SECURITY

A. Bid security shall be submitted with each bid in the amount of 5 percent of the bid amount. No bids may be withdrawn for a period of 60 days after opening of bids. Owner reserves the right to reject any and all bids and to waive informalities and irregularities.

1.4 PREBID CONFERENCE

A. MANDATORY PRE-BID MEETING: A **Mandatory Pre-Bid Meeting** will be conducted on **Tuesday, May 14th, 2024, at 9:00 a.m.** at the Project Site: 2700 Willow Street, North Little Rock, AR 72114. **Only General Contractors attending this Meeting will be eligible to submit a bid.** Sub-Contractors and Suppliers are invited but not required to attend.

1.5 DOCUMENTS

A. Printed Procurement and Contracting Documents: Plans may be obtained from Capitol Imaging, 11223 Otter Creek East Blvd., Mabelvale, Arkansas 72103 / Phone 501-376-2446 / Fax 501-375-9007 (Designated Distribution Representative). Downloads are available for purchase at www.capitolblueplanroom.com. **Plans and Specifications will be ready for distribution on Monday, May 6th, 2024,** Obtaining contract documents through any source other than the designated distribution representative is not advisable due to the risks of receiving incomplete or inaccurate information, and the bidders are at risk of basing their Bid(s) on such incomplete and inaccurate information. The documents obtained through Capitol Imaging are considered the official version and take precedence if any discrepancies occur. Bidding documents may be examined at the Architect's Office (Taggart Architects), by **Appointment Only**.

1.6 TIME OF COMPLETION **AND LIQUIDATED DAMAGES**

A. Bidders shall begin the Work on receipt of the Notice to Proceed and shall complete the Work within the Contract Time of **210 Calendar Days** (one hundred and eighty days)**.**

B. Liquidated damages shall be assessed beginning on the first day following the maximum delivery or completion time in the amount of $250 per day until the project is fully completed.

1.7 BIDDER'S QUALIFICATIONS

A. Bidders must be properly licensed under the laws governing their respective trades and be able to obtain insurance and bonds required for the Work. A Performance Bond, a separate Labor and Material Payment Bond, and Insurance in a form acceptable to Owner will be required of the successful Bidder.

1.8 MINORITY PARTICIPATION

A. Pursuant to Arkansas Code Annotated 22-9-203, the Owner encourages participation of qualified small, minority and woman owned business enterprises in the procurement of goods, services, and construction, Either as the General Contractor or subcontractor. The Owner further requests that General Contractors who require Subcontractors seek qualified small, minority, and woman owned businesses to partner with them.

1.9 COMPLIANCE WITH ARKANSAS STATUTES

A. Bidders must comply with requirements of Contractor's Licensing Law of the State of Arkansas, and all applicable Arkansas regulations. All bonds on this project shall comply with applicable Arkansas regulations. All Contractors must be licensed the day the project bids.

1.10 ACKNOWLEDGEMENT OF CONTRACT

A. Respondents acknowledge and understand that upon award of the winning bid, the selected bidder will be required to review and sign a contract with the City of North Little Rock, prior to providing any services to the City, which will contain additional terms and conditions.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF DOCUMENT 001116

DOCUMENT 002113 - INSTRUCTIONS TO BIDDERS

PART 1 - GENERAL

1.1 INSTRUCTIONS TO BIDDERS

A. AIA Document A701, "Instructions to Bidders," is hereby incorporated into the Procurement and Contracting Requirements by reference.

1. A copy of AIA Document A701, "Instructions to Bidders," is bound in this Project Manual.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF DOCUMENT 002113

DOCUMENT 002213 - SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

PART 1 - GENERAL

1.1 INSTRUCTIONS TO BIDDERS

A. Instructions to Bidders for Project consist of the following:

1. AIA Document A701, "Instructions to Bidders, a copy of which is bound in this Project Manual.
2. The following Supplementary Instructions to Bidders that modify and add to the requirements of the Instructions to Bidders.

1.2 SUPPLEMENTARY INSTRUCTIONS TO BIDDERS, GENERAL

A. The following supplements modify AIA Document A701, "Instructions to Bidders." Where a portion of the Instructions to Bidders is modified or deleted by these Supplementary Instructions to Bidders, unaltered portions of the Instructions to Bidders shall remain in effect.

1.3 ARTICLE 2 - BIDDER'S REPRESENTATIONS

A. Add Section 2.1.3.1:

1. 2.1.3.1 - The Bidder has investigated all required fees, permits, and regulatory requirements of authorities having jurisdiction and has properly included in the submitted bid the cost of such fees, permits, and requirements not otherwise indicated as provided by Owner.

B. Add Section 2.1.5:

1. 2.1.5 - The Bidder is a properly licensed Contractor according to the laws and regulations of The State of Arkansas and meets qualifications indicated in the Procurement and Contracting Documents.

C. Add Section 2.1.6:

1. 2.1.6 - The Bidder has incorporated into the Bid adequate sums for work performed by installers whose qualifications meet those indicated in the Procurement and Contracting Documents.

1.4 ARTICLE 3 - BIDDING DOCUMENTS

A. 3.2 - Interpretation or Correction of Procurement and Contracting Documents:

1. Add Section 3.2.2.1:

a. 3.2.2.1 - Submit Bidder's Requests for Interpretation using AIA Document G-716-2004, Request for Information (RFI) or other form providing identical information.

B. 3.4 - Addenda:

1. Delete Section 3.4.3 and replace with the following:

a. 3.4.3 - Addenda may be issued at any time prior to the receipt of bids.

2. Add Section 3.4.4.1:

a. 3.4.4.1 - Owner may elect to waive the requirement for acknowledging receipt of 3.4.4 Addenda as follows:

1) 3.4.4.1.1 - Information received as part of the Bid indicates that the Bid, as submitted, reflects modifications to the Procurement and Contracting Documents included in an unacknowledged Addendum.
2) 3.4.4.1.2 - Modifications to the Procurement and Contracting Documents in an unacknowledged Addendum do not, in the opinion of Owner, affect the Contract Sum or Contract Time.

1.5 ARTICLE 4 - BIDDING PROCEDURES

A. 4.1 - Preparation of Bids:

1. Add Section 4.1.8:

a. 4.1.8 - The Bid shall include unit prices when called for by the Procurement and Contracting Documents. Owner may elect to consider unit prices in the determination of award. Unit prices will be incorporated into the Contract.

2. Add Section 4.1.9:

a. 4.1.9 - Owner may elect to disqualify a bid due to failure to submit a bid in the form requested, failure to bid requested alternates or unit prices, failure to complete entries in all blanks in the Bid Form, or inclusion by the Bidder of any alternates, conditions, limitations or provisions not called for.

3. Add Section 4.1.10:

a. 4.1.10 - Bids shall include sales and use taxes. Contractors shall show separately with each monthly payment application the sales and use taxes paid by them and their subcontractors in the form indicated. Reimbursement of sales and use taxes, if any, shall be applied for by Owner for the sole benefit of Owner.

B. 4.3 - Submission of Bids:

1. Add Section 4.3.1.2:

a. 4.3.1.2 - Include Bidder's Contractor License Number applicable in Project jurisdiction on the face of the sealed bid envelope.

C. 4.4 - Modification or Withdrawal of Bids:

1. Add the following sections to 4.4.2:

a. 4.4.2.1 - Such modifications to or withdrawal of a bid may only be made by persons authorized to act on behalf of the Bidder. Authorized persons are those so identified in the Bidder's corporate bylaws, specifically empowered by the Bidder's charter or similar legally binding document acceptable to Owner, or by a power of attorney, signed and dated, describing the scope and limitations of the power of attorney. Make such documentation available to Owner at the time of seeking modifications or withdrawal of the Bid.

b. 4.4.2.2 - Owner will consider modifications to a bid written on the sealed bid envelope by authorized persons when such modifications comply with the following: the modification is indicated by a percent or stated amount to be added to or deducted from the Bid; the amount of the Bid itself is not made known by the modification; a signature of the authorized person, along with the time and date of the modification, accompanies the modification. Completion of an unsealed bid form, awaiting final figures from the Bidder, does not require power of attorney due to the evidenced authorization of the Bidder implied by the circumstance of the completion and delivery of the Bid.

D. 4.6 - Subcontractors, Suppliers, and Manufacturers List Bid Supplement:

1. Add Section 4.6:

a. 4.6 - Provide list of major subcontractors, suppliers, and manufacturers furnishing or installing products no later than two business days following Architect's request. Include those subcontractors, suppliers, and manufacturers providing work totaling three percent or more of the Bid amount. Do not change subcontractors, suppliers, and manufacturers from those submitted without approval of Architect.

1.6 ARTICLE 5 - CONSIDERATION OF BIDS

A. 5.2 - Rejection of Bids:

1. Add Section 5.2.1:

a. 5.2.1 - Owner reserves the right to reject a bid based on Owner's and Architect's evaluation of qualification information submitted following opening of bids. The Owner reserves the right to select the General Contractor who, in the Owner’s opinion, is best qualified to perform the Work. Owner's evaluation of the

Bidder's qualifications will include: status of licensure and record of compliance with licensing requirements, record of quality of completed work, record of Project completion and ability to complete, record of financial management including financial resources available to complete Project and record of timely payment of obligations, record of Project site management including compliance with requirements of authorities having jurisdiction, record of and number of current claims and disputes and the status of their resolution, and qualifications of the Bidder's proposed Project staff and proposed subcontractors. In addition, the selection will be based on the following section criteria.

b. Construction Bid Amount
c. Construction Completion date – number of days for construction
d. Published company profile, including but not limited to, demonstrating the contractor's similar project experience with references.
e. Number of Bank approved Sub-Contractor Vendors that are used in the Contractor's Bid.

1.7 ARTICLE 6 - POSTBID INFORMATION

A. 6.1 - Contractor's Qualification Statement:

1. Add Section 6.1.1:

a. 6.1.1 - Submit Contractor's Qualification Statement no later than two **b**usiness days following Architect's request.

B. 6.3 - Submittals:

1. Add Section 6.3.1.4:

a. 6.3.1.4 - Submit information requested in Sections 6.3.1.1, 6.3.1.2, and 6.3.1.3 no later than two business days following Architect's request.

1.8 ARTICLE 7 - PERFORMANCE BOND AND PAYMENT BOND

A. 7.1 - Bond Requirements:

1. Add Section 7.1.1.1:

a. 7.1.1.1 - Both a Performance Bond and a Payment Bond will be required, each in an amount equal to 100 percent of the Contract Sum.

B. 7.2 - Time of Delivery and Form of Bonds:

1. Delete the first sentence of Section 7.2.1 and insert the following:

a. The Bidder shall deliver the required bonds to Owner no later than 10 days after the date of Notice of Intent to Award and no later than the date of execution of the Contract, whichever occurs first. Owner may deem the failure of the Bidder to deliver required bonds within the period of time allowed a default.

2. Delete Section 7.2.3 and insert the following:

a. 7.2.3 - Bonds shall be executed and be in force on the date of the execution of the Contract.

1.9 GENERAL NOTES AND REQUIREMENTS

A. BONDS: Bid Security in the form of a Bid Bond (AIA Document A310) or Certified Check, in the amount of five percent (5%) of the contract sum, and payable to Owner will be required. The Bidder to whom the contract is awarded shall furnish Performance and Payment Bond(s) in an amount equal to one hundred percent (100%) of the amount of the contract, guaranteeing the faithful performance of the contract and the payment of all labor, materials, rental, equipment, etc. The Surety shall be a Surety company which is acceptable to the Owner and qualified and authorized to do business in Arkansas.

B. CONSTRUCTION PHASING: All portions of the work shall commence after a Notice to Proceed has been issued.

C. RETAINAGE: Refer to AIA Document A201 (1997 Edition), General Conditions of the Contract for Construction and the Supplementary General Conditions included as part of this Project Manual for retainage amounts.

D. EXAMINATION OF SITE AND DOCUMENTS: The Bidder is encouraged to examine carefully the site of the proposed work, the proposal, plans, specifications, and contract forms. He shall satisfy himself as to the character, quality, and quantities of work to be performed, materials to be furnished, and as to the requirements of these specification, special provisions, and contract. The submission of a proposal shall be "prima facie" evidence that the Bidder has made such examination.

E. RESPONSIBILITY OF BIDDERS: Bidders are presumed to be familiar with all federal, state, county, and city laws, ordinances and regulations which affect those persons engaged or employed in such work, materials, or equipment used, and other conditions affecting the work. Bidders shall comply with all such laws, ordinances and regulations.

F. DISCRIMINATION PARAGRAPH: In the event that a contract is entered into pursuant to the Invitation to Bids, the Bidder shall not discriminate against any qualified employee or qualified applicant for employment because of race, color, creed, national origin, or ancestry. The Bidder must include in any and all subcontracts a provision similar to the one above.

G. CONTRACT TIME: The contract time shall be as indicated in the Bid Proposal Form. Extensions to the contract time will only be considered if the requests are fully in compliance with Article 8, General Conditions of the Contract for Construction. The construction shall be substantially completed as indicated in the Bid Proposal Form.

H. CONTRACT DOCUMENT DISTRIBUTION: Obtaining contract document through any source other than the primary distribution point at Capitol Imaging or viewing the document located at the same location is not advisable due to the risks of receiving incomplete or inaccurate information, and the bidder's are at risk of basing their Bid(s) on such incomplete and inaccurate information. Only full sets of contract documents may be obtained. Partial sets will not be issued. The documents obtained through Capitol Imaging are considered the official version and take precedence if any discrepancies occur.

1. Printed Procurement and Contracting Documents:

Plans may be obtained from Capitol Imaging, 11223 Otter Creek East Blvd., Mabelvale, Arkansas 72103 / Phone 501-376-2446 / Fax 501-375-9007 (Designated Distribution Representative). Downloads are available for purchase at www.capitolblueplanroom.com. **Plans and Specifications will be ready for distribution on Monday, May 6th, 2024,** Obtaining contract documents through any source other than the designated distribution representative is not advisable due to the risks of receiving incomplete or inaccurate information, and the bidders are at risk of basing their Bid(s) on such incomplete and inaccurate information. The documents obtained through Capitol Imaging are considered the official version and take precedence if any discrepancies occur. Bidding documents may be examined at the Architect's Office (Taggart Architects), by **Appointment Only**.

I. By submitting a Bid for this Project, Bidders acknowledge they have read and understand the above provisions for Contract Document Distribution and also acknowledge they have read and understand the provisions that detail their responsibility to:

a. Bid or withdraw from consideration

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF DOCUMENT 002213

DOCUMENT 002513 - PREBID MEETINGS

PART 1 - GENERAL

1.1 PREBID MEETING

A. Architect will conduct a Prebid meeting as indicated below:

1. Meeting Date: **Tuesday, May 14th, 2024**
2. Meeting Time: **9:00 a.m.** local time.
3. Location: **2700 Willow Street, North Little Rock, AR 72114.**

B. Attendance:

1. **Prime Bidders: Attendance at Prebid meeting is Required**
2. Subcontractors: Attendance at Prebid meeting is recommended.

C. Agenda: Prebid meeting agenda will include review of topics that may affect proper preparation and submittal of bids, including the following:

1. Procurement and Contracting Requirements:

a. Advertisement for Bids.
b. Instructions to Bidders.
c. Bidder Qualifications.
d. Bonding.
e. Insurance.
f. Bid Security.
g. Bid Form and Attachments.
h. Bid Submittal Requirements.
i. Bid Submittal Checklist.
j. Notice of Award.

2. Communication during Bidding Period:

a. Obtaining documents.
b. Access to Project Web site.
c. Bidder's Requests for Information.
d. Bidder's Substitution Request/Prior Approval Request.
e. Addenda.

3. Contracting Requirements:

a. Agreement.
b. The General Conditions.
c. The Supplementary Conditions.
d. Other Owner requirements.

4. Construction Documents:

    a. Scopes of Work.
    b. Temporary Facilities.
    c. Use of Site.
    d. Work Restrictions.
    e. Alternates, Allowances, and Unit Prices.
    f. Substitutions following award.

5. Separate Contracts:

    a. Work by Owner.
    b. Work of Other Contracts.

6. Schedule:

    a. Project Schedule.
    b. Contract Time.
    c. Liquidated Damages.
    d. Other Bidder Questions.

7. Site/facility visit or walkthrough.
8. Post-Meeting Addendum.

E. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes to Prime Contractors**.** Distribution to Sub-Contractors and Suppliers will be the responsibility of the Prime Contractors. Minutes of meeting are issued as available Information and do not constitute a modification to the Procurement and Contracting Documents. Modifications to the Procurement and Contracting Documents are issued by written Addendum only.

    1. Sign-in Sheet: Minutes will include list of meeting attendees.
    2. List of Planholders: Minutes will include list of planholders.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF DOCUMENT 002513

SECTION 003132 - GEOTECHNICAL REPORT COVER

PART 1 - GENERAL

1.1 DESCRIPTION

A. General: A soils investigation report has been prepared for the site of this Project, by Terracon, 25809 I-30 Frontage Road, Bryant, Arkansas 72022, Phone (501) 847-9292, hereinafter referred to as the Soil Engineer or Geotechnical Engineer.

B. Availability: The soils investigation report has been included following this Section of the Specifications.

C. Use of Data:

1. This report was obtained only for the Architect's use in design and is not part of the Contract Documents. The report is available for bidder's information but is not a warranty of subsurface conditions.
2. Bidders should visit the site and acquaint themselves with all existing conditions. Prior to bidding, bidders may make their own subsurface investigations to satisfy themselves as to site and subsurface conditions, but all such investigations shall be performed only under time schedules and arrangements approved in advance by the Architect.
3. Bidders shall acquaint themselves with the soils investigation pertaining to the types of soil conditions found at this site.

1.2 DESCRIPTION

A. Test Boring Logs: The report will present physical data on subsurface conditions that is for the information of the Owner only, and in no event is this information to be considered as part of the Contract. It is expressly understood that the Owner or the Architect will not be responsible for any interpretation or conclusions drawn there from by the Contractor.

B. Limitations of Subsurface Information Indicated on Drawings:

1. Certain information regarding the reputed presence, size, character and location of existing underground structures, pipes and conduits has been indicated on the Drawings for the benefit of the Owner. There is no certainty of the accuracy of this information, and the location of underground structures indicated may be inaccurate, and other obstructions than those indicated may be encountered.
2. The Contractor hereby distinctly agrees that neither the Owner nor the Architect is responsible for the correctness or sufficiency of the information given:

a. That in no event is this information to be considered as a part of the Contract.
b. That he shall have no claim for delay or extra compensation, or damage given; or on account of the insufficiency or absence of information regarding obstruction either revealed or not revealed by the Drawings; and

c. That he shall have no claim for relief from any obligation or responsibility under the Contract, in case the location, size or character of any pipe or other underground structure is not as indicated on the Drawings, or in case any pipe or other underground structure is encountered that is not indicated on the Drawings.

1.2 SUBSURFACE INVESTIGATION

A. Test borings were made at the site by: Terracon, 25809 I-30 Frontage Road, Bryant, Arkansas 72022, Phone (501) 847-9292.

B. Geotechnical report and boring logs will be included with the Report.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION 003132

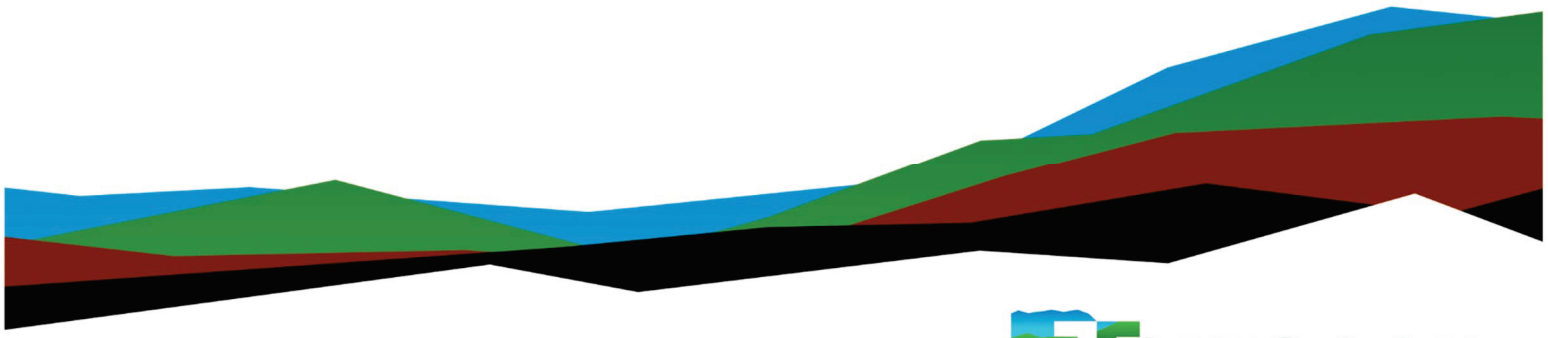
NLR Convention Center

Geotechnical Engineering Report

September 6, 2024 | Terracon Project No. 35245108

Prepared for:

City of North Little Rock
North Little Rock, Arkansas 72114



Terracon
Explore with us

Nationwide
Terracon.com

- Facilities
- Environmental
- Geotechnical
- Materials

25809 I-30 Frontage Road
Bryant, AR 72022
(501) 847-9292
Terracon.com

September 6, 2024

City of North Little Rock
700 W 29th Street
North Little Rock, Arkansas 72114

Attn: Mary Beth Bowman
P: (501) 912-8805
E: mbowman@nlr.ar.gov

Re: Geotechnical Engineering Report
NLR Convention Center
Washington Avenue & Main Street
North Little Rock, Arkansas
Terracon Project No. 35245108

Dear Ms. Bowman:

We have completed a subsurface exploration and geotechnical engineering evaluation for the referenced project in general accordance with Terracon Proposal No. P35245108 dated July 26, 2024. This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork and the design and construction of foundations, floor slabs, and pavements for the project.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us.

Sincerely,

Terracon
Certificate of Authorization No. 223, expires 12/31/2025

Gabrielle E. Whitesides
Field Engineer

Christopher H. Handley, P.E.
Principal

Table of Contents

Figures

Attachments

Exploration and Laboratory Results Supporting Information

Note: This report was originally delivered in a web-based format. **Blue Bold** text in the report indicates a referenced section heading. The PDF version also includes hyperlinks which direct the reader to that section and clicking on the Terracon logo will bring you back to this page. For more interactive features, please view your project online at **client.terracon.com**.

Refer to each individual Attachment for a listing of contents.

Introduction

This report presents the results of our subsurface exploration and Geotechnical Engineering services performed for the proposed North Little Rock Convention Center at Washington Avenue & Main Street in North Little Rock, Arkansas. The purpose of these services was to provide information and geotechnical engineering recommendations relative to:

- Subsurface soil conditions
- Groundwater conditions
- IBC seismic site class
- Site preparation and earthwork
- Excavation considerations
- Foundations
- Floor slabs
- Pavements

Drawings showing the site and boring locations are shown on the attached **Site Location** and **Exploration Plan**. The results of the laboratory testing performed on soil samples obtained from the site during our field exploration are included on the boring logs in **Exploration Results**.

Project Description

Our initial understanding of the project was provided in our proposal and was discussed during project planning. A period of collaboration has transpired since the project was initiated, and our final understanding of the project conditions is as follows:

Item	Description
Information Provided	After an initial discussion with Mary Beth Bowman, an email request for proposal was provided by James Meyer with Taggart Architects on July 23, 2024. The request included a Google Earth image of the site, possible boring layout plan, and conceptual plan drawings of the planned development. Plans from the previously demolished building, and existing fill documentation has been provided by the City of North Little Rock.

Item	Description
Project Description	The project includes a two-story convention center building with a footprint of about 30,000 square feet, with approximately 15,000 square feet dedicated to the ballroom at the center of the building. The building will be slab-on-grade (no basement).
Proposed Structure	Structures associated with the project include a 30,000 square-foot, single-story convention center building. Building construction type is unknown at the time of this proposal.
Finished Floor Elevation (FFE)	The FFE of the building was not provided at the time of this proposal. We anticipate the FFE will be at or near existing grade.
Maximum Loads	Anticipated structural loads were not provided. We have assumed the following maximum loads based on our experience with similar projects. ■ Columns: 100 kips ■ Walls: 1 kip per linear foot (klf) ■ Slabs: 150 pounds per square foot (psf)
Grading	A site grading plan was not provided. We have considered no more than 2 feet of cut and 2 feet of fill will be required to develop final grades.
Below-Grade Structures	No basement level or other below-grade areas are planned.
Free-Standing Retaining Walls	No free-standing retaining walls are planned.
Pavements	No information regarding anticipated vehicle types, axle loads, or traffic volumes was provided. We anticipate the pavements will be utilized primarily by passenger vehicles (cars, pickup trucks, SUV's) with occasional 2-axle delivery trucks and 3-axle trash collection trucks.

Terracon should be notified if any of the above information is inconsistent with the planned construction, as modifications to our recommendations may be necessary.

Site Conditions

The following description of site conditions is derived from our site visit in association with the field exploration and our review of publicly available geologic and topographic maps.

Item	Description
Parcel Information	The project is located at Washington Avenue & Main Street in North Little Rock, Arkansas. Latitude/Longitude: 34.7548°, -92.2672° (approximate) See **Site Location**
Current Ground Cover	Recently demolished building, asphalt and concrete paved parking lot
Existing Topography	The site is relatively level. The previous structure had a basement and was supported on piles. The structure has been recently demolished, and the basement walls and pile caps have been removed. The piles were left in place.
Geology	Silty sand, silty clay with varying amounts of sand, sandy silt, fat clay with varying amounts of sand, and poorly graded sand, typical of the alluvial formation.

Geotechnical Characterization

We have developed a general characterization of the subsurface conditions based on the subsurface exploration, laboratory data, geologic setting, and our understanding of the project. This characterization, termed GeoModel, forms the basis of our geotechnical evaluation. Conditions observed at each boring location are indicated on the individual logs. The individual logs are in the **Exploration Results** and the GeoModel is in the **Figures** attachment of this report.

As part of our analyses, we identified the following model layers within the subsurface profile. For a more detailed view of the model layer depths at each boring location, refer to the GeoModel.

Model Layer	Layer Name	General Description
1	**Fill**	Fill consisting of clayey sand and silty sand with varying amounts of gravel, silt with sand, and poorly graded gravel with sand
2	**Silty Sand Soils**	Very loose to dense silty sand
3	**Fine Grained Soils**	Soft to stiff silty clay with varying amounts of sand, medium stiff to stiff sandy silt, and medium stiff fat clay with varying amounts of sand
4	**Poorly Graded Sand**	Medium dense to dense poorly graded sand

The borings were observed during drilling and shortly after completion of drilling for the presence and level of water. Groundwater was observed in boring B-2 at a depth of 14 feet below the ground surface. A longer period of time may be required for groundwater to develop and stabilize in a borehole. Longer-term observations in piezometers or observation wells, sealed from the influence of surface water, are often required to define groundwater levels.

Groundwater levels may fluctuate due to seasonal variations in the amount of rainfall, runoff, and other factors not evident at the time the borings were performed. "Perched" water could occur above lower permeability soil layers and "trapped" water could be present within existing fill materials. Therefore, groundwater conditions at other times may be different than the conditions encountered in our exploratory borings. The potential for water level fluctuations and perched water should be considered when developing design and construction plans and specifications for the project.

Seismic Site Class

The seismic design requirements for buildings and other structures are based on Seismic Design Category. The Site Class is required to determine the Seismic Design Category for a structure. The Site Class is based on the upper 100 feet of the site profile defined by a weighted average value of either shear wave velocity, standard penetration resistance, or undrained shear strength in accordance with Section 20.4 of ASCE 7 and the International Building Code (IBC). Based on the soils encountered in our subsurface exploration, **Seismic Site Class D** can be considered for design of the project. The subsurface exploration at this site extended to a maximum depth of 50 feet. The site properties below the maximum boring depth were estimated based on our experience and knowledge of geologic conditions of the general area. Upon request, we could perform deeper borings or geophysical testing to confirm the conditions below the current maximum boring depth.

Geotechnical Overview

The general soil stratigraphy consists of fill soils to a depth of up to 8.5 feet, underlain by a combination of very loose to dense silty sand, soft to stiff silty clay with varying amounts of sand, medium stiff to stiff sandy silt, medium stiff fat clay with varying amounts of sand, followed by medium dense to dense poorly graded sand. Piles from the previous building were left in place approximately 3 feet below existing grade. The piles are expected to be around 12 inches in diameter. Groundwater was observed in boring B-2 at a depth of 14 feet below the ground surface. The following sections discuss the geotechnical conditions and considerations identified for the project site.

Low-Strength Soils

Deep-seated low-strength (soils with SPT N-values less than or equal to 5 blows per foot) sand soils were observed at the site. Because of this, we recommend ground improvement be considered for building support. Ground improvement may consist of various technologies such as rammed aggregate piers which can be considered for providing additional or enhanced foundation and/or floor slab support. Recommendations for rammed aggregate piers are found in the **Ground Improvement** section of this report.

Existing Fill

Existing fill was observed to depths up to 8.5 feet. This material was placed after the previous building was demolished. Documentation of existing fill, including the field density tests and laboratory reports, has been provided by the City of North Little Rock. There is an inherent risk for the owner that compressible fill or unsuitable material within or buried by the fill will not be discovered. This risk of unforeseen conditions cannot be eliminated without completely removing the existing fill. If the existing fill is removed, excavated on-site soil may be selectively reused as fill provided the material is observed, tested, and meets the recommendations in this report.

Alternative to Removal

As an alternative to the removal of existing fill and low-strength soils, the foundations may be constructed over the existing fill and low-strength soils at the project site. For this alternative, the owner must be willing to accept some risk of unpredictable settlement of foundations in exchange for reduced construction cost. For this alternative, any localized soft/unstable subgrade areas present during construction will need to be remediated prior to the construction of foundations.

We have considered the risk of unpredictable structure performance if the existing fill and/or low-strength soils are left in-place and have provided a reduced allowable bearing pressure for this alternative. If greater allowable bearing pressures are necessary for project constructability, deep foundations may be considered. Terracon can develop these for an additional fee.

General Overview

The recommendations contained in this report are based upon the results of field and laboratory testing (presented in the **Exploration Results**), engineering analyses, and our current understanding of the proposed project. Additional site preparation recommendations, including subgrade improvement and fill placement, are provided in

the **Earthwork** section. The **Shallow Foundations** section addresses support of the building bearing on existing soft to hard lean clay soils or new engineered fill. The **Floor Slabs** section addresses slab-on-grade support of the building. The **General Comments** section provides an understanding of the report limitations.

Earthwork

Site preparation, excavation, subgrade preparation and placement of engineered fill should follow the recommendations presented in this section. The recommendations presented for design and construction of earth-supported elements including foundations, slabs, and pavements are contingent upon the recommendations outlined in this section being followed. We recommend earthwork on this project be observed and evaluated by Terracon. The evaluation of earthwork should include observation and testing of subgrade preparation, engineered fill, foundation bearing soils, and other geotechnical conditions exposed during the construction of the project.

Site Preparation

Pavement, surface vegetation, topsoil and any other existing surface or subsurface structures and underground utilities, should be removed from the construction areas. Attention should be given to removing all loose or poorly compacted existing fill materials. All existing utilities should be properly abandoned and/or relocated. This should include removal of poorly compacted trench backfill extending into the proposed building area. In addition, care should be taken by contractors to protect all existing improvements to remain, such as pavements and utilities. Excavations created by removal of existing features should be backfilled with engineered fill that is placed and compacted as recommended in this report.

If the owner elects to construct the footings and floor slabs on the existing fill, the following protocol should be followed. Once the planned grading has been completed, the area should be undercut three feet within the building area as well as five feet beyond the lateral limits of the building area. Once these materials have been removed, the entire area should be proof-rolled with heavy, rubber tire construction equipment, to aid in delineating areas of soft, or otherwise unsuitable soil.

Proofrolling can be accomplished using a loaded tandem-axle dump truck with a gross weight of at least 20 tons, or similarly loaded equipment. Areas that display excessive deflection (pumping) or rutting during proofroll operations should be improved by scarification/compaction or by removal and replacement with engineered fill. Once any areas of unsuitable materials have been remediated, and the subgrade has passed the proof-roll test, the existing, and undocumented fill that was removed can be evaluated for reuse as engineered fill.

Excavation

We anticipate that excavations for the proposed construction can be accomplished with conventional earthmoving equipment. The bottom of excavations should be thoroughly cleaned of loose soils and disturbed materials prior to backfill placement and/or construction.

As a minimum, excavations should be performed in accordance with OSHA 29 CFR, Part 1926, Subpart P, "Excavations" and its appendices, and in accordance with any applicable local, state, and federal safety regulations. The contractor should be aware that slope height, slope inclination, and excavation depth should in no instance exceed those specified by these safety regulations. Flatter slopes than those dictated by these regulations may be required depending upon the soil conditions encountered and other external factors. These regulations are strictly enforced and if they are not followed, the owner, contractor, and/or earthwork and utility subcontractor could be liable and subject to substantial penalties. Under no circumstances should the information provided in this report be interpreted to mean that Terracon is responsible for construction site safety or the contractor's activities. Construction site safety is the sole responsibility of the contractor who shall also be solely responsible for the means, methods, and sequencing of the construction operations.

Fill Material Types

Fill required to achieve design grade should be classified as engineered fill and general fill. Engineered fill is material used below, or within 10 feet of structures, pavements or constructed slopes. General fill is material used to achieve grade outside of these areas.

Reuse of On-Site Soil: Excavated on-site soil may be selectively reused as fill provided the material is observed, tested, and meets the recommendations in this report. If any higher plasticity clays (LL≥45 and/or PI≥23) are encountered, these materials should be separated and only used as fill in deeper fill areas (more than 3 feet below bottom-of-floor-slab level) where slabs are planned or as fill outside the slab areas.

Material property requirements for on-site soil for use as general fill and engineered fill are noted in the table below:

Fill Type	USCS Classification	Acceptable Location for Placement
Native Fat Clays and/or Lean to Fat Clays (LL≥45 and/or PI≥20)	CL, CH	Pavement areas at depths greater than 24 inches below finished subgrade

Fill Type	USCS Classification	Acceptable Location for Placement
Native Low Plasticity Clays (LL<45 and PI<20)	CL, SC	Engineered fill beneath building pad and pavement areas
Native Silt and Silty Sand Soils	ML, SM, SP-SM	Not recommended for re-use
Coarse-Grained Soils	SP, GP	Engineered fill beneath building pad and pavement areas

Imported Fill Materials: Imported fill materials should meet the following material property requirements. Regardless of its source, compacted fill should consist of approved materials that are free of organic matter and debris. Frozen material should not be used, and fill should not be placed on a frozen subgrade.

Fill Type	USCS Classification	Acceptable Location for Placement
Low Volume Change (LVC) material	GM or CL, SC (LL<45 and PI<20)	All locations and elevations, except where free-draining material is required
Free Draining Granular	GW, GP, SW, SP	Beneath floor slabs and pavements

1. Engineered fill should consist of approved materials that are free of organic matter and debris. Frozen material should not be used, and fill should not be placed on a frozen subgrade.
2. ARDOT Class 7 aggregate base course or an approved alternate gradation of crushed limestone aggregate.
3. Granular materials with less than 5 percent fines (material passing the #200 sieve), such as ASTM C33 Size No. 57 aggregate or an approved alternate gradation.

Fill Placement and Compaction Requirements

Structural and general fill should meet the following compaction requirements.

Item	Engineered fill
Maximum Lift Thickness	8 inches or less in loose thickness when heavy, self-propelled compaction equipment is used 4 to 6 inches in loose thickness when hand-guided equipment (i.e., jumping jack or plate compactor) is used
Minimum Compaction Requirements [1,2,3]	98% of max. below foundations and within 1 foot of finished pavement subgrade 95% of max. above foundations, below floor slabs, and more than 1 foot below finished pavement subgrade
Water Content Range [1]	Cohesive: -2% to +2% of optimum Granular: Workable moisture levels

1. Maximum density and optimum water content as determined by the standard Proctor test (ASTM D 698).
2. High plasticity cohesive fill should not be compacted to more than 100% of standard Proctor maximum dry density.
3. If the granular material is a coarse sand or gravel, or of a uniform size, or has a low fines content, compaction comparison to relative density may be more appropriate. In this case, granular materials should be compacted to at least 70% relative density (ASTM D 4253 and D 4254). Materials not amenable to density testing should be placed and compacted to a stable condition observed by the Geotechnical Engineer or representative.

Utility Trench Backfill

Any soft or unsuitable materials encountered at the bottom of utility trench excavations should be removed and replaced with engineered fill or bedding material in accordance with public works specifications for the utility be supported. This recommendation is particularly applicable to utility work requiring grade control and/or in areas where subsequent grade raising could cause settlement in the subgrade supporting the utility. Trench excavation should not be conducted below a downward 1:1 projection from existing foundations without engineering review of shoring requirements and geotechnical observation during construction.

On-site materials are considered suitable for backfill of utility and pipe trenches from 1 foot above the top of the pipe to the final ground surface or as noted in the Fill Materials Type section of this report, provided the material is free of organic matter and deleterious substances.

Trench backfill should be mechanically placed and compacted as discussed earlier in this report. Compaction of initial lifts should be accomplished with hand-operated tampers or other lightweight compactors. Where trenches are placed beneath slabs or footings, the

backfill should satisfy the gradation and expansion index requirements of engineered fill discussed in this report. Flooding or jetting for placement and compaction of backfill is not recommended.

Utility trenches are a common source of water infiltration and migration. Utility trenches that penetrate beneath the building should be effectively sealed to restrict water intrusion and flow through the trenches, which could migrate below the building. Each trench should be provided with an effective trench plug that extends at least 5 feet from the face of the building exterior. The plug material should consist of cementitious flowable fill or low permeability clay. The trench plug material should be placed to surround the utility line. If clay is used to construct the trench plug, the clay should be placed and compacted in accordance with the water content and compaction recommendations for engineered fill provided in this report.

Grading and Drainage

The site should be graded to provide effective drainage away from the building during and after construction, and these conditions should be maintained throughout the life of the structure. Accumulation of water adjacent to the structure could contribute to significant moisture increases in the subgrade soils and subsequent softening/settlement or expansion/heave, which could result in soil movements greater than those discussed in this report. Greater movements can result in unacceptable differential floor slab and/or foundation movements, cracked slabs and walls, and roof leaks.

After building construction and landscaping have been completed, final grades should be verified to document effective drainage has been achieved. Grades around the structure should also be periodically inspected and adjusted, as necessary, as part of the structure's maintenance program. Where paving or flatwork abuts the structure, a maintenance program should be established to effectively seal and maintain joints and prevent surface water infiltration.

Earthwork Construction Considerations

Terracon should be retained during the construction phase of the project to observe earthwork and to perform necessary tests and observations during subgrade preparation, proofrolling, placement and compaction of engineered fill, backfilling of excavations into completed subgrades, and just prior to construction of foundations, slabs, and pavements.

Care should be taken to avoid disturbance of prepared subgrades. Unstable subgrade conditions can develop during general construction operations, particularly if the soils are wetted and/or subjected to repetitive construction traffic. If unstable subgrade conditions develop, stabilization measures will need to be employed. Construction traffic

over the completed subgrade should be avoided to the extent practical. If the subgrade becomes frozen, desiccated, saturated, or disturbed, the affected materials should be removed or these materials should be scarified, moisture conditioned, and compacted prior to floor slab construction.

Based on conditions encountered in the borings, significant seepage is generally not expected in excavations for this project (e.g., for footing construction and utility installation). If seepage is encountered in excavations during construction, the contractor is responsible for designing, implementing, and maintaining appropriate dewatering methods to control seepage and facilitate construction. In our experience, dewatering of excavations in clay soils can typically be accomplished using sump pits and pumps. If seepage occurs where sand seams or sand layers are encountered in excavations, a more extensive dewatering system may be required.

Construction Observation and Testing

The earthwork efforts should be observed by the Geotechnical Engineer (or others under their direction). Observation should include documentation of adequate removal of surficial materials (vegetation, topsoil, and pavements), evaluation and remediation of existing fill materials, as well as proofrolling and mitigation of unsuitable areas delineated by the proofroll.

Each lift of compacted fill should be tested, evaluated, and reworked, as necessary, as recommended by the Geotechnical Engineer prior to placement of additional lifts. Each lift of fill should be tested for density and water content at a frequency of at least one test for every 2,500 square feet of compacted fill in the building areas and 5,000 square feet in pavement areas. Where not specified by local ordinance, one density and water content test should be performed for every 100 linear feet of compacted utility trench backfill and a minimum of one test performed for every 12 vertical inches of compacted backfill.

In areas of foundation excavations, the bearing subgrade should be evaluated by the Geotechnical Engineer. If unanticipated conditions are observed, the Geotechnical Engineer should prescribe mitigation options.

In addition to the documentation of the essential parameters necessary for construction, the continuation of the Geotechnical Engineer into the construction phase of the project provides the continuity to maintain the Geotechnical Engineer's evaluation of subsurface conditions, including assessing variations and associated design changes.

Ground Improvement

As discussed in the Geotechnical Overview section, the general soil stratigraphy is comprised of very loose to dense silty sand, soft to stiff silty clay with varying amounts of sand, medium stiff to stiff sandy silt, medium stiff fat clay with varying amounts of sand, followed by medium dense to dense poorly graded sand. To reduce footing foundation size or increase allowable bearing capacity, structures may be supported on shallow foundations after ground improvement. A ground improvement system could be used to improve the deep-seated low- to moderate-strength soils, increase their allowable bearing pressure, and reduce the settlement of the footing or mat foundations.

With this alternative, a ground improvement system, such as aggregate piers or stone columns, could be installed in a grid pattern. In addition to increasing the allowable bearing pressure and reducing the magnitude of settlement, the ground improvement system will serve as a gravel conduit for the dissipation of pore-water pressure, thereby shortening the time required for consolidation settlements. Ground improvement systems are typically installed after clearing and grubbing and before beginning of fill construction.

Ground improvement systems are proprietary and are designed and installed by specialty design-build contractors. The specialty contractor should provide detailed design calculations sealed by a professional engineer licensed in the state of Arkansas. The design calculations should demonstrate that soil reinforcement system will control long-term settlements to less than 1-inch total and ½ inch differential.

The design parameters are typically verified by a full-scale modulus test (similar to a pile load test) performed in the field. Terracon should be retained to monitor the modulus test and subsequent production installations.

Shallow Foundations

Based on the conditions encountered at the borings, there are two options for shallow footing foundations. Option 1 is to support the building on lightly loaded footings that bear on engineered fill over weak soils. Option 2 is to support the building on soils after ground improvement methods such as rammed aggregate piers.

Shallow Foundation Design Parameters

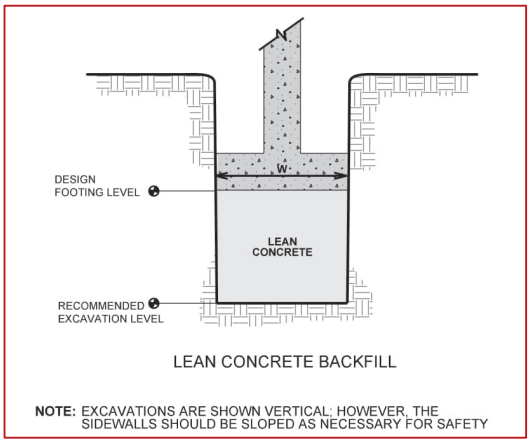
Item	Description
Maximum Net Allowable Bearing Pressure [1, 2]	Option 1 - Existing fill soils: 1,500 psf Option 2 - Rammed Aggregate Piers: The allowable bearing pressure of foundations bearing on soils after ground improvement should be verified by the licensed installer
Foundation Bearing Material	Option 1 - Existing fill soils left in place Option 2 – Existing soils with rammed aggregate piers
Minimum Foundation Dimensions	Columns: 30 inches Continuous: 18 inches
Minimum Embedment below Finished Grade [6]	24 inches
Estimated Total Settlement from Structural Loads [2]	Option 1 - Less than about 1 inch Option 2 - To be verified by licensed installer
Estimated Differential Settlement [2, 5]	Option 1 - About 2/3 of total settlement Option 2 - To be verified by licensed installer

1. The maximum net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation.
2. Values provided are for maximum loads noted in **Project Description**. Additional geotechnical consultation will be necessary if higher loads are anticipated.
3. Unsuitable or soft soils should be overexcavated and replaced per the recommendations presented in **Earthwork**.
4. Embedment necessary to minimize the effects of frost and/or seasonal water content variations.
5. Differential settlements are noted for equivalent-loaded foundations and bearing elevation as measured over a span of 50 feet.

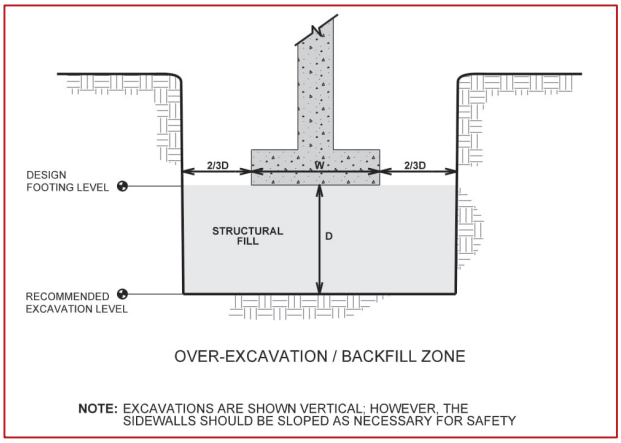
Foundation Construction Considerations

The base of all foundation excavations should be free of water and loose soil prior to placing concrete. Concrete should be placed soon after excavating to reduce bearing soil disturbance. Care should be taken to prevent wetting or drying of the bearing materials during construction. If the soils at the bearing level become excessively dry, disturbed, saturated, or frozen, the affected soil should be removed prior to placing concrete. If the excavations must remain open overnight or for an extended period of time, placement of a lean concrete mud-mat over the bearing soils should be considered.

The bearing materials at the base of each footing excavation should be evaluated by a representative of the Geotechnical Engineer. If unsuitable bearing materials are observed, the excavation should be extended deeper to suitable soils. The footings could bear directly on suitable soils at the lower level or on lean concrete backfill as shown on the following figure.



The footings could also bear on properly compacted engineered fill extending down to suitable soils as shown in the following figure. Overexcavation for compacted engineered fill placement below footings should extend laterally beyond all edges of the footings at least 8 inches per foot of overexcavation depth below footing elevation. The overexcavation should then be backfilled up to the footing base elevation with well graded granular material (e.g., ARDOT class 7 aggregate or an approved alternate gradation) placed and compacted as recommended in the **Earthwork** section.



Floor Slabs

Design parameters for floor slabs assume the requirements for **Earthwork** have been followed. Specific attention should be given to positive drainage away from the structure and positive drainage of the aggregate base beneath the floor slab.

Floor Slab Design Parameters

Item	Description
Floor Slab Support[1]	Tested and approved existing fill or new engineered fill
Granular Leveling Course Layer Thickness [2, 3]	4 inches (minimum)
Estimated Modulus of Subgrade Reaction [4]	150 pounds per square inch per inch (psi/in) for point loads

1. Floor slabs should be structurally independent of building footings or walls to reduce the possibility of floor slab cracking caused by differential movements between the slab and foundation.
2. Well graded crushed sone (ARDOT class 7) or open-graded crushed stone (e.g., ASTM C33, Size No. 57 aggregate) can be used as the leveling course.
3. These granular materials can be considered part of the LVC zone.
4. Modulus of subgrade reaction is an estimated value based upon our experience with the subgrade condition, the requirements noted in **Earthwork**, and the floor slab support as noted in this table. It is provided for point loads. For large area loads the modulus of subgrade reaction would be lower.

The use of a vapor retarder should be considered beneath concrete slabs on grade covered with wood, tile, carpet, or other moisture sensitive or impervious coverings, when the project includes humidity-controlled areas, or when the slab will support equipment sensitive to moisture. When conditions warrant the use of a vapor retarder, the slab designer should refer to ACI 302 and/or ACI 360 for procedures and cautions regarding the use and placement of a vapor retarder.

Joints should be placed in slabs at regular intervals as recommended by ACI to help control the locations of cracks. Joints or any cracks that develop in the floor slab should be sealed with a waterproof, non-extruding compressible compound.

If floor slabs are tied to perimeter walls or turn-down slabs to meet structural or other construction objectives, our experience indicates differential movement between the

walls and slabs will likely be observed in adjacent slab expansion joints or floor slab cracks beyond the length of the structural dowels. The Structural Engineer should account for potential differential settlement through use of sufficient control joints, appropriate reinforcing or other means.

Floor Slab Construction Considerations

The subgrade should be maintained within the moisture content range recommended for engineered fill until the floor slab is constructed. If the subgrade becomes desiccated prior to construction of the floor slab, the affected material should be removed or the materials should be scarified, moistened, and compacted. Upon completion of grading operations in the building area, care should be taken to maintain the subgrade within the moisture content and density ranges recommended for engineered fill prior to construction of the building floor slab.

On most project sites, the site grading is generally accomplished early in the construction phase. However, as construction proceeds, the subgrade may be disturbed due to utility excavations, construction traffic, desiccation, rainfall etc. As a result, the floor slab subgrade soils may not be suitable for placement of the granular course and/or concrete at the time of building construction, and corrective action may be required.

The Geotechnical Engineer should observe the condition of the floor slab subgrades immediately prior to placement of the floor slab support course, reinforcing steel, and concrete. Attention should be paid to high traffic areas that were rutted and disturbed earlier, and to areas where backfilled trenches are located.

Pavements

Pavement Subgrade Preparation

Pavement subgrades are expected to consist of engineered fill. The pavement subgrades should be proofrolled as recommended in **Earthwork**. If soft or otherwise unsuitable areas are observed, additional over-excavation and replacement will be needed.

Grading and paving are commonly performed by separate contractors and there is often a time lapse between the end of grading operations and the commencement of paving. Subgrades prepared early in the construction process may become disturbed by construction traffic. Non-uniform subgrades often result in poor pavement performance and local failures relatively soon after pavements are constructed. Depending on the paving equipment used by the contractor, measures may be required to improve

subgrade strength to greater depths for support of heavily loaded concrete/asphalt trucks.

We recommend the moisture content and density of the subgrade be evaluated and the pavement subgrades be proofrolled (using a loaded tandem-axle dump truck with a minimum gross weight of 20 tons or similarly loaded rubber-tire equipment) within two days prior to commencement of actual paving operations. Areas not in compliance with the required ranges of moisture or density should be scarified, moisture conditioned, and compacted. Particular attention should be paid to high traffic areas that were rutted and disturbed earlier and to areas where backfilled trenches are located. Areas where unsuitable conditions are located should be repaired by removing and replacing the materials with properly compacted fills. The subgrade should be in its finished form at the time of the final review.

Support characteristics of subgrade for pavement design do not account for shrink/swell movements of an expansive clay subgrade, such as soils observed on this project. Thus, the pavement may be adequate from a structural standpoint, yet still experience cracking and deformation due to shrink/swell related movement of the subgrade.

Pavement Section Thicknesses

Pavement thickness depends upon many factors including but not limited to:

- applied wheel/axle loads and number of repetitions
- subgrade and pavement material characteristics
- climate conditions
- site and pavement drainage

Specific information regarding anticipated vehicle types, axle loads and traffic volumes was not provided at the time of this report. The "Parking Lots" pavement section considers 4-tire, 2-axle personal vehicle traffic only (cars, vans, pickups and SUVs). The "Drives" pavement section considers personal vehicle traffic and a maximum of ten delivery trucks/trash collection trucks per week. Our recommendations for full depth asphaltic cement concrete (ACC) pavement, ACC pavement over aggregate base, and portland cement concrete (PCC) pavement sections are outlined in the following table.

Traffic Area	Pavement Section [1]	Minimum Recommended Pavement Section Thickness (in.)				
		Asphalt Surface Course [2]	Asphalt Binder Course [2]	Portland Cement Concrete [2] (4,000 psi)	Aggregate Base [2]	Total Thickness
Light-duty	I	3	---	---	8	11
	II	---	---	5	4	9
Heavy-duty	I	2	3	--	8	13
	II	---	---	8	6	14
Dumpster Pad	II	---	---	7	6	13

1. Pavement Section I = Asphaltic Concrete over Aggregate Base
Pavement Section II = 4,000 psi, Air Entrained Portland Cement Concrete (PCC) over Aggregate Base
2. Arkansas State Highway and Transportation Department Standard Specifications for Highway Construction

PCC pavements will perform better than ACC in areas where short radius turning and braking are expected (i.e., entrance/exit aprons) due to better resistance to rutting and shoving. In addition, PCC pavement will perform better in areas subject to heavy static loads.

Construction traffic on the pavements was not considered in developing our opinions of minimum pavement thickness. If the pavements will be subject to construction equipment/vehicles, the pavement sections should be revised to consider the additional loading.

Pavements and subgrades will be subject to freeze-thaw cycles and seasonal fluctuations in moisture content. Pavement thickness design methods are intended to provide adequate thickness of structural materials over a particular subgrade such that wheel loads are reduced to a level that the subgrade can support. The subgrade support parameters for pavement thickness design do not account for shrink/swell movements of a subgrade constructed of expansive clay soils. Therefore, the pavement may be adequate from a structural standpoint, yet still experience cracking and deformation due to shrink/swell related movement of the subgrade.

The pavement sections provided above consider that the subgrade soils will not experience significant increases in moisture content. Paved areas should be sloped to provide rapid drainage of surface water and to drain water away from the pavement edges. Pavements should be designed so water does not accumulate on or adjacent to the pavement, since this could saturate and soften the subgrade soils and subsequently accelerate pavement deterioration.

Periodic maintenance of the pavements will be required. Cracks should be sealed, and areas exhibiting distress should be repaired promptly to help prevent further deterioration. Even with periodic maintenance, some movement and related cracking may still occur, and repairs may be required.

Pavement Drainage

Pavements should be sloped to provide rapid drainage of surface water. Water allowed to pond on or adjacent to the pavements could saturate the subgrade and contribute to premature pavement deterioration. In addition, the pavement subgrade should be graded to provide positive drainage within the granular base section. Appropriate sub-drainage or connection to a suitable daylight outlet should be provided to remove water from the granular subbase.

Based on the possibility of shallow and/or perched groundwater, we recommend installing a pavement subdrain system to control groundwater, improve stability, and improve long-term pavement performance.

Pavement Maintenance

The pavement sections represent minimum recommended thicknesses, and periodic maintenance and repairs should be anticipated. Preventive maintenance should be planned and provided for through an on-going pavement management program. Maintenance activities are intended to slow the rate of pavement deterioration and to preserve the pavement investment. Pavement care consists of both localized (e.g., crack sealing, joint sealing, and patching) and global maintenance (e.g., surface sealing). Additional engineering consultation is recommended to determine the type and extent of a cost-effective program. Even with periodic maintenance, some movements and related cracking may still occur, and repairs may be required.

Pavement performance is affected by the pavement's surroundings. In addition to providing preventive maintenance, the civil engineer should consider the following recommendations in the design and layout of pavements:

- Final grade adjacent to paved areas should slope down from the edges at a minimum 2%.
- Subgrade and pavement surfaces should have a minimum 2% slope to promote proper surface drainage.
- Install pavement drainage systems surrounding areas anticipated for frequent wetting.
- Install joint sealant and seal cracks immediately.
- Seal all landscaped areas in or adjacent to pavements to reduce moisture migration to subgrade soils.

- Place compacted, low permeability backfill against the exterior side of curb and gutter.
- Place curb, gutter and/or sidewalk directly on clay subgrade soils rather than on unbound granular base course materials.

General Comments

Our analysis and opinions are based upon our understanding of the project, the geotechnical conditions in the area, and the data obtained from our site exploration. Variations will occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. Terracon should be retained as the Geotechnical Engineer, where noted in this report, to provide observation and testing services during pertinent construction phases. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations.

Support of floor slabs and pavements above existing fill is discussed in this report. Even with the construction observation/testing recommended in this report, the owner must accept the risk that unsuitable materials within or buried by the fill will not be discovered. This may result in larger than normal settlement and damage to slabs and pavements supported above existing fill, requiring additional maintenance. This risk cannot be eliminated without removing the existing fill from below the building and pavement areas, but it can be reduced by thorough observation and testing as discussed herein.

Our Scope of Services does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

Our services and any correspondence are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third-party beneficiaries intended. Any third-party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly impact excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety, cost estimating, excavation support, and dewatering requirements/design are the responsibility of others. Construction and site development have the potential to affect adjacent properties. Such impacts can include damages due to vibration, modification of groundwater/surface water flow during construction, foundation movement due to undermining or subsidence from excavation, as well as noise or air quality concerns. Evaluation of these items on nearby properties are commonly associated with contractor means and methods and are not addressed in this report. The owner and contractor should consider a preconstruction/precondition survey of surrounding development. If changes in the nature, design, or location of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

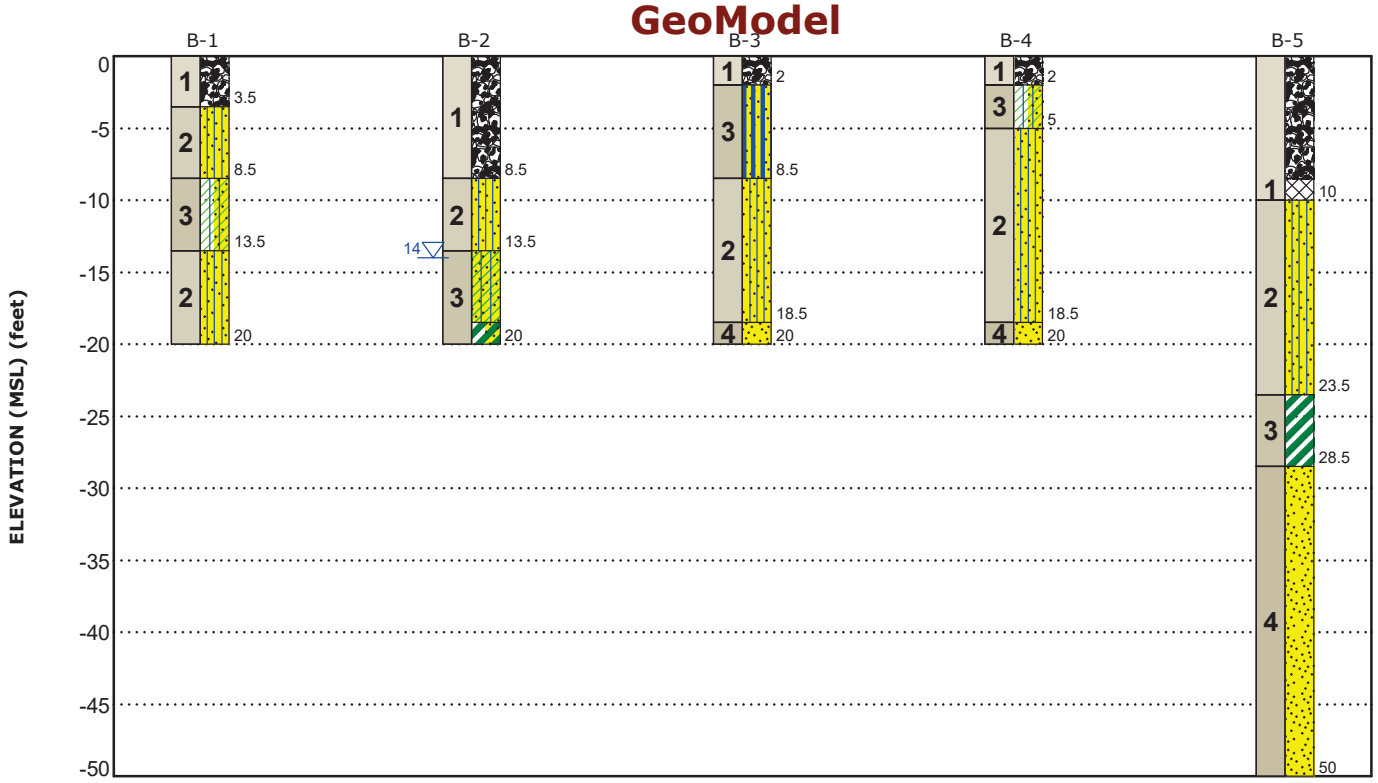
Figures

Contents:

NLR Convention Center
Washington Avenue & Main Street | North Little Rock, AR
Terracon Project No. 35245108

Terracon
25809 I 30
Bryant, AR

GeoModel



This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

Model Layer	Layer Name	General Description
1	Fill	Fill consisting of clayey sand and silty sand with varying amounts of gravel, silt with sand, and poorly graded gravel with sand
2	Silty Sand Soils	Very loose to dense silty sand
3	Fine Grained Soils	Soft to stiff silty clay with varying amounts of sand, medium stiff to stiff sandy silt, and medium stiff fat clay with varying amounts of sand
4	Poorly Graded Sand	Medium dense to dense poorly graded sand

Legend

- Fill
- Silty Sand
- Silty Clay with Sand
- Sandy Silty Clay
- Fat Clay with Sand
- Sandy Silt
- Poorly-graded Sand
- Fill
- Fat Clay

▽ First Water Observation

Groundwater levels are temporal. The levels shown are representative of the date and time of our exploration. Significant changes are possible over time.
Water levels shown are as measured during and/or after drilling. In some cases, boring advancement methods mask the presence/absence of groundwater. See individual logs for details.

NOTES:
Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project.
Numbers adjacent to soil column indicate depth below ground surface.

Attachments

Exploration and Testing Procedures

Field Exploration

Number of Borings	Approximate Boring Depth (feet)	Location
4	20	Within the proposed building area
1	50	

Boring Layout and Elevations: Terracon personnel provided the boring layout using handheld GPS equipment (estimated horizontal accuracy of about ±10 feet) and referencing existing site features. Approximate ground surface elevations were estimated using Google Earth. If elevations and a more precise boring layout are desired, we recommend borings be surveyed.

Subsurface Exploration Procedures: We advanced the borings with a track-mounted rotary drill rig using continuous flight augers (solid stem and/or hollow stem, as necessary, depending on soil conditions). Five samples were obtained in the upper 10 feet of each boring and at intervals of 5 feet thereafter. In the thin-walled tube sampling procedure, a thin-walled, seamless steel tube with a sharp cutting edge was pushed hydraulically into the soil to obtain a relatively undisturbed sample. In the split-barrel sampling procedure, a standard 2-inch outer diameter split-barrel sampling spoon was driven into the ground by a 140-pound automatic hammer falling a distance of 30 inches. The number of blows required to advance the sampling spoon the last 12 inches of a normal 18-inch penetration is recorded as the Standard Penetration Test (SPT) resistance value. The SPT resistance values, also referred to as N-values, are indicated on the boring logs at the test depths. For safety purposes, all borings were backfilled with auger cuttings after their completion.

We also observed the boreholes while drilling and at the completion of drilling for the presence of groundwater. The groundwater levels are shown on the attached boring logs.

The sampling depths, penetration distances, and other sampling information was recorded on the field boring logs. The samples were placed in appropriate containers and taken to our soil laboratory for testing and classification by a geotechnical engineer. Our exploration team prepared field boring logs as part of the drilling operations. These field logs included visual classifications of the materials observed during drilling and our interpretation of the subsurface conditions between samples. Final boring logs were prepared from the field logs. The final boring logs represent the Geotechnical Engineer's interpretation of the field logs and include modifications based on observations and tests of the samples in our laboratory.

Laboratory Testing

The project engineer reviewed the field data and assigned laboratory tests. The laboratory testing program included the following tests on selected samples:

- Moisture Content
- Percent Fines
- Atterberg Limits

The laboratory testing program included examination of soil samples by an engineer. Based on the results of our field and laboratory programs, we described and classified the soil samples in accordance with the Unified Soil Classification System.

Site Location and Exploration Plans

Contents:

Site Location Plan
Exploration Plan

Note: All attachments are one page unless noted above.

Site Location

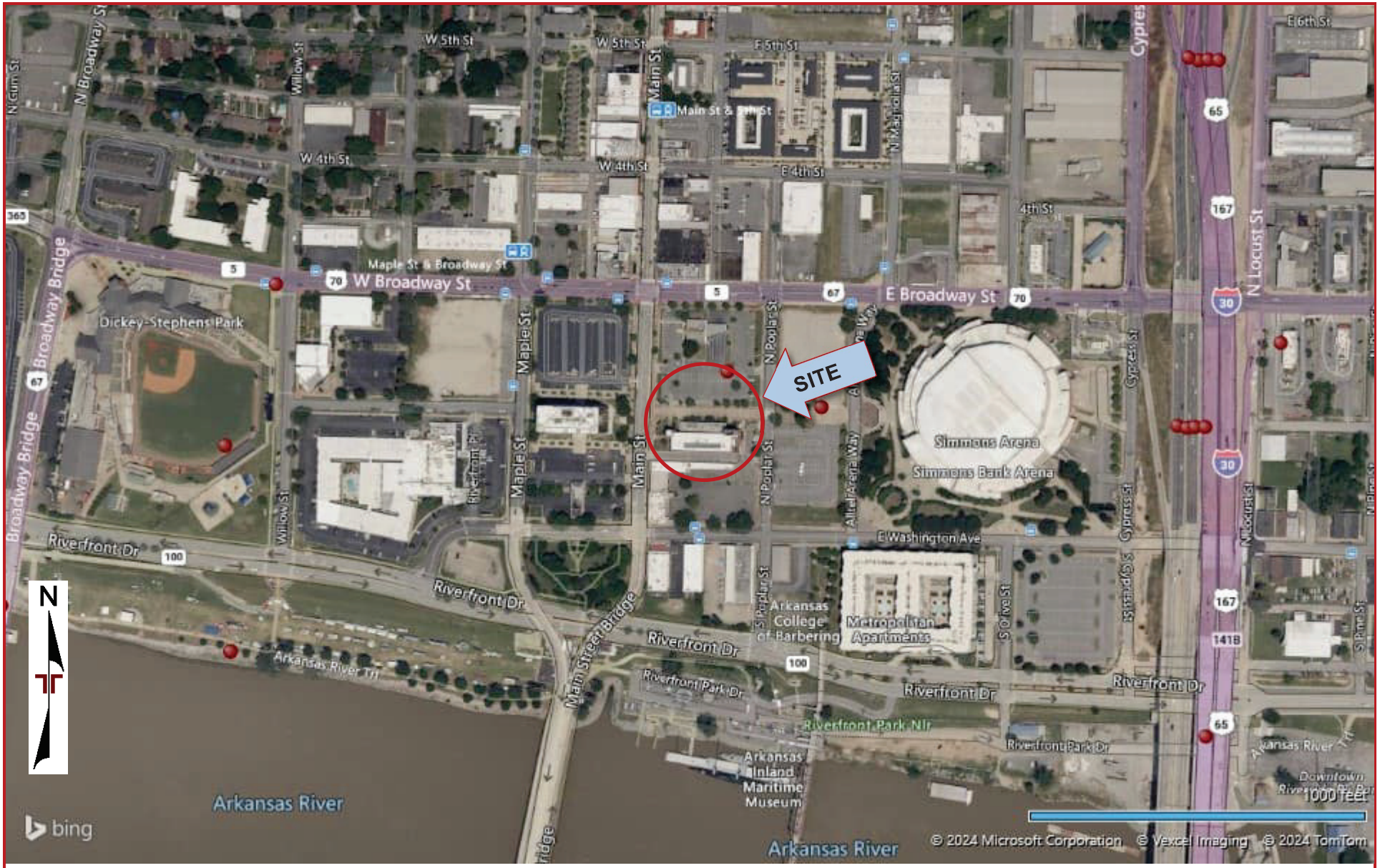


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

Exploration Plan

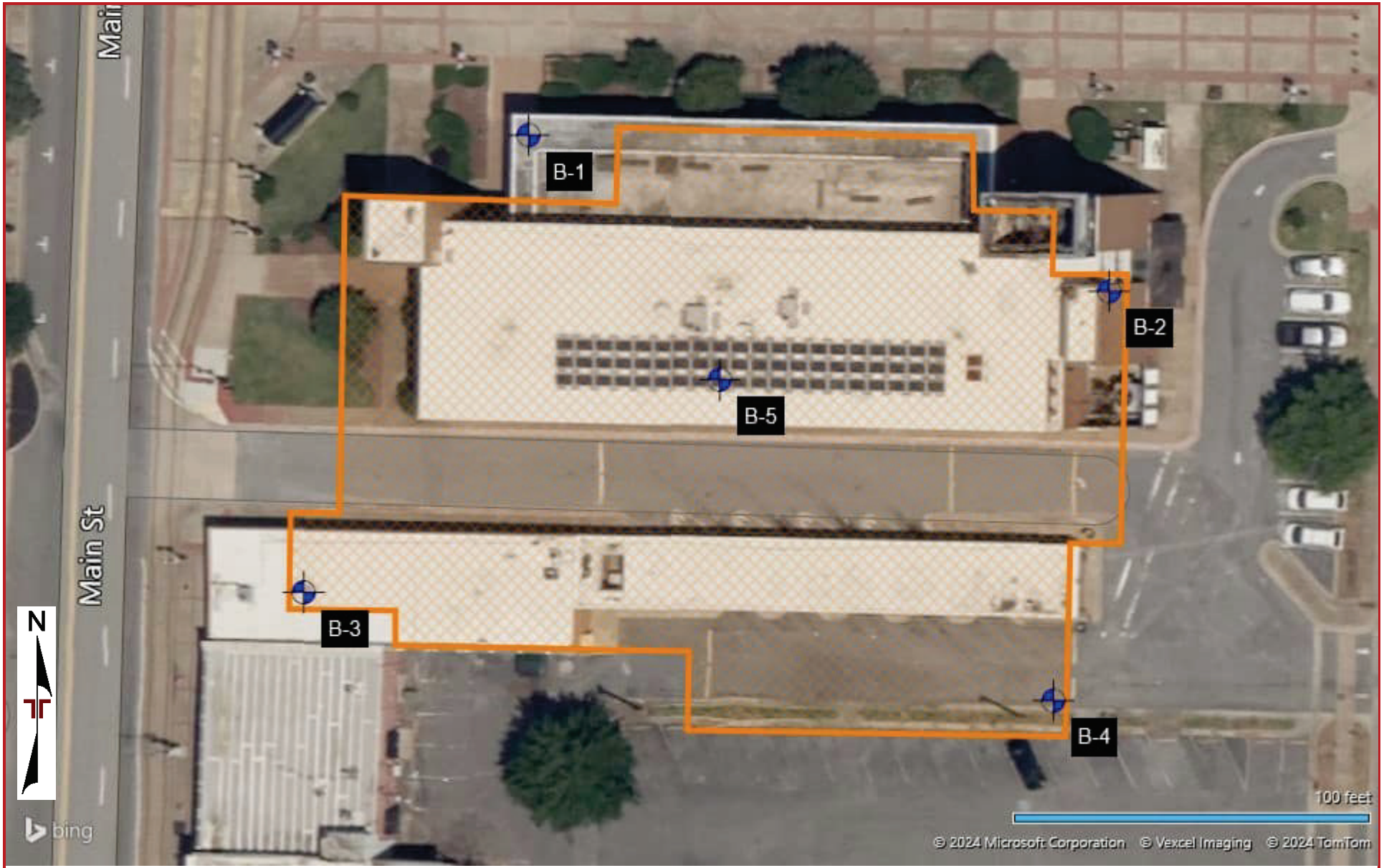


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

Exploration and Laboratory Results

Contents:

Boring Logs (B-1 through B-5)

Note: All attachments are one page unless noted above.

NLR Convention Center
Washington Avenue & Main Street | North Little Rock, AR
Terracon Project No. 35245108

25809 I 30
Bryant, AR

Boring Log No. B-1

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 34.7550° Longitude: -92.2674° Depth (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
1		**FILL - CLAYEY SAND WITH GRAVEL**				3-4-6 N=10	10.7		
						6-3-4 N=7	16.3		
		3.5							
2		**SILTY SAND (SM)**, brown, loose	5			2-2-3 N=5	12.8	NP	44
						3-3-3 N=6	15.0		
		8.5							
3		**SILTY CLAY WITH SAND (CL-ML)**, brown, soft	10			1-2-1 N=3	18.6		
		13.5							
2		**SILTY SAND (SM)**, brown, medium dense	15			4-5-5 N=10	17.4		
						5-7-5 N=12	12.9		
		20.0	20						
		Boring Terminated at 20 Feet							

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).
See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
Groundwater not encountered

Drill Rig
840

Hammer Type
Automatic

Driller
LW

Logged by
TL

Boring Started
08-14-2024

Boring Completed
08-14-2024

Notes

Advancement Method
Solid stem auger

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Boring Log No. B-2

Location: See Exploration Plan

Latitude: 34.7549° Longitude: -92.2669°

Model Layer	Graphic Log	Depth (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
1		**FILL - SILTY SAND WITH GRAVEL**				18-29-34 N=63	3.9		
						27-30-50 N=80	4.2	NP	32
						32-50/4"	4.4		
			5			33-38-28 N=66	4.3		
		8.5							
2		**SILTY SAND (SM)**, light brown and light gray, dense				8-17-17 N=34	4.5	NP	33
			10						
		13.5							
3		**SANDY SILTY CLAY (CL-ML)**, brown, stiff		▽		9-7-2 N=9	13.4		
			15						
		18.5							
		FAT CLAY WITH SAND (CH), brown, medium stiff				3-3-4 N=7	22.6		
		20.0	20						
		Boring Terminated at 20 Feet							

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
▽ 14 feet while drilling

Drill Rig
840

Hammer Type
Automatic

Driller
LW

Logged by
TL

Boring Started
08-14-2024

Boring Completed
08-14-2024

Notes

Advancement Method
Solid stem auger

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

NLR Convention Center
Washington Avenue & Main Street | North Little Rock, AR
Terracon Project No. 35245108

25809 I 30
Bryant, AR

Boring Log No. B-3

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 34.7546° Longitude: -92.2676° Depth (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
1		**FILL - SILT WITH SAND** 2.0				8-7-6 N=13	5.2		
3		**SANDY SILT (ML)**, brown, medium stiff to stiff				6-5-4 N=9	12.4		
						4-4-4 N=8	15.7		
			5			3-4-3 N=7	15.3	NP	86
		8.5							
2		**SILTY SAND (SM)**, brown, loose				3-3-2 N=5	19.6		
			10						
						4-4-4 N=8	16.4		
			15						
4		**POORLY GRADED SAND (SP)**, brown, medium dense 20.0				4-5-11 N=16	7.2		
		Boring Terminated at 20 Feet	20						

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
Groundwater not encountered

Drill Rig
840

Hammer Type
Automatic

Driller
LW

Logged by
TL

Boring Started
08-14-2024

Boring Completed
08-14-2024

Notes

Advancement Method
Solid stem auger

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

NLR Convention Center
Washington Avenue & Main Street | North Little Rock, AR
Terracon Project No. 35245108

25809 I 30
Bryant, AR

Boring Log No. B-4

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 34.7545° Longitude: -92.2669° Depth (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
1		**FILL - GRAVELLY SILTY SAND** 2.0				18-17-6 N=23	13.0	NP	59
3		**SILTY CLAY WITH SAND (CL-ML)**, dark brown, soft to medium stiff 5.0				5-3-3 N=6	11.3		
						1-3-1 N=4	21.3		
2		**SILTY SAND (SM)**, brown, loose to medium dense	5			2-3-4 N=7	12.4	NP	39
						2-3-2 N=5	19.6		
			10						
						2-4-8 N=12	22.6		
			15						
4		**POORLY GRADED SAND (SP)**, light brown, medium dense 18.5 20.0				4-5-9 N=14	7.7		
		Boring Terminated at 20 Feet	20						

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
Groundwater not encountered

Drill Rig
840

Hammer Type
Automatic

Driller
LW

Logged by
TL

Boring Started
08-14-2024

Boring Completed
08-14-2024

Notes

Advancement Method
Solid stem auger

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

NLR Convention Center
Washington Avenue & Main Street | North Little Rock, AR
Terracon Project No. 35245108

25809 I 30
Bryant, AR

Boring Log No. B-5

Location: See Exploration Plan

Latitude: 34.7548° Longitude: -92.2673°

Model Layer	Graphic Log	Depth (Ft.)	Description	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
			FILL - CLAYEY SAND WITH GRAVEL							
							19-17-23 N=40	5.1	21-15-6	33
							13-9-11 N=20			
							3-4-5 N=9	36.2		
				5			5-5-3 N=8	13.1		
		8.5								
1			**FILL - POORLY GRADED GRAVEL WITH SAND**				11-11-11 N=22	6.3		
		10.0		10						
2			**SILTY SAND (SM)**, brown, very loose to loose							
							1-4-2 N=6			
				15						
							1-2-1 N=3	11.5		
				20						
		23.5								
3			**FAT CLAY (CH)**, brown, medium stiff				6-3-2 N=5	27.6		
				25						
		28.5								
4			**POORLY GRADED SAND (SP)**, brown, medium dense to dense				13-13-16 N=29	22.5		
				30						

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
Water level not determined

Drill Rig
840

Hammer Type
Automatic

Driller
LW

Logged by
TL

Boring Started
08-14-2024

Boring Completed
08-14-2024

Notes

Advancement Method
Mud rotary drilling

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Boring Log No. B-5

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 34.7548° Longitude: -92.2673° Depth (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
4		**POORLY GRADED SAND (SP)**, brown, medium dense to dense *(continued)*	35			10-10-10 N=20	28.6		
			40			8-8-10 N=18	18.8		
			45			14-16-16 N=32	21.8		
		50.0	50			15-10-14 N=24	16.6		
		Boring Terminated at 50 Feet							

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
Water level not determined

Drill Rig
840

Hammer Type
Automatic

Driller
LW

Logged by
TL

Boring Started
08-14-2024

Boring Completed
08-14-2024

Notes

Advancement Method
Mud rotary drilling

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Supporting Information

Contents:

Note: All attachments are one page unless noted above.

General Notes

Sampling	Water Level	Field Tests
Standard Penetration Test	Water Initially Encountered Water Level After a Specified Period of Time Water Level After a Specified Period of Time Cave In Encountered Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.	N Standard Penetration Test Resistance (Blows/Ft.) (HP) Hand Penetrometer (T) Torvane (DCP) Dynamic Cone Penetrometer UC Unconfined Compressive Strength (PID) Photo-Ionization Detector (OVA) Organic Vapor Analyzer

Descriptive Soil Classification

Soil classification as noted on the soil boring logs is based Unified Soil Classification System. Where sufficient laboratory data exist to classify the soils consistent with ASTM D2487 "Classification of Soils for Engineering Purposes" this procedure is used. ASTM D2488 "Description and Identification of Soils (Visual-Manual Procedure)" is also used to classify the soils, particularly where insufficient laboratory data exist to classify the soils in accordance with ASTM D2487. In addition to USCS classification, coarse grained soils are classified on the basis of their in-place relative density, and fine-grained soils are classified on the basis of their consistency. See "Strength Terms" table below for details. The ASTM standards noted above are for reference to methodology in general. In some cases, variations to methods are applied as a result of local practice or professional judgment.

Location And Elevation Notes

Exploration point locations as shown on the Exploration Plan and as noted on the soil boring logs in the form of Latitude and Longitude are approximate. See Exploration and Testing Procedures in the report for the methods used to locate the exploration points for this project. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

Strength Terms

Relative Density of Coarse-Grained Soils (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance		Consistency of Fine-Grained Soils (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance		
Relative Density	**Standard Penetration or N-Value (Blows/Ft.)**	**Consistency**	**Unconfined Compressive Strength Qu (tsf)**	**Standard Penetration or N-Value (Blows/Ft.)**
Very Loose	0 - 3	Very Soft	less than 0.25	0 - 1
Loose	4 - 9	Soft	0.25 to 0.50	2 - 4
Medium Dense	10 - 29	Medium Stiff	0.50 to 1.00	4 - 8
Dense	30 - 50	Stiff	1.00 to 2.00	8 - 15
Very Dense	> 50	Very Stiff	2.00 to 4.00	15 - 30
		Hard	> 4.00	> 30

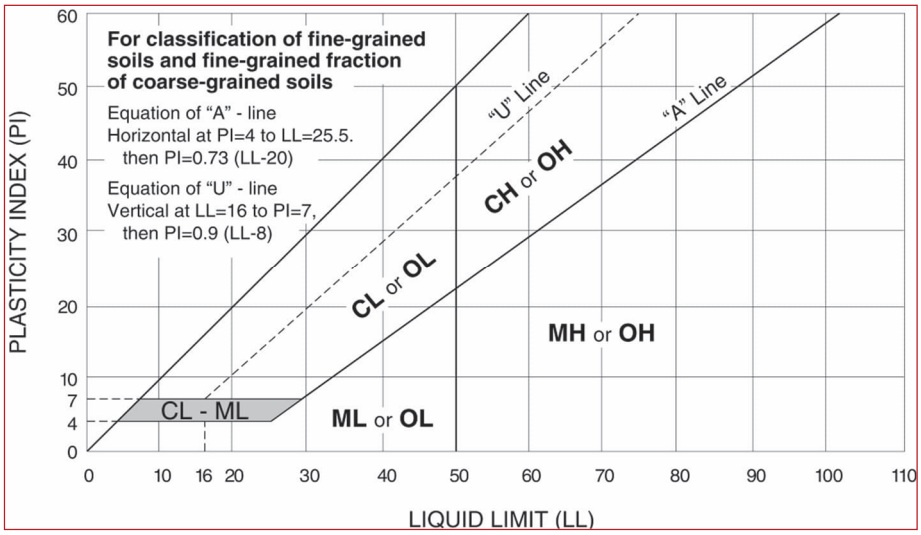
Relevance of Exploration and Laboratory Test Results

Exploration/field results and/or laboratory test data contained within this document are intended for application to the project as described in this document. Use of such exploration/field results and/or laboratory test data should not be used independently of this document.

Unified Soil Classification System

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]				Soil Classification	
				Group Symbol	Group Name [B]
Coarse-Grained Soils: More than 50% retained on No. 4 sieve	**Gravels:** More than 50% of coarse fraction retained on No. 4 sieve	**Clean Gravels:** Less than 5% fines [C]	Cu≥4 and 1≤Cc≤3 [E]	GW	Well-graded gravel [F]
			Cu<4 and/or [Cc<1 or Cc>3.0] [E]	GP	Poorly graded gravel [F]
		Gravels with Fines: More than 12% fines [C]	Fines classify as ML or MH	GM	Silty gravel [F, G, H]
			Fines classify as CL or CH	GC	Clayey gravel [F, G, H]
	Sands: 50% or more of coarse fraction passes No. 4 sieve	**Clean Sands:** Less than 5% fines [D]	Cu≥6 and 1≤Cc≤3 [E]	SW	Well-graded sand [I]
			Cu<6 and/or [Cc<1 or Cc>3.0] [E]	SP	Poorly graded sand [I]
		Sands with Fines: More than 12% fines [D]	Fines classify as ML or MH	SM	Silty sand [G, H, I]
			Fines classify as CL or CH	SC	Clayey sand [G, H, I]
Fine-Grained Soils: 50% or more passes the No. 200 sieve	**Silts and Clays:** Liquid limit less than 50	**Inorganic:**	PI > 7 and plots above "A" line [J]	CL	Lean clay [K, L, M]
			PI < 4 or plots below "A" line [J]	ML	Silt [K, L, M]
		Organic:	$\frac{LL\ oven\ dried}{LL\ not\ dried} < 0.75$	OL	Organic clay [K, L, M, N]
					Organic silt [K, L, M, O]
	Silts and Clays: Liquid limit 50 or more	**Inorganic:**	PI plots on or above "A" line	CH	Fat clay [K, L, M]
			PI plots below "A" line	MH	Elastic silt [K, L, M]
		Organic:	$\frac{LL\ oven\ dried}{LL\ not\ dried} < 0.75$	OH	Organic clay [K, L, M, P]
					Organic silt [K, L, M, Q]
Highly organic soils:	Primarily organic matter, dark in color, and organic odor			PT	Peat

[A] Based on the material passing the 3-inch (75-mm) sieve.
[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.
[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.
[E] $Cu = D_{60}/D_{10}$ $Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$
[F] If soil contains ≥ 15% sand, add "with sand" to group name.
[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.
[H] If fines are organic, add "with organic fines" to group name.
[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.
[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.
[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.
[L] If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.
[N] PI ≥ 4 and plots on or above "A" line.
[O] PI < 4 or plots below "A" line.
[P] PI plots on or above "A" line.
[Q] PI plots below "A" line.



Rock Classification Notes

WEATHERING	
Term	**Description**
Fresh	Mineral crystals appear bright; show no discoloration. Features show little or now staining on surfaces. Discoloration does not extend into intact rock.
Slightly weathered	Rock generally fresh except along fractures. Some fractures stained and discoloration may extend <0.5 inches into rock.
Moderately weathered	Significant portions of rock are dull and discolored. Rock may be significantly weaker than in fresh state near fractures. Soil zones of limited extent may occur along some fractures.
Highly weathered	Rock dull and discolored throughout. Majority of rock mass is significantly weaker and has decomposed and/or disintegrated; isolated zones of stronger rock and/or soil may occur throughout.
Completely weathered	All rock material is decomposed and/or disintegrated to soil. The rock mass or fabric is still evident and largely intact. Isolated zones of stronger rock may occur locally.

STRENGTH OR HARDNESS		
Description	**Field Identification**	**Uniaxial Compressive Strength, psi**
Extremely strong	Can only be chipped with geological hammer. Rock rings on hammer blows. Cannot be scratched with a sharp pick. Hand specimens require several hard hammer blows to break.	>36,000
Very strong	Several blows of a geological hammer to fracture. Cannot be scratched with a 20d common steel nail. Can be scratched with a geologist's pick only with difficulty.	15,000-36,000
Strong	More than one blow of a geological hammer needed to fracture. Can be scratched with a 20d nail or geologist's pick. Gouges or grooves to ¼ inch deep can be excavated by a hard blow of a geologist's pick. Hand specimens can be detached by a moderate blow.	7,500-15,000
Medium strong	One blow of geological hammer needed to fracture. Can be distinctly scratched with 20d nail. Can be grooved or gouged 1/16 in. deep by firm pressure with a geologist's pick point. Can be fractured with single firm blow of geological hammer. Can be excavated in small chips (about 1-in. maximum size) by hard blows of the point of a geologist's pick;	3,500-7,500
Weak	Shallow indent by firm blow with geological hammer point. Can be gouged or grooved readily with geologist's pick point. Can be excavated in pieces several inches in size by moderate blows of a pick point. Small thin pieces can be broken by finger pressure.	700-3,500
Very weak	Crumbles under firm blow with geological hammer point. Can be excavated readily with the point of a geologist's pick. Pieces 1-in. or more in thickness can be broken with finger pressure. Can be scratched readily by fingernail.	150-700

DISCONTINUITY DESCRIPTION			
Fracture Spacing (Joints, Faults, Other Fractures)		**Bedding Spacing (May Include Foliation or Banding)**	
Description	**Spacing**	**Description**	**Spacing**
Intensely fractured	< 2.5 inches	**Laminated**	< ½-inch
Highly fractured	2.5 – 8 inches	**Very thin**	½ – 2 inches
Moderately fractured	8 inches to 2 feet	**Thin**	2 inches – 1 foot
Slightly fractured	2 to 6.5 feet	**Medium**	1 – 3 feet
Very slightly fractured	> 6.5 feet	**Thick**	3 – 10 feet
		Massive	> 10 feet

ROCK QUALITY DESIGNATION (RQD) [1]	
Description	**RQD Value (%)**
Very Poor	0 - 25
Poor	25 – 50
Fair	50 – 75
Good	75 – 90
Excellent	90 - 100

1. The combined length of all sound and intact core segments equal to or greater than 4 inches in length, expressed as a percentage of the total core run length.

SECTION 004000 - CONTRACT FORMS

PART 1 - GENERAL

1.1 SUMMARY

A. This section describes articles and forms required for the project.

1.2 TABLE OF ARTICLES AND FORMS

A. General Conditions – AIA Document A201 – 2017, "*General Conditions of the Contract for Construction*" (Attached)

B. Architect's Request for Information Form, AIA Document G716 – 2004; "*Request for Information (RFI)*", or Contractor Generated Form (AIA Document G716 attached.)

C. Architect's Electronic File Release Forms (Attached under Section 006520 – TAGGART ARCHITECTS – ELECTRONIC FILE RELEASE FORMS)

PART 2 - PRODUCTS

2.1 FORM DESCRIPTIONS AND REQUIREMENTS

A. AGREEMENT – GENERAL CONDITIONS

1. AIA, Document A201 – 2017, "*General Conditions of the Contract for Construction"* is included as an attachment to this specification and shall be the basis of the General Conditions for this project.

B. REQUEST FOR INFORMATION – RFI

1. When supplemental information and/or clarification of the Contract Documents are required during the construction phase, the Contractor shall request such information and/or clarification by submitting a Request for Information(RFI). Use AIA Document G716 – "*Request for Information*" or a Contractor Generated Form which provides the same information. A copy of the AIA Document is contained in this portion of the Project Manual.
2. Work associated with an RFI will not initiate a Change Order unless, as determine by the Architect, the work involved is significantly greater or different than the design intent in the drawings.

C. TAGGART ARCHITECTS – ELECTRONIC FILE RELEASE FORMS

1. The AutoCad and Revit file request forms are included in this Project Manual under Specification Section 006520 – TAGGART ARCHITECTS – ELECTRONIC FILE RELEASE FORMS.

PART 3 - EXECUTION (NOT USED)

END OF SECTION 004000

AIA® Document A201® – 2017

General Conditions of the Contract for Construction

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

North Little Rock New Conference Center
North Little Rock, Arkansas

THE OWNER:
(Name, legal status and address)

City of North Little Rock
120 Main Street
North Little Rock, Arkansas 72119

THE ARCHITECT:
(Name, legal status and address)

Taggart Architects
600 Main Street, Suite 300
North Little Rock, Arkansas 72114

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

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

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

TABLE OF ARTICLES

Init.
/

15 CLAIMS AND DISPUTES

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

ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents

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

§ 1.1.2 The Contract

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

These Specifications are separated into various sections. This Division, however, shall not be construed to imply that the Architect shall not act as the arbiter to establish subcontract and jurisdiction limits between Contractor and Subcontractor and crafts.

Subcontractors shall familiarize themselves with the entire Specifications and Drawings and include work coming under their particular division heading or called for elsewhere in the Specifications or Drawings. The Work under each respective heading in the following specifications is subject to the General Conditions of the Specifications and Contract, and Contractors and Subcontractors will be held responsible for and be governed by requirements thereunder as though specifically repeated in each case.

Contractors and Subcontractors are cautioned to examine all drawings and the complete specifications relating to other branches of work and be governed accordingly. Provide contractors and subcontractors of other Trades, whose work comes in contact with work under each heading, with shop drawings and/or other information.

§ 1.1.3 The Work

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

§ 1.1.4 The Project

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

§ 1.1.5 The Drawings

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

§ 1.1.6 The Specifications

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

§ 1.1.7 Instruments of Service

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

§ 1.1.8 Initial Decision Maker

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

§ 1.2 Correlation and Intent of the Contract Documents

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

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

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

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

§ 1.2.4 Any discrepancies in Contract Documents shall be called to the attention of the Architect before work affected thereby is commenced, and his decision thereon shall be final and binding. The precedent of the Contract Documents is in the following sequence:

§ 1.2.4.1 Addenda or modification and changes of any nature to the Drawings and Specifications take precedent over the original Contract Documents.

§ 1.2.4.2 The Specifications: Where, should there be a conflict, the Architect shall decide which stipulations will provide the best installation.

§ 1.2.4.3 The Drawings: Where, should there be a conflict, the Architect shall decide which stipulations will provide the best installation.

§ 1.2.4.4 Sections of Division 1: General Requirements govern the execution of the work of all sections of the specifications.

§ 1.3 Capitalization

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

§ 1.4 Interpretation

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

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

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

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

§ 1.6 Notice

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

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

§ 1.7 Digital Data Use and Transmission

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

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

ARTICLE 2 OWNER

§ 2.1 General

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

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

§ 2.2 Evidence of the Owner's Financial Arrangements

§ 2.2.1 Prior to commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner

provides such evidence. If commencement of the Work is delayed under this Section 2.2.1, the Contract Time shall be extended appropriately.

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

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

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

§ 2.3 Information and Services Required of the Owner

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

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

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

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

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

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

§ 2.4 Owner's Right to Stop the Work

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the

Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.5 Owner's Right to Carry Out the Work

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

ARTICLE 3 CONTRACTOR

§ 3.1 General

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

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

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

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

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

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

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

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner, subject to Section 15.1.7,

as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 Supervision and Construction Procedures

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

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

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

§ 3.4 Labor and Materials

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work. All Contractors and Subcontractors shall conform to all applicable labor laws, ordinances, and legal requirements. All labor shall be performed in the best and most workmanlike manner by the mechanics skilled in their respective trades. The standard of the work throughout shall be of such grade as is the Industry Standard for that type of Work.

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

§ 3.4.2.1 After the Contract has been executed, the Owner and Architect will consider requests for the substitution of products in place of those specified only under the conditions set forth in the General Requirements (Division 1 of the Specifications). By making requests for substitutions, the Contractor:

.1 represents that it has personally investigated the proposed substitute product and determined that it is equal or superior in all respects to that specified;
.2 represents that it will provide the same warranty for the substitution as it would have provided for the product specified;
.3 certifies that the cost data presented is complete and includes all related costs for the substituted product and for Work that must be changed as a result of the substitution, except for the Architect's redesign costs, and waives all claims for additional costs related to the substitution that subsequently become apparent; and
.4 shall coordinate the installation of the accepted substitute, making such changes as may be required for the Work to be complete in all respects.

§ 3.4.2.2 The Owner shall be entitled to reimbursement from the Contractor for amounts paid to the Architect for reviewing the Contractor's proposed substitutions and making agreed-upon changes in the Drawings and Specifications resulting from such substitutions.

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

§ 3.5 Warranty

§ 3.5.1 The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. Contractor will and does warrant all work performed under this Contract against defects in material and/or workmanship, for a period of one (1) year, except as may be otherwise required for a longer period from the date of completion of the Project as evidenced by the date of final certificate of payment or certificate of substantial completion, whichever is issued first. Work, materials, or equipment not conforming to these requirements may be considered defective. Work not completed after date of certificate of substantial completion shall begin its warranty on the date of final certificate of payment. The Owner shall give notice of observed defects with reasonable promptness. Contractor, within a reasonable time after such notice, shall remedy same and pay for any damage to other work resulting therefore. All questionable work arising under this article shall be decided by the Architect. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

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

§ 3.6 Taxes

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

§ 3.7 Permits, Fees, Notices and Compliance with Laws

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

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

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

§ 3.7.4 Concealed or Unknown Conditions

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

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

§ 3.8 Allowances

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

§ 3.8.2 Unless otherwise provided in the Contract Documents,

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

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

§ 3.9 Superintendent

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

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

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

§ 3.10 Contractor's Construction and Submittal Schedules

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

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

Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

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

§ 3.11 Documents and Samples at the Site

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

§ 3.12 Shop Drawings, Product Data and Samples

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

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

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

§ 3.12.4 Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. Their purpose is to demonstrate how the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action. Shop Drawings, diagrams, descriptive data, and field drawings, as required, shall be submitted to the Architect in the form specified. These submissions shall bear written approval to the effect that the Contractor has carefully examined these submittals, whether prepared by the General Contractor or a subcontractor and found them to be in accordance with the drawings and specifications.

Where the specifications call for the work to be performed in accordance with manufacturer's specifications, directions, or recommendations, or copies of same shall be submitted to the Architect. A copy shall also be on file in the Contractor's Field Office for guidance of his supervisory personnel. This shall be done as practicable and within thirty (30) days after award of Contract.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve, and submit to the Architect, Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents, in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of Separate Contractors. Additionally, the General Contractor shall ensure that any subcontractor requesting electronic copies of Architectural or Engineering Drawings for the purposes of preparing Submittals (Shop Drawings, Product Data, etc) shall (1) prepare the appropriate Taggart / Architects Electronic File Release Form (AutoCad or Revit), (2) submit the appropriate Fee in the form of a Check or other Monetary Instrument (refer to the Electronic File Release Form for fee amounts), and (3) submit the Form and associated Fee Payment through the General Contractor to the Architect for processing and preparation. Failure to utilize the approved form, to provide the Fee Amount, or to submit through the General Contractor will result in the request being denied by the Architect.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and (3) checked and

coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

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

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

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

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

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

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

§ 3.12.11 The Architect's review of Contractor's submittals will be limited to examination of an initial submittal and Two (2) resubmittals. The Owner is entitled to obtain reimbursement from the Contractor for amounts paid to the Architect for evaluation of additional resubmittals.

§ 3.13 Use of Site

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

§ 3.14 Cutting and Patching

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

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

§ 3.15 Cleaning Up

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

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

§ 3.16 Access to Work

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

§ 3.17 Royalties, Patents and Copyrights

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

§ 3.18 Indemnification

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

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

ARTICLE 4 ARCHITECT

§ 4.1 General

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

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

§ 4.2 Administration of the Contract

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

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

§ 4.2.2.1 The Owner is entitled to reimbursement from the Contractor for amounts paid to the Architect for site visits made necessary by the fault of the Contractor or by defects and deficiencies in the Work.

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

§ 4.2.4 Communications

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

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

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

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

§ 4.2.7.1 Unless previously coordinated and approved by the Architect, the Architect's review period on any submittal will not be less than fifteen (15) calendar days after receipt of the submittal from the Contractor.

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

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

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

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

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

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

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

§ 4.2.14.1 Contractor's requests for information shall be prepared and submitted in accordance with specification section 013300, "SUBMITTAL PROCEDURES" listing the information required, on the form included in the Contract Documents, or on AIA Document G716–2004. The Architect will return without action requests for information that do not conform to requirements of the Contract Documents.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

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

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

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

§ 5.2.1 Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. Within 14 days of receipt of the information, the Architect may notify the Contractor whether the Owner or the Architect (1) has

reasonable objection to any such proposed person or entity or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

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

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

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

§ 5.3 Subcontractual Relations

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

§ 5.4 Contingent Assignment of Subcontracts

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

.1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor; and

.2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

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

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

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

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

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

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

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

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

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

§ 6.2 Mutual Responsibility

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

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

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

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

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

§ 6.3 Owner's Right to Clean Up

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

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

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

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

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

§ 7.2 Change Orders

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

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

§ 7.3 Construction Change Directives

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

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

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

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

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

- **.1** Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;
- **.2** Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;
- **.3** Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
- **.4** Costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; and
- **.5** Costs of supervision and field office personnel directly attributable to the change.

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

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

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

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

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

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

§ 7.4 Minor Changes in the Work

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

ARTICLE 8 TIME

§ 8.1 Definitions

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

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

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

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

§ 8.2 Progress and Completion

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

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

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

§ 8.3 Delays and Extensions of Time

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

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

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

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

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

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

§ 9.2 Schedule of Values

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

§ 9.3 Applications for Payment

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. The application shall be notarized, if required, and supported by all data substantiating the Contractor's right to payment that the Owner or Architect require, such as copies of requisitions, and releases and waivers of liens from Subcontractors and suppliers, and shall reflect retainage if provided for in the Contract Documents. The form of Application for Payment, duly notarized, shall be a current authorized edition of AIA Document G702™–(Latest Edition), Application and Certificate for Payment, supported by a current authorized edition of AIA Document G703™–(Latest Edition), Continuation Sheet.

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

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

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location

agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage, and transportation to the site, for such materials and equipment stored off the site.

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

§ 9.4 Certificates for Payment

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

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

§9.4.3 Subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

§9.4.3.1. Take that portion of the Contract Sum properly allocatable to completed Work as determined by multiplying the percentage completion of each portion of the Work by the share of the Contract Sum allocated to that portion of the Work in the schedule of values, less retainage as follows:

§9.4.3.1.1 For Contracts with Private Entities, retainage will be calculated using the system below:

.1 Take that portion of the Contract Sum properly allocable to completed Work as determined by multiplying the percentage completion of each portion of the Work by the share of the Contract Sum allocated to that portion of the Work in the schedule of values, less retainage as calculated utilizing the formula as describe in paragraph 9.4.3.5 below. Pending final determination of cost to the Owner of changes in the Work, amounts not in dispute shall be included as provided in Section 7.3.8 of AIA Document A201-1997;

.2 Add that portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction (or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing), less retainage as calculated utilizing the formula as describe in paragraph 9.4.3.5 below:

.3 Subtract the aggregate of previous payments made by the Owner; and

.4 Subtract amounts, if any, for which the Architect has withheld or nullified a Certificate for Payment as provided in Section 9.5 of AIA Document A201-1997.

.5 Retainage shall be held at the percentage rate of 10% from each application for payment through 50% of the contract completion, at which time the retention shall be shall be reduced to 50% of the completed contract and the retention shall remain at the percentage rate of 05% until the work is substantially complete as defined in A.I.A Document A201. (The retainage will be held by the Owner and will be paid to the Contractor within 30 days after substantial completion to the project)

§9.4.3.1.2 For Contracts with a Public Agency as defined in Title 22 Public Property, Chapter 9 Public Works, Subchapter 6 – Retainage, A.C.A. § 22-9-603 (2012), section 22-9-601. Definitions. Retainage will be calculated using the system as specified in Arkansas Code Annotated § 22-9-604 which states:

.1 22-9-604. Procedure.

(a) (1) In the case of a construction contract entered into between a public agency and a contractor who is required to furnish a performance bond, the contractor shall be entitled to payment of ninety-five percent (95%) of the earned progress payments when due, with the public agency retaining five percent (5%) to assure faithful performance of the contract.

(2) If the construction contract allows for phased work in which completion may occur on a partial occupancy, any retention proceeds withheld and retained under this section shall be partially released within thirty (30) days under the same conditions under this section in direct proportion to the value of the part of the capital improvement completed.

(b) All sums withheld by the public agency shall be paid to the contractor within thirty (30) days after the construction contract has been completed.

(c) In the event the construction contract requires the contractor to purchase and furnish materials or equipment that will be stored on the job site or in a bonded warehouse by the contractor and used in the job as required by the construction contract, no retainage will be withheld on that amount of the submitted progress payment pertaining to the cost of these stored materials or equipment.

§9.4.3.2 Pending final determination of cost to the Owner of changes in the Work, amounts not in dispute shall be included as provided in subparagraph 7.3.8 above.

§9.4.3.3 Subtract the aggregate of previous payments made by the Owner and

§9.4.3.4 Subtract amounts, if any, for which the Architect has withheld or nullified from a Certificate of Payment as provided in Paragraph 9.5 below.

§ 9.5 Decisions to Withhold Certification

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

- **.1** defective Work not remedied;
- **.2** third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
- **.3** failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;
- **.4** reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- **.5** damage to the Owner or a Separate Contractor;

.6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or

.7 repeated failure to carry out the Work in accordance with the Contract Documents.

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

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

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

§ 9.6 Progress Payments

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

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

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

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

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

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

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

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

§ 9.7 Failure of Payment

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

§ 9.8 Substantial Completion

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

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

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

§ 9.8.3.1 The Architect will perform no more than Two (2) inspections to determine whether the Work or a designated portion thereof has attained Substantial Completion in accordance with the Contract Documents. The Owner is entitled to reimbursement from the Contractor for amounts paid to the Architect for any additional inspections.

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

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

§ 9.9 Partial Occupancy or Use

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

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

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

§ 9.10 Final Completion and Final Payment

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

§ 9.10.1.1 The Architect will perform no more than Two (2) inspections to determine whether the Work or a designated portion thereof has attained Final Completion in accordance with the Contract Documents. The Owner is entitled to reimbursement from the Contractor for amounts paid to the Architect for any additional inspections.

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

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

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

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

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

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

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

§ 10.2 Safety of Persons and Property

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

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

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

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

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

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

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

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

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

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

§ 10.2.8 Injury or Damage to Person or Property

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

§ 10.3 Hazardous Materials and Substances

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

§ 10.3.2 Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

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

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

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

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

§ 10.4 Emergencies

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

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

§ 11.1.1 The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations and completed operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by

a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

.1 Claims under workers' compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be performed;

.2 Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;

.3 Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;

.4 Claims for damages insured by usual personal injury liability coverage;

.5 Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;

.6 Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;

.7 Claims for bodily injury or property damage arising out of completed operations; and**.8** Claims involving contractual liability insurance applicable to the Contractor's obligations under Section 3.18.

.9 Liability Insurance shall include all the major divisions of coverage and be on a comprehensive basis including

.1 Premises Operations (including X-C/U as applicable)
.2 Independent Contractors protective.
.3 Products and Completed Operations.
.4. Personal Injury Liability with Employment Exclusion deleted.
.5 Contractual – Including specified provisions for Contractor's obligation under Paragraph 4.18.
.6 Broad Form Property Damage including Completed Operation.

§ 11.1.2 The insurance required by Section 11.1.1 shall be written for not less than limits of liability specified in the Contract Documents or required by law, whichever coverage is greater. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from the date of commencement of the Work until the date of final payment and termination of any coverage required to be maintained after final payment, and, with respect to the Contractor's completed operations coverage, until the expiration of the period for correction of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents. Refer to Supplementary General Conditions for the Liability specified in Arkansas Law.

§ 11.1.3 Certificates of insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work and thereafter upon renewal or replacement of each required policy of insurance. These certificates and the insurance policies required by this Section 11.1 shall contain a provision that coverages afforded under the policies will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment as required by Section 9.10.2 and thereafter upon renewal or replacement of such coverage until the expiration of the time required by Section 11.1.2. Information concerning reduction of coverage on account of revised limits or claims paid under the General Aggregate, or both, shall be furnished by the Contractor with reasonable promptness.

The Contractor, at his expense, shall effect and maintain insurance with carriers approved by the Owner. Prior to commencement of the Work under this Contract, the Contractor shall furnish one copy of each of the Certificates of Insurance herein required or each copy of the Agreement which shall specifically set forth the evidence of all coverage required by Subparagraphs 11.1.1, 11.1.2, and 11.1.3. The for of the Certificate shall be AIA Document G705, "Certificates of Insurance". The Contractor shall furnish to the Owner copies of any endorsements that are sequentially issued amending coverage limits. The Certificate shall state that such coverage shall not be cancelled or modified except upon thirty (30) day prior written notice by registered mail to the Owner.

§ 11.1.4 The Contractor shall not commence work under this Contract or allow any subcontractor to commence work until he has obtained all the insurance have been filed with the Owner and the Architect and approved by the Owner.

§11.1.5 The required insurance must be written by a company licensed to do business in the State of Arkansas, at the time the policy is issued.

§11.1.6 The Contractor shall not cause any insurance to be cancelled nor permit any insurance to lapse. All insurance policies shall contain a clause to the effect that the policy shall not cancelled or reduced, restricted or limited until thirty (30L days after the Owner and the Architect have received written notice as evidenced by return receipt of registered letter. Certificates of insurance shall contain insured, the extent of the insurance, the location and the operations to which the insurance applies, the expiration date, and the above mentioned Notice of Cancellation Clause.

§ 11.1.7 The Contractor shall cause the commercial liability coverage required by the Contract Documents to include (1) the Owner, the Architect and the Architect's consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's completed operations.

§ 11.1.8 Notice of Cancellation or Expiration of Contractor's Required Insurance. Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

§ 11.2 Owner's Insurance

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

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

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

§ 11.3 Waivers of Subrogation

§ 11.3.1 The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Architect and Architect's consultants; and (3) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for

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

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

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

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

§11.5 Adjustment and Settlement of Insured Loss

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

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

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

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

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

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

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

§ 12.2.2 After Substantial Completion

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

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

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

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

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

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

§ 12.3 Acceptance of Nonconforming Work

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

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

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

§ 13.2 Successors and Assigns

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to covenants, agreements, and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the

other. If either party attempts to make an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

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

§ 13.3 Rights and Remedies

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

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

§ 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

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

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

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

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

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

§ 13.5 Interest

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

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

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

.1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;

.2 An act of government, such as a declaration of national emergency, that requires all Work to be stopped;

.3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or

.4 The Owner has failed to furnish to the Contractor reasonable evidence as required by Section 2.2.

.5 A trustee-in-bankruptcy may proceed to continue performance of the construction contract after giving the Owner adequate assurance of its ability to cure defaults, compensate for damages and perform satisfactorily in the future.

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

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

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

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

.1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;

.2 fails to make payment to Subcontractors or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;

.3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or

.4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

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

.1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;

.2 Accept assignment of subcontracts pursuant to Section 5.4; and

.3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

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

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

§ 14.3 Suspension by the Owner for Convenience

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

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

.1 that performance is, was, or would have been, so suspended, delayed, or interrupted, by another cause for which the Contractor is responsible; or

.2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 Termination by the Owner for Convenience

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

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

.1 cease operations as directed by the Owner in the notice;

.2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and

.3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

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

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition

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

§ 15.1.2 Time Limits on Claims

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

§ 15.1.3 Notice of Claims

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

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

§ 15.1.4 Continuing Contract Performance

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

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

§ 15.1.5 Claims for Additional Cost

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

§ 15.1.6 Claims for Additional Time

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

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

§ 15.1.7 Waiver of Claims for Consequential Damages

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

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

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

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

§ 15.2 Initial Decision

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

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker

lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

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

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

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

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

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

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

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

§ 15.3 Mediation

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

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

§ 15.3.3 Either party may, within 30 days from the date that mediation has been concluded without resolution of the dispute or 60 days after mediation has been demanded without resolution of the dispute, demand in writing that the other party file for binding dispute resolution. If such a demand is made and the party receiving the demand fails to

file for binding dispute resolution within 60 days after receipt thereof, then both parties waive their rights to binding dispute resolution proceedings with respect to the initial decision.

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

§ 15.4 Arbitration

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

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

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

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

§ 15.4.4 Consolidation or Joinder

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

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

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

AIA® Document G716™ – 2004

Request for Information ("RFI")

TO:
Brandon Ruhl, A.I.A.
Taggart Architects
600 Main Street, Suite 300
North Little Rock, Arkansas 72114

FROM:

PROJECT:
North Little Rock New Conference Center
North Little Rock, Arkansas

ISSUE DATE:

RFI No.

REQUESTED REPLY DATE:

PROJECT NUMBERS: 159722 /

COPIES TO:

RFI DESCRIPTION: *(Fully describe the question or type of information requested.)*

REFERENCES/ATTACHMENTS: *(List specific documents researched when seeking the information requested.)*
SPECIFICATIONS: **DRAWINGS:** **OTHER:**

SENDER'S RECOMMENDATION: *(If RFI concerns a site or construction condition, the sender may provide a recommended solution, including cost and/or schedule considerations.)*

RECEIVER'S REPLY: *(Provide answer to RFI, including cost and/or schedule considerations.)*

BY	DATE	COPIES TO

Note: This reply is not an authorization to proceed with work involving additional cost, time or both. If any reply requires a change to the Contract Documents, a Change Order, Construction Change Directive or a Minor Change in the work must be executed in accordance with the Contract Documents.

DOCUMENT 004113 - BID FORM - STIPULATED SUM (SINGLE-PRIME CONTRACT)

PART 1 - GENERAL

1.1 BID INFORMATION

A. Bidder: _____

B. Project Name: **NORTH LITTLE ROCK COMMUNITY CENTER RENOVATION, North Little Rock, Arkansas**

C. Project Location: **2700 Willow Street, North Little Rock, AR 72114**

D. Owner: **City of North Little Rock**

E. Architect: **TAGGART Architects**

F. Architect Project Number: **161423.**

1.2 CERTIFICATIONS AND BASE BID

A. Base Bid, Single-Prime (All Trades) Contract: The undersigned Bidder, having carefully examined the Procurement and Contracting Requirements, Conditions of the Contract, Drawings, Specifications, and all subsequent Addenda, as prepared by TAGGART Architects and Architect's consultants, having visited the site, and being familiar with all conditions and requirements of the Work, hereby agrees to furnish all material, labor, equipment and services, including all scheduled allowances, necessary to complete the construction of the above-named project, according to the requirements of the Procurement and Contracting Documents, for the stipulated sum of:

1. _____ Dollars ($ _____). (Amounts shall be shown in both words and figures. In case of discrepancy, the amount shown in words shall govern.)
2. The above amount may be modified by amounts indicated by the Bidder on the attached Document 004322 "Unit Prices Form" and Document 004323 "Alternates Form."

1.3 BID GUARANTEE

A. The undersigned Bidder agrees to execute a contract for this Work in the above amount and to furnish surety as specified within 10 days after a written Notice to Proceed, if offered within 60 days after receipt of bids, and on failure to do so agrees to forfeit to Owner the attached cash, cashier's check, certified check, U.S. money order, or bid bond, as liquidated damages for such failure, in the following amount constituting five percent (5%) of the Base Bid amount above:

1. _____ Dollars ($ _____). (Amounts shall be shown in both words and figures. In case of discrepancy, the amount shown in words shall govern.)

B. In the event Owner does not offer Notice to Proceed within the time limits stated above, Owner will return to the undersigned the cash, cashier's check, certified check, U.S. money order, or bid bond.

1.4 TIME OF COMPLETION

A. The undersigned Bidder proposes and agrees hereby to commence the Work of the Contract Documents on a date specified in a written Notice to Proceed to be issued by Architect, and shall fully complete the Work within **210 (two hundred and ten)** calendar days.

B. A project is defined as being Substantially Complete when it has been issued all certificates of occupancy by the State of Arkansas, the City of North Little Rock, Arkansas, and any other authority having jurisdiction (AHJ).

1.5 ACKNOWLEDGEMENT OF ADDENDA

A. The undersigned Bidder acknowledges receipt of and use of the following Addenda in the preparation of this Bid:

1. Addendum No. 1, dated _____
2. Addendum No. 2, dated _____
3. Addendum No. 3, dated _____
4. Addendum No. 4, dated _____

1.7 BID SUPPLEMENTS

A. The following supplements are a part of this Bid Form and are attached hereto.

1. Bud Form Supplement – Alternates.
2. Bid Form Supplement - Allowances.
3. Bid Form Supplement - Bid Bond Form (AIA Document A310).

1.8 CONTRACTOR'S LICENSE

A. The undersigned further states that it is a duly licensed contractor, for the type of work proposed, in the State of Arkansas**,** and that all fees, permits, etc., pursuant to submitting this proposal have been paid in full.

1.9 CONSTRUCTION SUPERINTENDENT

A. Enclosed is the resume of the Construction Superintendent that will be placed on this job during the entire duration of construction. His/Her name is _____ _____.

1.10 SUBMISSION OF BID

A. Respectfully submitted this _____ day of _____ 2024.

B. Submitted By _____
(Name of bidding firm or corporation).

C. Authorized Signature: _____
(Handwritten signature).

D. Signed By: _____
(Type or print name).

E. Title: _____
(Owner/Partner/President/Vice President).

F. Witness By: _____
(Handwritten signature).

G. Attest: _____
(Handwritten signature).

H. By: _____
(Type or print name).

I. Title: _____
(Corporate Secretary or Assistant Secretary).

J. Street Address: _____

K. City, State, Zip _____

L. Phone: _____

M. License No.: _____

N. Federal ID No.: _____

(Affix Corporate Seal Here).

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used

END OF DOCUMENT 004113

DOCUMENT 004313 - BID SECURITY FORMS

PART 1 - GENERAL

1.1 BID FORM SUPPLEMENT

A. A completed bid bond form is required to be attached to the Bid Form.

1.2 BID BOND FORM

A. AIA Document A310, "Bid Bond," is the recommended form for a bid bond. A bid bond acceptable to Owner, or other bid security as described in the Instructions to Bidders, is required to be attached to the Bid Form as a supplement.

B. Copies of AIA standard forms may be obtained from The American Institute of Architects; www.aia.org/contractdocs/purchase/index.htm; email: docspurchases@aia.org; (800) 942-7732.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF DOCUMENT 004313

SECTION 004321 - ALLOWANCE FORM

PART 1 - GENERAL

1.1 BID INFORMATION

A. Bidder: _____

B. Project Name: **Pulaski County Homeless Village, Providence Park – Harmony Hall/Nilu's Nook**

C. Project Location: **Mabelvale, Arkansas**

D. Owner: **Pulaski County**

E. Architect: **TAGGART / Architects**

F. Architect Project Number: **164423**

1.2 BID FORM SUPPLEMENT

A. This form is required to be attached to the Bid Form.

B. The undersigned Bidder certifies that Base Bid submission to which this Bid Supplement is attached includes those allowances described in the Contract Documents and scheduled in Section 012100 "Allowances."

1.3 SUBMISSION OF BID SUPPLEMENT

A. Respectfully submitted this _____ day of _____, 2024.

B. Submitted By: _____
(Insert name of bidding firm or corporation).

C. Authorized Signature: _____
(Handwritten signature).

D. Signed By: _____
(Type or print name).

E. Title: _____
(Owner/Partner/President/Vice President).

PART 2 – PRODUCTS (Not Used)
PART 3 – EXECUTION (Not Used)

END OF DOCUMENT 004321

SECTION 004322 - UNIT PRICES FORM

PART 1 - GENERAL

1.1 BID INFORMATION

A. Bidder: _____

B. Project Name: **Pulaski County Homeless Village, Providence Park – Harmony Hall/Nilu's Nook**

C. Project Location: **Mabelvale, Arkansas**

D. Owner: **Pulaski County**

E. Architect: **TAGGART / Architects**

F. Architect Project Number: **164423**

1.2 BID FORM SUPPLEMENT

A. This form is required to be attached to the Bid Form.

B. The undersigned Bidder proposes the amounts below be added to or deducted from the Contract Sum on performance and measurement of the individual items of Work[and for adjustment of the quantity given in the Unit-Price Allowance for the actual measurement of individual items of the Work].

C. If the unit price does not affect the Work of this Contract, the Bidder shall indicate "NOT APPLICABLE."

1.3 UNIT PRICES

A. Unit-Price No. 1: Removal of Undesirable Soils.

1. _____ Dollars ($ _____) per Cu/Yd.

B. Unit-Price No. 2: Additional Structural Fill.

1. _____ Dollars ($ _____) per Cu/Yd.

C. Unit-Price No. 3: Removal of Trench Rock Mechanically.

1. _____ Dollars ($ _____) per Cu/Yd.

D. Unit-Price No. 4: Removal of Bulk Rock Mechanically.

1. _____ Dollars ($ _____) per Cu/Yd.

1.4 SUBMISSION OF BID SUPPLEMENT

A. Respectfully submitted this _____ day of _____, 2014.

B. Submitted By: _____
(Insert name of bidding firm or corporation).

C. Authorized Signature: _____
(Handwritten signature).

D. Signed By: _____
(Type or print name).

E. Title: _____
(Owner/Partner/President/Vice President).

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF DOCUMENT 004322

SECTION 006520 — TAGGART ARCHITECTS – ELECTRONIC FILE RELEASE FORMS.

PART 1 - GENERAL

1.1 SUMMARY

A. Attached are the Electronic Release Forms utilized by TAGGART Architects for the release of electronic copies of documents in AutoCAD and Revit formats. These forms shall be utilized to request the release of documents.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 06520

AUTOCAD FILE RELEASE
(Revit to AutoCAD)

Date: _____

Contractor Name: _____

At your request, TAGGART Architects will provide electronic files for your convenience and use in the preparation of shop drawings related to the City of North Little Rock, New Conference Center, North Little Rock, Arkansas (TAGGART Architects Project #159722), subject to the following terms and conditions.

TAGGART Architects' electronic files are compatible with: AUTOCAD Release (Most Current Release). TAGGART Architects makes no representation as to the compatibility of these files with your hardware or your software beyond the specified release of the referenced specifications.

Data contained on these electronic files is part of TAGGART Architects' instruments of service and shall not be used by you or anyone receiving this data through or from you for any purpose other than as a convenience in the preparation of shop drawings for the referenced project. Any other use or reuse by you or by others, will be at your sole risk and without liability or legal exposure to TAGGART Architects. You agree to make no claim and hereby waive, to the fullest extent permitted by law, any claim or cause of action of any nature against TAGGART Architects, its officers, directors, employees, agents or subconsultants which may arise out of or in connection with your use of the electronic files.

Furthermore, you shall, to the fullest extent permitted by law, indemnify and hold harmless TAGGART Architects from all claims, damages, losses and expenses, including attorney's fees arising out of or resulting from your use of these electronic files.

These electronic files are not contract documents. Significant differences may exist between these electronic files and corresponding hard copy contract documents due to addenda, change orders or other revisions. TAGGART Architects makes no presentation regarding the accuracy or completeness of the electronic files you receive. In the event that a conflict arises between the signed contract documents prepared by TAGGART Architects and electronic files, the signed contract documents shall govern. You are responsible for determining if any conflict exists. By your use of these electronic files, you are not relieved of your duty to fully comply with the contract documents, including and without limitations, the need to check, confirm and coordinate all dimensions and details, take field measurements, verify field conditions and coordinate your work with that of other contractors for the project.

Because of the potential that the information presented on the electronic files can be modified, unintentionally or otherwise, TAGGART Architects reserves the right to remove all indication of its ownership and/or involvement from each electronic display.

TAGGART Architects will furnish you electronic files of the following drawing sheets from Revit project to AutoCAD Drawings at a cost of $75.00 per sheet, total of $_____,check payable to TAGGART Architects. This fee is based upon receiving payment in full prior to delivery of requested files. If a purchase order is necessary, this purchase order is required to state the amount, as well as, the specific items requested prior to release.

Under no circumstances shall delivery of the electronic files for use by you be deemed a sale by TAGGART Architects and TAGGART Architects makes no warranties, either express or implied, of merchantability and fitness for any particular purpose. In no event shall TAGGART Architects be liable for any loss of profit or any consequential damages.

TAGGART Architects / Date	Contractor Name / Date

Revit FILE RELEASE

Date: _____

Contractor Name: _____

At your request, TAGGART Architects Architecture will provide an electronic Revit Model for your convenience related to the City of North Little Rock, New Conference Center, North Little Rock, Arkansas (TAGGART Architects Project #159722), subject to the following terms and conditions.

TAGGART Architects electronic Revit (.rvt) files are compatible with latest Autodesk Release: Revit Architecture 2017. TAGGART Architects makes no representation as to the compatibility of these files with your hardware or your software beyond the specified release of the referenced specifications.

These electronic Revit files are not contract documents. Significant differences may exist between these electronic files and corresponding hard copy contract documents due to addenda, change orders or other revisions. TAGGART Architects makes no representation regarding the accuracy or completeness of the electronic files you receive. In the event that a conflict arises between the signed contract documents prepared by TAGGART Architects and electronic files, the signed contract documents shall govern. You are responsible for determining if any conflict exists. By your use of these electronic files, you are not relieved of your duty to fully comply with the contract documents, including and without limitations, the need to check, confirm and coordinate all dimensions and details, take field measurements, verify field conditions and coordinate your work with that of other contractors for the project.

In consideration of TAGGART Architects providing a copy of the Revit electronic files, the General Contractor agrees to the following:

1. You agree to make no claim and hereby waive, to the fullest extent permitted by law, any claim or cause of action of any nature against TAGGART Architects, its officers, directors, employees, agents or sub-consultants which may arise out of or in connection with your use of the electronic Revit files.

2. You shall, to the fullest extent permitted by law, indemnify and hold harmless TAGGART Architects from all claims, damages, losses and expenses, including attorney's fees arising out of or resulting from your use of these electronic files.

3. You agree to defend, indemnify, and hold the Owner, Architect/Engineer, and Contractor harmless in connection with any defects contained in the electronic Revit files and any claims arising out of the use of the electronic Revit files.

4. You acknowledge the electronic Revit files shall not replace or supersede the record hardcopy set of the drawings and other Contract Documents (“Paper Documents”). In the event of a conflict between the Paper Documents and the electronic Revit files, the Paper Documents shall govern. The General Contractor shall be deemed to have used the Paper Documents in performing its work.

5. You agree to use the Electronic Revit Files for coordination and informational purposes and agree to make no modifications to the TAGGART Architects electronic Revit files and shall return all copies of the Electronic Files, if requested. You shall not use or attempt to use the electronic Revit files or Revit Content for any other project or any purpose other than in connection with the Project.

6. You acknowledge that the Data contained on these electronic Revit files is part of TAGGART Architects' intellectual property and shall not be used by you or anyone receiving this data through or from you for any purpose other than the collaborative effort for the referenced project. Any other use or reuse by you or by others, will be at your sole risk and without liability or legal exposure to TAGGART Architects.

Because of the potential that the information presented on the electronic files can be modified, unintentionally or otherwise, TAGGART Architects reserves the right to remove all indication of its ownership and/or involvement from each electronic display.

TAGGART Architects will furnish an electronic Revit Model for the project at a cost of $100.00, check payable to TAGGART Architects. This fee is based upon receiving payment in full prior to delivery of the requested file. If a purchase order is necessary, this purchase order is required to state the amount, as well as the specific items requested prior to release.

Under no circumstances shall delivery of the electronic files for use by you be deemed a sale by TAGGART Architects and TAGGART Architects makes no warranties, either express or implied, of merchantability and fitness for any particular purpose. In no event shall TAGGART Architects be liable for any loss of profit or any consequential damages.

_____ _____

TAGGART Architects / Date Contractor Name / Date

SECTION 006600 - INDEX OF DRAWINGS

PART 1 – GENERAL

1.1 DATE OF INDEX

A. Last Revision – October 31, 2024

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION

3.1 INDEX OF DRAWINGS

A. Below is listed the index of Drawings for this Project.

COVER & LIFE SAFETY
G101 COVER & INDEX OF DRAWINGS
LS001 DESIGN & CODE DATA
LS101 LIFE SAFETY PLAN

CIVIL
C1.0 SITE PLAN
C2.0 GRADING PLAN
C3.0 UTILITY PLAN
C4.0 EROSION CONTROL PLAN
C5.0 EROSION CONTROL DETAILS
C6.0 CONSTRUCTION DETAILS
SS1.0 NORTH LITTLE ROCK WASTEWATER UTILITY DETAILS
W1.0 CENTRAL ARKANSAS WATER DETAILS
W2.0 CENTRAL ARKANSAS WATER DETAILS

STRUCTURAL
S001 GENERAL NOTES
S002 SPECIAL INSPECTIONS
S003 LOADING DIAGRAMS
S101 FOUNDATION PLAN
S201 TYP. FOUNDATION DETAILS
S202 FOUNDATION SECTIONS
S301 LOW ROOF FRAMING PLAN
S302 LOBBY ROOF FRAMING PLAN
S303 HIGH ROOF FRAMING PLAN
S304 SCREENWALL FRAMING PLAN
S305 JOIST LOAD DIAGRAMS
S401 TYP. FRAMING DETAILS
S402 TYP. FRAMING DETAILS
S403 FRAMING SECTIONS
S404 FRAMING SECTIONS
S405 FRAMING SECTIONS
S406 FRAMING SECTIONS
S407 FRAMING SECTIONS
S408 FRAMING SECTIONS

STRUCTURAL(Con't)

S501 FRAMING ELEVATIONS
S502 FRAMING ELEVATIONS
S503 FRAMING ELEVATIONS
S601 MOMENT & BRACE FRAME DETAILS

ARCHITECTURAL

A101 FLOOR PLAN
A102 CLERESTORY / LOW ROOF PLAN
A103 DIMENSNION & PARTITION TYPE PLAN
A104 DIMENSION PLAN CLERESTORY LEVEL
A110 ROOF PLAN
A120 REFLECTED CEILING PLAN
A121 REFLECTED CEILING PLAN
A122 ENLARGED RCP AND CEILING DETAILS
A200 EXTERIOR VIEWS
A201 EXTERIOR ELEVATIONS
A202 EXTERIOR ELEVATIONS
A300 BUILDING SECTIONS
A301 BUILDING SECTIONS
A305 WALL SECTIONS
A306 WALL SECTIONS
A307 WALL SECTIONS
A308 WALL SECTIONS
A309 WALL SECTIONS
A310 DETAILS
A311 DETAILS
A312 DETAILS
A313 DETAILS
A314 DETAILS
A315 DETAILS
A316 DETAILS
A400 INTERIOR VIEWS
A401 ENLARGED PLANS AND INTERIOR ELEVATIONS
A402 INTERIOR ELEVATIONS
A403 INTERIOR ELEVATIONS
A404 ENLARGED PLANS AND INTERIOR ELEVATIONS
A405 INTERIOR ELEVATIONS
A406 INTERIOR ELEVATIONS
A407 INTERIOR ELEVATIONS
A408 ENLARGED ROOF ACCESS STAIR PLANS
A409 ENLARGED ROOF ACCESS STAIR PLANS
A501 INTERIOR PARTITION TYPES
A502 INTERIOR DETAILS
A601 ROOM FINISH SCHEDULE & MATERIALS SELECTION
A602 DOOR SCHEDULE
A603 ALUMINUM FRAME TYPES
A604 ALUMINUM FRAME TYPES
A701 FINISH FLOOR PLAN

MECHANICAL

M001 MECHANICAL GENERAL NOTES AND LEGEND
M101 FLOOR PLAN - MECHANICAL DUCTWORK
M102 FLOOR PLAN - MECHANICAL PIPING
M103 ROOF PLAN - MECHANICAL
M301 MECHANICAL DETAILS
M302 MECHANICAL DETAILS
M401 MECHANICAL SCHEDULES
M501 MECHANICAL CONTROLS

PLUMBING

P001 PLUMBING GENERAL NOTES, LEGEND AND SCHEDULES
P101 FLOOR PLAN - SANITARY WASTE AND VENT
P102 FLOOR PLAN - DOMESTIC WATER AND GAS
P103 ROOF PLAN - PLUMBING
P201 ENLARGED PLANS - PLUMBING
P301 PLUMBING RISER DIAGRAMS
P401 PLUMBING DETAILS
P402 PLUMBING DETAILS

ELECTRICAL

E001 ELECTRICAL GENERAL NOTES, SCHEDULES, AND LEGEND
E101 ELECTRICAL- SITE PLAN
E201 ELECTRICAL- LIGHTING
E202 ELECTRICAL - POWER AND SYSTEMS
E203 ELECTRICAL - MECHANICAL POWER
E401 ELECTRICAL DETAILS AND DIAGRAMS
E402 ELECTRICAL DETAILS AND DIAGRAMS
E501 ELECTRICAL SCHEDULES

END OF SECTION 006600

(c) *Coaming*—The raised frame, as around a hatchway in the deck, to keep out water.

(d) *Jacob's ladder*—A marine ladder of rope or chain with wooden or metal rungs.

(e) *Rail*, for the purpose of §1926.605, means a light structure serving as a guard at the outer edge of a ship's deck.

Subpart P—Excavations

AUTHORITY: Sec. 107, Contract Worker Hours and Safety Standards Act (Construction Safety Act) (40 U.S.C. 333); Secs. 4, 6, 8, Occupational Safety and Health Act of 1970 (29 U.S.C. 653, 655, 657); Secretary of Labor's Order No. 12–71 (36 FR 8754), 8–76 (41 FR 25059), or 9–83 (48 FR 35736), as applicable, and 29 CFR part 1911.

SOURCE: 54 FR 45959, Oct. 31, 1989, unless otherwise noted.

§ 1926.650 Scope, application, and definitions applicable to this subpart.

(a) *Scope and application.* This subpart applies to all open excavations made in the earth's surface. Excavations are defined to include trenches.

(b) *Definitions applicable to this subpart.*

Accepted engineering practices means those requirements which are compatible with standards of practice required by a registered professional engineer.

Aluminum Hydraulic Shoring means a pre-engineered shoring system comprised of aluminum hydraulic cylinders (crossbraces) used in conjunction with vertical rails (uprights) or horizontal rails (walers). Such system is designed, specifically to support the sidewalls of an excavation and prevent cave-ins.

Bell-bottom pier hole means a type of shaft or footing excavation, the bottom of which is made larger than the cross section above to form a belled shape.

Benching (Benching system) means a method of protecting employees from cave-ins by excavating the sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels.

Cave-in means the separation of a mass of soil or rock material from the side of an excavation, or the loss of soil from under a trench shield or support system, and its sudden movement into the excavation, either by falling or sliding, in sufficient quantity so that it could entrap, bury, or otherwise injure and immobilize a person.

Competent person means one who is capable of identifying existing and predictable hazards in the surroundings, or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

Cross braces mean the horizontal members of a shoring system installed perpendicular to the sides of the excavation, the ends of which bear against either uprights or wales.

Excavation means any man-made cut, cavity, trench, or depression in an earth surface, formed by earth removal.

Faces or *sides* means the vertical or inclined earth surfaces formed as a result of excavation work.

Failure means the breakage, displacement, or permanent deformation of a structural member or connection so as to reduce its structural integrity and its supportive capabilities.

Hazardous atmosphere means an atmosphere which by reason of being explosive, flammable, poisonous, corrosive, oxidizing, irritating, oxygen deficient, toxic, or otherwise harmful, may cause death, illness, or injury.

Kickout means the accidental release or failure of a cross brace.

Protective system means a method of protecting employees from cave-ins, from material that could fall or roll from an excavation face or into an excavation, or from the collapse of adjacent structures. Protective systems include support systems, sloping and benching systems, shield systems, and other systems that provide the necessary protection.

Ramp means an inclined walking or working surface that is used to gain access to one point from another, and is constructed from earth or from structural materials such as steel or wood.

Registered Professional Engineer means a person who is registered as a professional engineer in the state where the work is to be performed. However, a professional engineer, registered in any

state is deemed to be a ''registered professional engineer'' within the meaning of this standard when approving designs for ''manufactured protective systems'' or ''tabulated data'' to be used in interstate commerce.

Sheeting means the members of a shoring system that retain the earth in position and in turn are supported by other members of the shoring system.

Shield (Shield system) means a structure that is able to withstand the forces imposed on it by a cave-in and thereby protect employees within the structure. Shields can be permanent structures or can be designed to be portable and moved along as work progresses. Additionally, shields can be either premanufactured or job-built in accordance with §1926.652 (c)(3) or (c)(4). Shields used in trenches are usually referred to as ''trench boxes'' or ''trench shields.''

Shoring (Shoring system) means a structure such as a metal hydraulic, mechanical or timber shoring system that supports the sides of an excavation and which is designed to prevent cave-ins.

Sides. See ''Faces.''

Sloping (Sloping system) means a method of protecting employees from cave-ins by excavating to form sides of an excavation that are inclined away from the excavation so as to prevent cave-ins. The angle of incline required to prevent a cave-in varies with differences in such factors as the soil type, environmental conditions of exposure, and application of surcharge loads.

Stable rock means natural solid mineral material that can be excavated with vertical sides and will remain intact while exposed. Unstable rock is considered to be stable when the rock material on the side or sides of the excavation is secured against caving-in or movement by rock bolts or by another protective system that has been designed by a registered professional engineer.

Structural ramp means a ramp built of steel or wood, usually used for vehicle access. Ramps made of soil or rock are not considered structural ramps.

Support system means a structure such as underpinning, bracing, or shoring, which provides support to an adjacent structure, underground installation, or the sides of an excavation.

Tabulated data means tables and charts approved by a registered professional engineer and used to design and construct a protective system.

Trench (Trench excavation) means a narrow excavation (in relation to its length) made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench (measured at the bottom) is not greater than 15 feet (4.6 m). If forms or other structures are installed or constructed in an excavation so as to reduce the dimension measured from the forms or structure to the side of the excavation to 15 feet (4.6 m) or less (measured at the bottom of the excavation), the excavation is also considered to be a trench.

Trench box. See ''Shield.''

Trench shield. See ''Shield.''

Uprights means the vertical members of a trench shoring system placed in contact with the earth and usually positioned so that individual members do not contact each other. Uprights placed so that individual members are closely spaced, in contact with or interconnected to each other, are often called ''sheeting.''

Wales means horizontal members of a shoring system placed parallel to the excavation face whose sides bear against the vertical members of the shoring system or earth.

§ 1926.651 Specific excavation requirements.

(a) *Surface encumbrances*. All surface encumbrances that are located so as to create a hazard to employees shall be removed or supported, as necessary, to safeguard employees.

(b) *Underground installations*. (1) The estimated location of utility installations, such as sewer, telephone, fuel, electric, water lines, or any other underground installations that reasonably may be expected to be encountered during excavation work, shall be determined prior to opening an excavation.

(2) Utility companies or owners shall be contacted within established or customary local response times, advised of

the proposed work, and asked to establish the location of the utility underground installations prior to the start of actual excavation. When utility companies or owners cannot respond to a request to locate underground utility installations within 24 hours (unless a longer period is required by state or local law), or cannot establish the exact location of these installations, the employer may proceed, provided the employer does so with caution, and provided detection equipment or other acceptable means to locate utility installations are used.

(3) When excavation operations approach the estimated location of underground installations, the exact location of the installations shall be determined by safe and acceptable means.

(4) While the excavation is open, underground installations shall be protected, supported or removed as necessary to safeguard employees.

(c) *Access and egress*—(1) *Structural ramps.* (i) Structural ramps that are used solely by employees as a means of access or egress from excavations shall be designed by a competent person. Structural ramps used for access or egress of equipment shall be designed by a competent person qualified in structural design, and shall be constructed in accordance with the design.

(ii) Ramps and runways constructed of two or more structural members shall have the structural members connected together to prevent displacement.

(iii) Structural members used for ramps and runways shall be of uniform thickness.

(iv) Cleats or other appropriate means used to connect runway structural members shall be attached to the bottom of the runway or shall be attached in a manner to prevent tripping.

(v) Structural ramps used in lieu of steps shall be provided with cleats or other surface treatments on the top surface to prevent slipping.

(2) *Means of egress from trench excavations.* A stairway, ladder, ramp or other safe means of egress shall be located in trench excavations that are 4 feet (1.22 m) or more in depth so as to require no more than 25 feet (7.62 m) of lateral travel for employees.

(d) *Exposure to vehicular traffic.* Employees exposed to public vehicular traffic shall be provided with, and shall wear, warning vests or other suitable garments marked with or made of reflectorized or high-visibility material.

(e) *Exposure to falling loads.* No employee shall be permitted underneath loads handled by lifting or digging equipment. Employees shall be required to stand away from any vehicle being loaded or unloaded to avoid being struck by any spillage or falling materials. Operators may remain in the cabs of vehicles being loaded or unloaded when the vehicles are equipped, in accordance with §1926.601(b)(6), to provide adequate protection for the operator during loading and unloading operations.

(f) *Warning system for mobile equipment.* When mobile equipment is operated adjacent to an excavation, or when such equipment is required to approach the edge of an excavation, and the operator does not have a clear and direct view of the edge of the excavation, a warning system shall be utilized such as barricades, hand or mechanical signals, or stop logs. If possible, the grade should be away from the excavation.

(g) *Hazardous atmospheres*—(1) *Testing and controls.* In addition to the requirements set forth in subparts D and E of this part (29 CFR 1926.50–1926.107) to prevent exposure to harmful levels of atmospheric contaminants and to assure acceptable atmospheric conditions, the following requirements shall apply:

(i) Where oxygen deficiency (atmospheres containing less than 19.5 percent oxygen) or a hazardous atmosphere exists or could reasonably be expected to exist, such as in excavations in landfill areas or excavations in areas where hazardous substances are stored nearby, the atmospheres in the excavation shall be tested before employees enter excavations greater than 4 feet (1.22 m) in depth.

(ii) Adequate precautions shall be taken to prevent employee exposure to atmospheres containing less than 19.5 percent oxygen and other hazardous

atmospheres. These precautions include providing proper respiratory protection or ventilation in accordance with subparts D and E of this part respectively.

(iii) Adequate precaution shall be taken such as providing ventilation, to prevent employee exposure to an atmosphere containing a concentration of a flammable gas in excess of 20 percent of the lower flammable limit of the gas.

(iv) When controls are used that are intended to reduce the level of atmospheric contaminants to acceptable levels, testing shall be conducted as often as necessary to ensure that the atmosphere remains safe.

(2) *Emergency rescue equipment.* (i) Emergency rescue equipment, such as breathing apparatus, a safety harness and line, or a basket stretcher, shall be readily available where hazardous atmospheric conditions exist or may reasonably be expected to develop during work in an excavation. This equipment shall be attended when in use.

(ii) Employees entering bell-bottom pier holes, or other similar deep and confined footing excavations, shall wear a harness with a life-line securely attached to it. The lifeline shall be separate from any line used to handle materials, and shall be individually attended at all times while the employee wearing the lifeline is in the excavation.

(h) *Protection from hazards associated with water accumulation.* (1) Employees shall not work in excavations in which there is accumulated water, or in excavations in which water is accumulating, unless adequate precautions have been taken to protect employees against the hazards posed by water accumulation. The precautions necessary to protect employees adequately vary with each situation, but could include special support or shield systems to protect from cave-ins, water removal to control the level of accumulating water, or use of a safety harness and lifeline.

(2) If water is controlled or prevented from accumulating by the use of water removal equipment, the water removal equipment and operations shall be monitored by a competent person to ensure proper operation.

(3) If excavation work interrupts the natural drainage of surface water (such as streams), diversion ditches, dikes, or other suitable means shall be used to prevent surface water from entering the excavation and to provide adequate drainage of the area adjacent to the excavation. Excavations subject to runoff from heavy rains will require an inspection by a competent person and compliance with paragraphs (h)(1) and (h)(2) of this section.

(i) *Stability of adjacent structures.* (1) Where the stability of adjoining buildings, walls, or other structures is endangered by excavation operations, support systems such as shoring, bracing, or underpinning shall be provided to ensure the stability of such structures for the protection of employees.

(2) Excavation below the level of the base or footing of any foundation or retaining wall that could be reasonably expected to pose a hazard to employees shall not be permitted except when:

(i) A support system, such as underpinning, is provided to ensure the safety of employees and the stability of the structure; or

(ii) The excavation is in stable rock; or

(iii) A registered professional engineer has approved the determination that the structure is sufficently removed from the excavation so as to be unaffected by the excavation activity; or

(iv) A registered professional engineer has approved the determination that such excavation work will not pose a hazard to employees.

(3) Sidewalks, pavements, and appurtenant structure shall not be undermined unless a support system or another method of protection is provided to protect employees from the possible collapse of such structures.

(j) *Protection of employees from loose rock or soil.* (1) Adequate protection shall be provided to protect employees from loose rock or soil that could pose a hazard by falling or rolling from an excavation face. Such protection shall consist of scaling to remove loose material; installation of protective barricades at intervals as necessary on the face to stop and contain falling material; or other means that provide equivalent protection.

(2) Employees shall be protected from excavated or other materials or equipment that could pose a hazard by falling or rolling into excavations. Protection shall be provided by placing and keeping such materials or equipment at least 2 feet (.61 m) from the edge of excavations, or by the use of retaining devices that are sufficient to prevent materials or equipment from falling or rolling into excavations, or by a combination of both if necessary.

(k) *Inspections.* (1) Daily inspections of excavations, the adjacent areas, and protective systems shall be made by a competent person for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions. An inspection shall be conducted by the competent person prior to the start of work and as needed throughout the shift. Inspections shall also be made after every rainstorm or other hazard increasing occurrence. These inspections are only required when employee exposure can be reasonably anticipated.

(2) Where the competent person finds evidence of a situation that could result in a possible cave-in, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions, exposed employees shall be removed from the hazardous area until the necessary precautions have been taken to ensure their safety.

(l) Walkways shall be provided where employees or equipment are required or permitted to cross over excavations. Guardrails which comply with §1926.502(b) shall be provided where walkways are 6 feet (1.8 m) or more above lower levels.

[54 FR 45959, Oct. 31, 1989, as amended by 59 FR 40730, Aug. 9, 1994]

§ 1926.652 Requirements for protective systems.

(a) *Protection of employees in excavations.* (1) Each employee in an excavation shall be protected from cave-ins by an adequate protective system designed in accordance with paragraph (b) or (c) of this section except when:

(i) Excavations are made entirely in stable rock; or

(ii) Excavations are less than 5 feet (1.52m) in depth and examination of the ground by a competent person provides no indication of a potential cave-in.

(2) Protective systems shall have the capacity to resist without failure all loads that are intended or could reasonably be expected to be applied or transmitted to the system.

(b) *Design of sloping and benching systems.* The slopes and configurations of sloping and benching systems shall be selected and constructed by the employer or his designee and shall be in accordance with the requirements of paragraph (b)(1); or, in the alternative, paragraph (b)(2); or, in the alternative, paragraph (b)(3), or, in the alternative, paragraph (b)(4), as follows:

(1) *Option (1)—Allowable configurations and slopes.* (i) Excavations shall be sloped at an angle not steeper than one and one-half horizontal to one vertical (34 degrees measured from the horizontal), unless the employer uses one of the other options listed below.

(ii) Slopes specified in paragraph (b)(1)(i) of this section, shall be excavated to form configurations that are in accordance with the slopes shown for Type C soil in appendix B to this subpart.

(2) *Option (2)—Determination of slopes and configurations using Appendices A and B.* Maximum allowable slopes, and allowable configurations for sloping and benching systems, shall be determined in accordance with the conditions and requirements set forth in appendices A and B to this subpart.

(3) *Option (3)—Designs using other tabulated data.* (i) Designs of sloping or benching systems shall be selected from and be in accordance with tabulated data, such as tables and charts.

(ii) The tabulated data shall be in written form and shall include all of the following:

(A) Identification of the parameters that affect the selection of a sloping or benching system drawn from such data;

(B) Identification of the limits of use of the data, to include the magnitude and configuration of slopes determined to be safe;

(C) Explanatory information as may be necessary to aid the user in making a correct selection of a protective system from the data.

(iii) At least one copy of the tabulated data which identifies the registered professional engineer who approved the data, shall be maintained at the jobsite during construction of the protective system. After that time the data may be stored off the jobsite, but a copy of the data shall be made available to the Secretary upon request.

(4) *Option (4)—Design by a registered professional engineer.* (i) Sloping and benching systems not utilizing Option (1) or Option (2) or Option (3) under paragraph (b) of this section shall be approved by a registered professional engineer.

(ii) Designs shall be in written form and shall include at least the following:

(A) The magnitude of the slopes that were determined to be safe for the particular project;

(B) The configurations that were determined to be safe for the particular project; and

(C) The identity of the registered professional engineer approving the design.

(iii) At least one copy of the design shall be maintained at the jobsite while the slope is being constructed. After that time the design need not be at the jobsite, but a copy shall be made available to the Secretary upon request.

(c) *Design of support systems, shield systems, and other protective systems.* Designs of support systems shield systems, and other protective systems shall be selected and constructed by the employer or his designee and shall be in accordance with the requirements of paragraph (c)(1); or, in the alternative, paragraph (c)(2); or, in the alternative, paragraph (c)(3); or, in the alternative, paragraph (c)(4) as follows:

(1) *Option (1)—Designs using appendices A, C and D.* Designs for timber shoring in trenches shall be determined in accordance with the conditions and requirements set forth in appendices A and C to this subpart. Designs for aluminum hydraulic shoring shall be in accordance with paragraph (c)(2) of this section, but if manufacturer's tabulated data cannot be utilized, designs shall be in accordance with appendix D.

(2) *Option (2)—Designs Using Manufacturer's Tabulated Data.* (i) Design of support systems, shield systems, or other protective systems that are drawn from manufacturer's tabulated data shall be in accordance with all specifications, recommendations, and limitations issued or made by the manufacturer.

(ii) Deviation from the specifications, recommendations, and limitations issued or made by the manufacturer shall only be allowed after the manufacturer issues specific written approval.

(iii) Manufacturer's specifications, recommendations, and limitations, and manufacturer's approval to deviate from the specifications, recommendations, and limitations shall be in written form at the jobsite during construction of the protective system. After that time this data may be stored off the jobsite, but a copy shall be made available to the Secretary upon request.

(3) *Option (3)—Designs using other tabulated data.* (i) Designs of support systems, shield systems, or other protective systems shall be selected from and be in accordance with tabulated data, such as tables and charts.

(ii) The tabulated data shall be in written form and include all of the following:

(A) Identification of the parameters that affect the selection of a protective system drawn from such data;

(B) Identification of the limits of use of the data;

(C) Explanatory information as may be necessary to aid the user in making a correct selection of a protective system from the data.

(iii) At least one copy of the tabulated data, which identifies the registered professional engineer who approved the data, shall be maintained at the jobsite during construction of the protective system. After that time the data may be stored off the jobsite, but a copy of the data shall be made available to the Secretary upon request.

(4) *Option (4)—Design by a registered professional engineer.* (i) Support systems, shield systems, and other protective systems not utilizing Option 1, Option 2 or Option 3, above, shall be approved by a registered professional engineer.

(ii) Designs shall be in written form and shall include the following:

(A) A plan indicating the sizes, types, and configurations of the materials to be used in the protective system; and

(B) The identity of the registered professional engineer approving the design.

(iii) At least one copy of the design shall be maintained at the jobsite during construction of the protective system. After that time, the design may be stored off the jobsite, but a copy of the design shall be made available to the Secretary upon request.

(d) *Materials and equipment.* (1) Materials and equipment used for protective systems shall be free from damage or defects that might impair their proper function.

(2) Manufactured materials and equipment used for protective systems shall be used and maintained in a manner that is consistent with the recommendations of the manufacturer, and in a manner that will prevent employee exposure to hazards.

(3) When material or equipment that is used for protective systems is damaged, a competent person shall examine the material or equipment and evaluate its suitability for continued use. If the competent person cannot assure the material or equipment is able to support the intended loads or is otherwise suitable for safe use, then such material or equipment shall be removed from service, and shall be evaluated and approved by a registered professional engineer before being returned to service.

(e) *Installation and removal of support*—(1) *General.* (i) Members of support systems shall be securely connected together to prevent sliding, falling, kickouts, or other predictable failure.

(ii) Support systems shall be installed and removed in a manner that protects employees from cave-ins, structural collapses, or from being struck by members of the support system.

(iii) Individual members of support systems shall not be subjected to loads exceeding those which those members were designed to withstand.

(iv) Before temporary removal of individual members begins, additional precautions shall be taken to ensure the safety of employees, such as installing other structural members to carry the loads imposed on the support system.

(v) Removal shall begin at, and progress from, the bottom of the excavation. Members shall be released slowly so as to note any indication of possible failure of the remaining members of the structure or possible cave-in of the sides of the excavation.

(vi) Backfilling shall progress together with the removal of support systems from excavations.

(2) *Additional requirements for support systems for trench excavations.* (i) Excavation of material to a level no greater than 2 feet (.61 m) below the bottom of the members of a support system shall be permitted, but only if the system is designed to resist the forces calculated for the full depth of the trench, and there are no indications while the trench is open of a possible loss of soil from behind or below the bottom of the support system.

(ii) Installation of a support system shall be closely coordinated with the excavation of trenches.

(f) *Sloping and benching systems.* Employees shall not be permitted to work on the faces of sloped or benched excavations at levels above other employees except when employees at the lower levels are adequately protected from the hazard of falling, rolling, or sliding material or equipment.

(g) *Shield systems*—(1) *General.* (i) Shield systems shall not be subjected to loads exceeding those which the system was designed to withstand.

(ii) Shields shall be installed in a manner to restrict lateral or other hazardous movement of the shield in the event of the application of sudden lateral loads.

(iii) Employees shall be protected from the hazard of cave-ins when entering or exiting the areas protected by shields.

(iv) Employees shall not be allowed in shields when shields are being installed, removed, or moved vertically.

(2) *Additional requirement for shield systems used in trench excavations.* Excavations of earth material to a level not greater than 2 feet (.61 m) below the bottom of a shield shall be permitted, but only if the shield is designed to resist the forces calculated for the full

depth of the trench, and there are no indications while the trench is open of a possible loss of soil from behind or below the bottom of the shield.

APPENDIX A TO SUBPART P OF PART 1926—SOIL CLASSIFICATION

(a) *Scope and application*—(1) *Scope.* This appendix describes a method of classifying soil and rock deposits based on site and environmental conditions, and on the structure and composition of the earth deposits. The appendix contains definitions, sets forth requirements, and describes acceptable visual and manual tests for use in classifying soils.

(2) *Application.* This appendix applies when a sloping or benching system is designed in accordance with the requirements set forth in §1926.652(b)(2) as a method of protection for employees from cave-ins. This appendix also applies when timber shoring for excavations is designed as a method of protection from cave-ins in accordance with appendix C to subpart P of part 1926, and when aluminum hydraulic shoring is designed in accordance with appendix D. This appendix also applies if other protective systems are designed and selected for use from data prepared in accordance with the requirements set forth in §1926.652(c), and the use of the data is predicated on the use of the soil classification system set forth in this appendix.

(b) *Definitions.* The definitions and examples given below are based on, in whole or in part, the following: American Society for Testing Materials (ASTM) Standards D653–85 and D2488; The Unified Soils Classification System, The U.S. Department of Agriculture (USDA) Textural Classification Scheme; and The National Bureau of Standards Report BSS–121.

Cemented soil means a soil in which the particles are held together by a chemical agent, such as calcium carbonate, such that a hand-size sample cannot be crushed into powder or individual soil particles by finger pressure.

Cohesive soil means clay (fine grained soil), or soil with a high clay content, which has cohesive strength. Cohesive soil does not crumble, can be excavated with vertical sideslopes, and is plastic when moist. Cohesive soil is hard to break up when dry, and exhibits significant cohesion when submerged. Cohesive soils include clayey silt, sandy clay, silty clay, clay and organic clay.

Dry soil means soil that does not exhibit visible signs of moisture content.

Fissured means a soil material that has a tendency to break along definite planes of fracture with little resistance, or a material that exhibits open cracks, such as tension cracks, in an exposed surface.

Granular soil means gravel, sand, or silt, (coarse grained soil) with little or no clay content. Granular soil has no cohesive strength. Some moist granular soils exhibit apparent cohesion. Granular soil cannot be molded when moist and crumbles easily when dry.

Layered system means two or more distinctly different soil or rock types arranged in layers. Micaceous seams or weakened planes in rock or shale are considered layered.

Moist soil means a condition in which a soil looks and feels damp. Moist cohesive soil can easily be shaped into a ball and rolled into small diameter threads before crumbling. Moist granular soil that contains some cohesive material will exhibit signs of cohesion between particles.

Plastic means a property of a soil which allows the soil to be deformed or molded without cracking, or appreciable volume change.

Saturated soil means a soil in which the voids are filled with water. Saturation does not require flow. Saturation, or near saturation, is necessary for the proper use of instruments such as a pocket penetrometer or sheer vane.

Soil classification system means, for the purpose of this subpart, a method of categorizing soil and rock deposits in a hierarchy of Stable Rock, Type A, Type B, and Type C, in decreasing order of stability. The categories are determined based on an analysis of the properties and performance characteristics of the deposits and the environmental conditions of exposure.

Stable rock means natural solid mineral matter that can be excavated with vertical sides and remain intact while exposed.

Submerged soil means soil which is underwater or is free seeping.

Type A means cohesive soils with an unconfined compressive strength of 1.5 ton per square foot (tsf) (144 kPa) or greater. Examples of cohesive soils are: clay, silty clay, sandy clay, clay loam and, in some cases, silty clay loam and sandy clay loam. Cemented soils such as caliche and hardpan are also considered Type A. However, no soil is Type A if:

(i) The soil is fissured; or

(ii) The soil is subject to vibration from heavy traffic, pile driving, or similar effects; or

(iii) The soil has been previously disturbed; or

(iv) The soil is part of a sloped, layered system where the layers dip into the excavation on a slope of four horizontal to one vertical (4H:1V) or greater; or

(v) The material is subject to other factors that would require it to be classified as a less stable material.

Type B means:

(i) Cohesive soil with an unconfined compressive strength greater than 0.5 tsf (48 kPa) but less than 1.5 tsf (144 kPa); or

(ii) Granular cohesionless soils including: angular gravel (similar to crushed rock),

silt, silt loam, sandy loam and, in some cases, silty clay loam and sandy clay loam.

(iii) Previously disturbed soils except those which would otherwise be classed as Type C soil.

(iv) Soil that meets the unconfined compressive strength or cementation requirements for Type A, but is fissured or subject to vibration; or

(v) Dry rock that is not stable; or

(vi) Material that is part of a sloped, layered system where the layers dip into the excavation on a slope less steep than four horizontal to one vertical (4H:1V), but only if the material would otherwise be classified as Type B.

Type C means:

(i) Cohesive soil with an unconfined compressive strength of 0.5 tsf (48 kPa) or less; or

(ii) Granular soils including gravel, sand, and loamy sand; or

(iii) Submerged soil or soil from which water is freely seeping; or

(iv) Submerged rock that is not stable, or

(v) Material in a sloped, layered system where the layers dip into the excavation or a slope of four horizontal to one vertical (4H:1V) or steeper.

Unconfined compressive strength means the load per unit area at which a soil will fail in compression. It can be determined by laboratory testing, or estimated in the field using a pocket penetrometer, by thumb penetration tests, and other methods.

Wet soil means soil that contains significantly more moisture than moist soil, but in such a range of values that cohesive material will slump or begin to flow when vibrated. Granular material that would exhibit cohesive properties when moist will lose those cohesive properties when wet.

(c) *Requirements*—(1) *Classification of soil and rock deposits.* Each soil and rock deposit shall be classified by a competent person as Stable Rock, Type A, Type B, or Type C in accordance with the definitions set forth in paragraph (b) of this appendix.

(2) *Basis of classification.* The classification of the deposits shall be made based on the results of at least one visual and at least one manual analysis. Such analyses shall be conducted by a competent person using tests described in paragraph (d) below, or in other recognized methods of soil classification and testing such as those adopted by the America Society for Testing Materials, or the U.S. Department of Agriculture textural classification system.

(3) *Visual and manual analyses.* The visual and manual analyses, such as those noted as being acceptable in paragraph (d) of this appendix, shall be designed and conducted to provide sufficient quantitative and qualitative information as may be necessary to identify properly the properties, factors, and conditions affecting the classification of the deposits.

(4) *Layered systems.* In a layered system, the system shall be classified in accordance with its weakest layer. However, each layer may be classified individually where a more stable layer lies under a less stable layer.

(5) *Reclassification.* If, after classifying a deposit, the properties, factors, or conditions affecting its classification change in any way, the changes shall be evaluated by a competent person. The deposit shall be reclassified as necessary to reflect the changed circumstances.

(d) *Acceptable visual and manual tests*—(1) *Visual tests.* Visual analysis is conducted to determine qualitative information regarding the excavation site in general, the soil adjacent to the excavation, the soil forming the sides of the open excavation, and the soil taken as samples from excavated material.

(i) Observe samples of soil that are excavated and soil in the sides of the excavation. Estimate the range of particle sizes and the relative amounts of the particle sizes. Soil that is primarily composed of fine-grained material is cohesive material. Soil composed primarily of coarse-grained sand or gravel is granular material.

(ii) Observe soil as it is excavated. Soil that remains in clumps when excavated is cohesive. Soil that breaks up easily and does not stay in clumps is granular.

(iii) Observe the side of the opened excavation and the surface area adjacent to the excavation. Crack-like openings such as tension cracks could indicate fissured material. If chunks of soil spall off a vertical side, the soil could be fissured. Small spalls are evidence of moving ground and are indications of potentially hazardous situations.

(iv) Observe the area adjacent to the excavation and the excavation itself for evidence of existing utility and other underground structures, and to identify previously disturbed soil.

(v) Observe the opened side of the excavation to identify layered systems. Examine layered systems to identify if the layers slope toward the excavation. Estimate the degree of slope of the layers.

(vi) Observe the area adjacent to the excavation and the sides of the opened excavation for evidence of surface water, water seeping from the sides of the excavation, or the location of the level of the water table.

(vii) Observe the area adjacent to the excavation and the area within the excavation for sources of vibration that may affect the stability of the excavation face.

(2) *Manual tests.* Manual analysis of soil samples is conducted to determine quantitative as well as qualitative properties of soil and to provide more information in order to classify soil properly.

(i) *Plasticity.* Mold a moist or wet sample of soil into a ball and attempt to roll it into threads as thin as ⅛-inch in diameter. Cohesive material can be successfully rolled into

threads without crumbling. For example, if at least a two inch (50 mm) length of ⅛-inch thread can be held on one end without tearing, the soil is cohesive.

(ii) *Dry strength.* If the soil is dry and crumbles on its own or with moderate pressure into individual grains or fine powder, it is granular (any combination of gravel, sand, or silt). If the soil is dry and falls into clumps which break up into smaller clumps, but the smaller clumps can only be broken up with difficulty, it may be clay in any combination with gravel, sand or silt. If the dry soil breaks into clumps which do not break up into small clumps and which can only be broken with difficulty, and there is no visual indication the soil is fissured, the soil may be considered unfissured.

(iii) *Thumb penetration.* The thumb penetration test can be used to estimate the unconfined compressive strength of cohesive soils. (This test is based on the thumb penetration test described in American Society for Testing and Materials (ASTM) Standard designation D2488—''Standard Recommended Practice for Description of Soils (Visual—Manual Procedure).'') Type A soils with an unconfined compressive strength of 1.5 tsf can be readily indented by the thumb; however, they can be penetrated by the thumb only with very great effort. Type C soils with an unconfined compressive strength of 0.5 tsf can be easily penetrated several inches by the thumb, and can be molded by light finger pressure. This test should be conducted on an undisturbed soil sample, such as a large clump of spoil, as soon as practicable after excavation to keep to a miminum the effects of exposure to drying influences. If the excavation is later exposed to wetting influences (rain, flooding), the classification of the soil must be changed accordingly.

(iv) *Other strength tests.* Estimates of unconfined compressive strength of soils can also be obtained by use of a pocket penetrometer or by using a hand-operated shearvane.

(v) *Drying test.* The basic purpose of the drying test is to differentiate between cohesive material with fissures, unfissured cohesive material, and granular material. The procedure for the drying test involves drying a sample of soil that is approximately one inch thick (2.54 cm) and six inches (15.24 cm) in diameter until it is thoroughly dry:

(A) If the sample develops cracks as it dries, significant fissures are indicated.

(B) Samples that dry without cracking are to be broken by hand. If considerable force is necessary to break a sample, the soil has significant cohesive material content. The soil can be classified as a unfissured cohesive material and the unconfined compressive strength should be determined.

(C) If a sample breaks easily by hand, it is either a fissured cohesive material or a granular material. To distinguish between the two, pulverize the dried clumps of the sample by hand or by stepping on them. If the clumps do not pulverize easily, the material is cohesive with fissures. If they pulverize easily into very small fragments, the material is granular.

Appendix B to Subpart P of Part 1926—Sloping and Benching

(a) *Scope and application.* This appendix contains specifications for sloping and benching when used as methods of protecting employees working in excavations from cave-ins. The requirements of this appendix apply when the design of sloping and benching protective systems is to be performed in accordance with the requirements set forth in §1926.652(b)(2).

(b) *Definitions.*

Actual slope means the slope to which an excavation face is excavated.

Distress means that the soil is in a condition where a cave-in is imminent or is likely to occur. Distress is evidenced by such phenomena as the development of fissures in the face of or adjacent to an open excavation; the subsidence of the edge of an excavation; the slumping of material from the face or the bulging or heaving of material from the bottom of an excavation; the spalling of material from the face of an excavation; and ravelling, i.e., small amounts of material such as pebbles or little clumps of material suddenly separating from the face of an excavation and trickling or rolling down into the excavation.

Maximum allowable slope means the steepest incline of an excavation face that is acceptable for the most favorable site conditions as protection against cave-ins, and is expressed as the ratio of horizontal distance to vertical rise (H:V).

Short term exposure means a period of time less than or equal to 24 hours that an excavation is open.

(c) *Requirements*—(1) *Soil classification.* Soil and rock deposits shall be classified in accordance with appendix A to subpart P of part 1926.

(2) *Maximum allowable slope.* The maximum allowable slope for a soil or rock deposit shall be determined from Table B–1 of this appendix.

(3) *Actual slope.* (i) The actual slope shall not be steeper than the maximum allowable slope.

(ii) The actual slope shall be less steep than the maximum allowable slope, when there are signs of distress. If that situation occurs, the slope shall be cut back to an actual slope which is at least ½ horizontal to one vertical (½H:1V) less steep than the maximum allowable slope.

(iii) When surcharge loads from stored material or equipment, operating equipment, or traffic are present, a competent person shall

determine the degree to which the actual slope must be reduced below the maximum allowable slope, and shall assure that such reduction is achieved. Surcharge loads from adjacent structures shall be evaluated in accordance with §1926.651(i).

(4) *Configurations.* Configurations of sloping and benching systems shall be in accordance with Figure B–1.

TABLE B-1

MAXIMUM ALLOWABLE SLOPES

SOIL OR ROCK TYPE	MAXIMUM ALLOWABLE SLOPES (H:V)[1] FOR EXCAVATIONS LESS THAN 20 FEET DEEP [3]
STABLE ROCK TYPE A [2] TYPE B TYPE C	VERTICAL (90°) 3/4 : 1 (53°) 1:1 (45°) 1½: 1 (34°)

NOTES:

1. Numbers shown in parentheses next to maximum allowable slopes are angles expressed in degrees from the horizontal. Angles have been rounded off.
2. A short-term maximum allowable slope of 1/2H:1V (63°) is allowed in excavations in Type A soil that are 12 feet (3.67 m) or less in depth. Short-term maximum allowable slopes for excavations greater than 12 feet (3.67 m) in depth shall be 3/4H:1V (53°).
3. Sloping or benching for excavations greater than 20 feet deep shall be designed by a registered professional engineer.

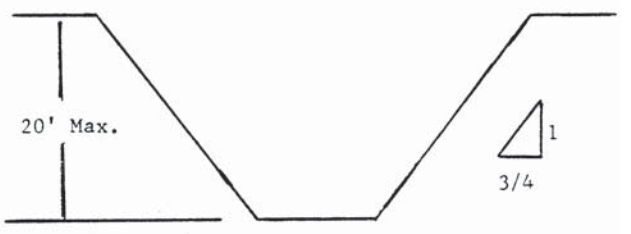
Figure B–1

Slope Configurations

(All slopes stated below are in the horizontal to vertical ratio)

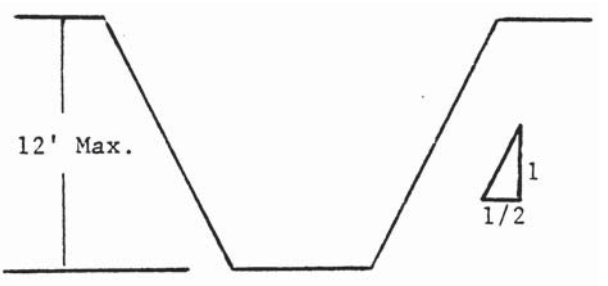
B–1.1 Excavations made in Type A soil.

1. All simple slope excavation 20 feet or less in depth shall have a maximum allowable slope of ¾:1.



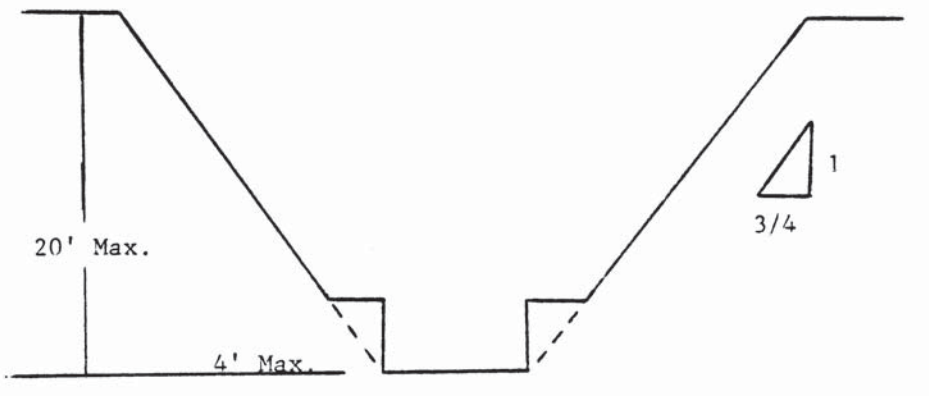
SIMPLE SLOPE—GENERAL

Exception: Simple slope excavations which are open 24 hours or less (short term) and which are 12 feet or less in depth shall have a maximum allowable slope of ½:1.

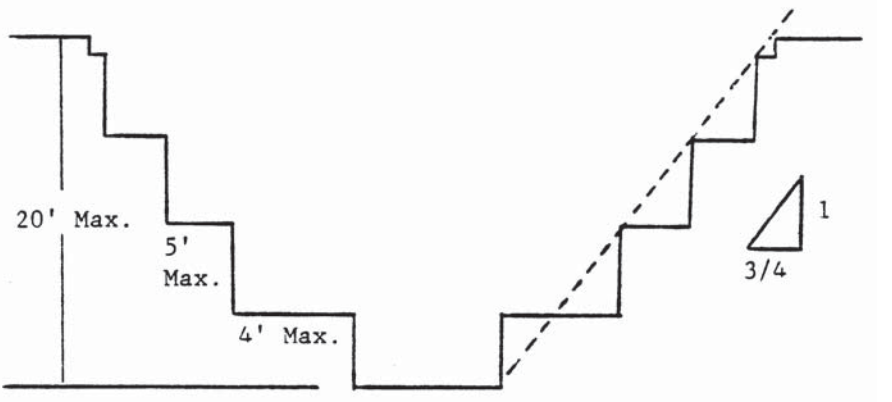


SIMPLE SLOPE—SHORT TERM

2. All benched excavations 20 feet or less in depth shall have a maximum allowable slope of ¾ to 1 and maximum bench dimensions as follows:

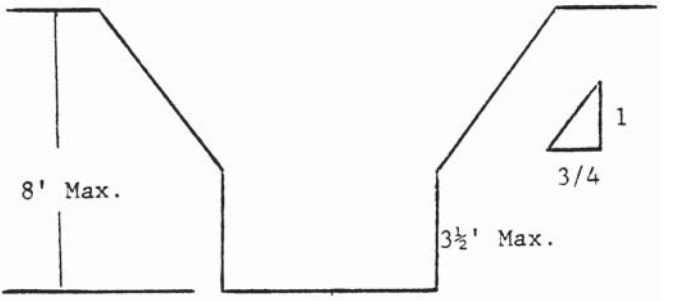


SIMPLE BENCH



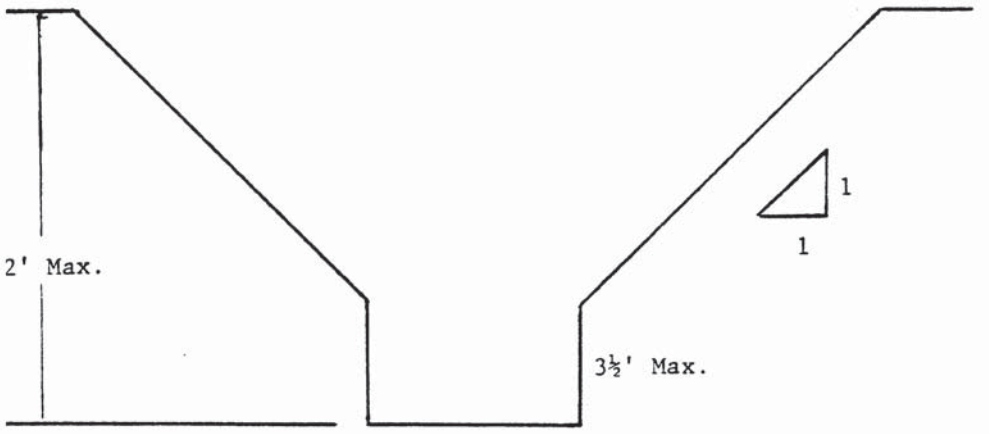
MULTIPLE BENCH

3. All excavations 8 feet or less in depth which have unsupported vertically sided lower portions shall have a maximum vertical side of 3½ feet.



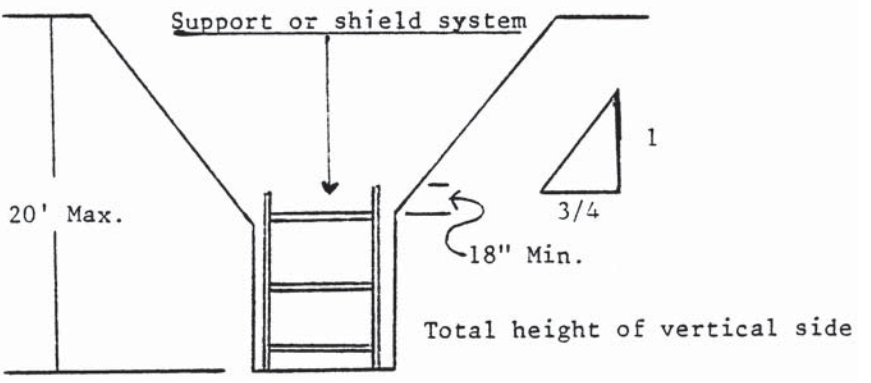
UNSUPPORTED VERTICALLY SIDED LOWER PORTION—MAXIMUM 8 FEET IN DEPTH

All excavations more than 8 feet but not more than 12 feet in depth which unsupported vertically sided lower portions shall have a maximum allowable slope of 1:1 and a maximum vertical side of 3½ feet.



UNSUPPORTED VERTICALLY SIDED LOWER PORTION—MAXIMUM 12 FEET IN DEPTH

All excavations 20 feet or less in depth which have vertically sided lower portions that are supported or shielded shall have a maximum allowable slope of ¾:1. The support or shield system must extend at least 18 inches above the top of the vertical side.

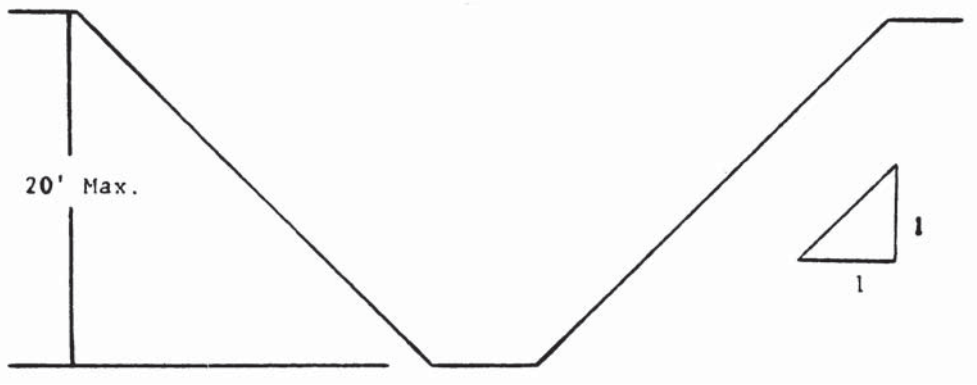


SUPPORTED OR SHIELDED VERTICALLY SIDED LOWER PORTION

4. All other simple slope, compound slope, and vertically sided lower portion excavations shall be in accordance with the other options permitted under §1926.652(b).

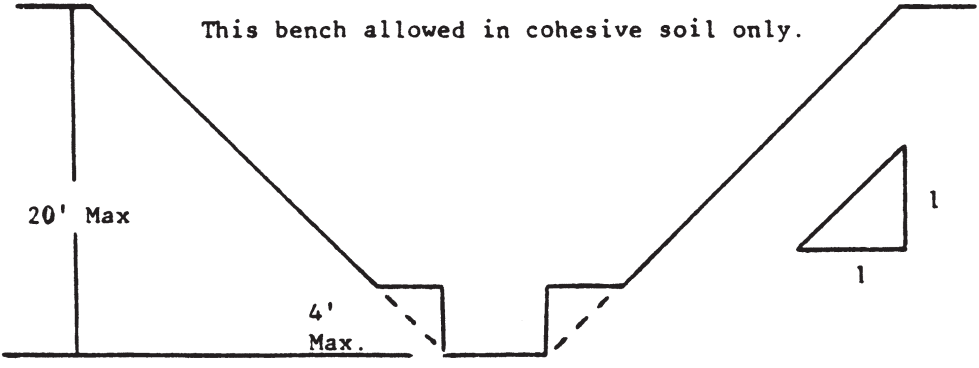
B–1.2 Excavations Made in Type B Soil

1. All simple slope excavations 20 feet or less in depth shall have a maximum allowable slope of 1:1.

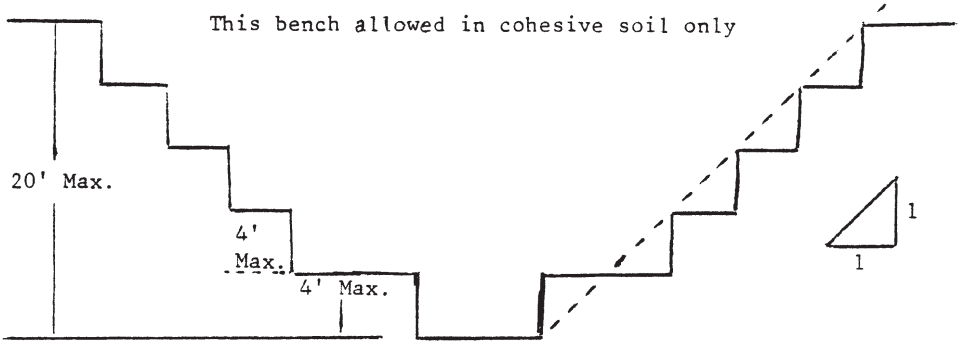


SIMPLE SLOPE

2. All benched excavations 20 feet or less in depth shall have a maximum allowable slope of 1:1 and maximum bench dimensions as follows:

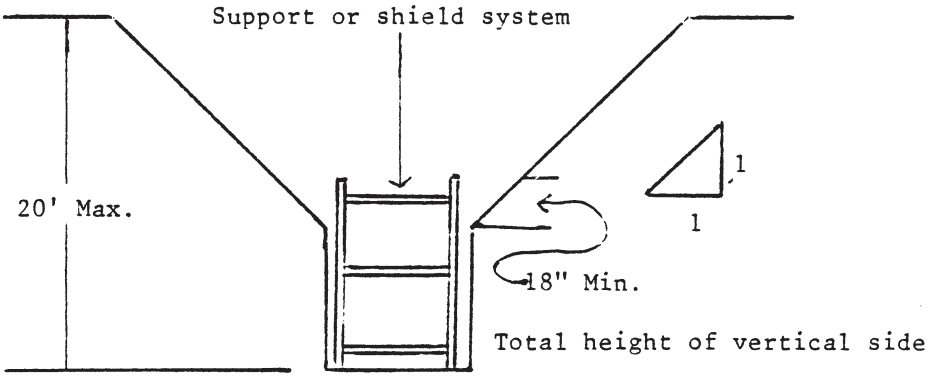


SINGLE BENCH



MULTIPLE BENCH

3. All excavations 20 feet or less in depth which have vertically sided lower portions shall be shielded or supported to a height at least 18 inches above the top of the vertical side. All such excavations shall have a maximum allowable slope of 1:1.

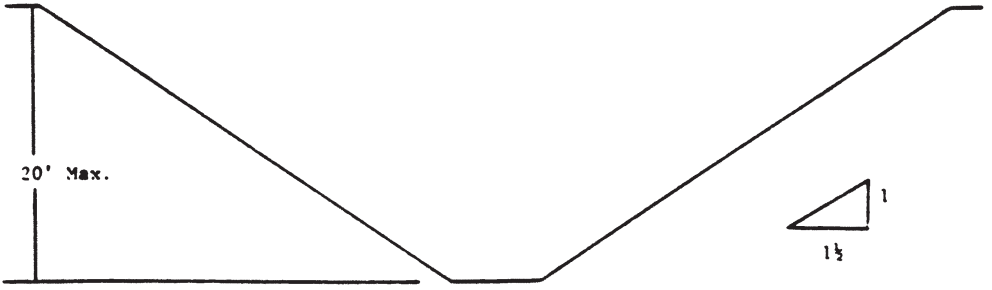


VERTICALLY SIDED LOWER PORTION

4. All other sloped excavations shall be in accordance with the other options permitted in §1926.652(b).

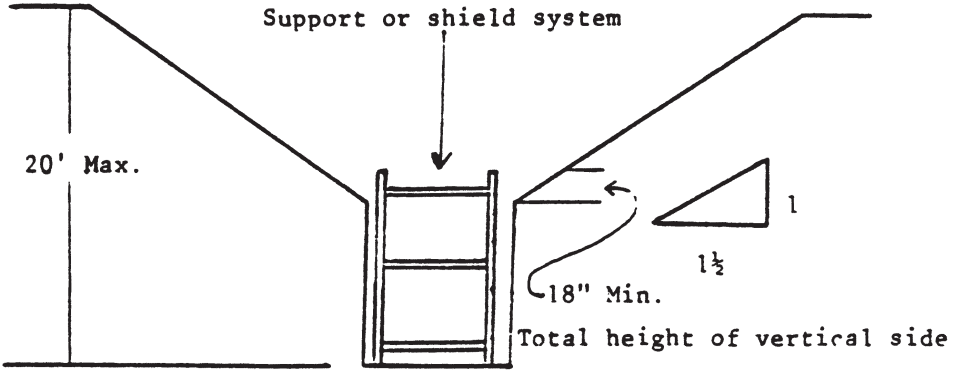
B–1.3 Excavations Made in Type C Soil

1. All simple slope excavations 20 feet or less in depth shall have a maximum allowable slope of 1½:1.



SIMPLE SLOPE

2. All excavations 20 feet or less in depth which have vertically sided lower portions shall be shielded or supported to a height at least 18 inches above the top of the vertical side. All such excavations shall have a maximum allowable slope of 1½:1.

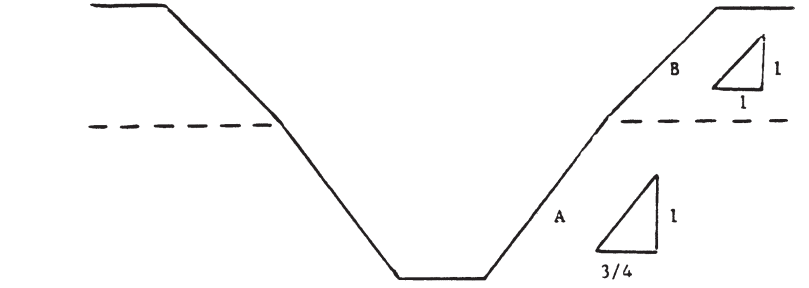


VERTICAL SIDED LOWER PORTION

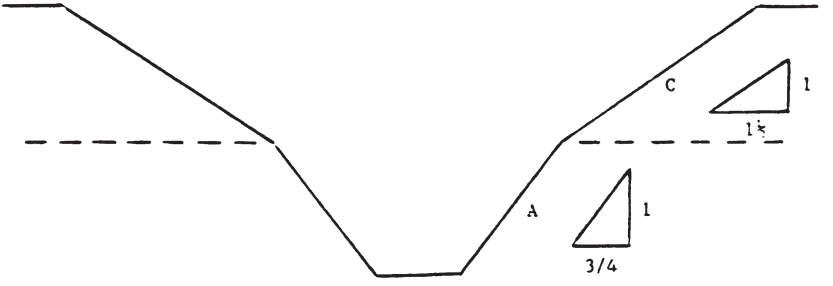
3. All other sloped excavations shall be in accordance with the other options permitted in §1926.652(b).

B–1.4 Excavations Made in Layered Soils

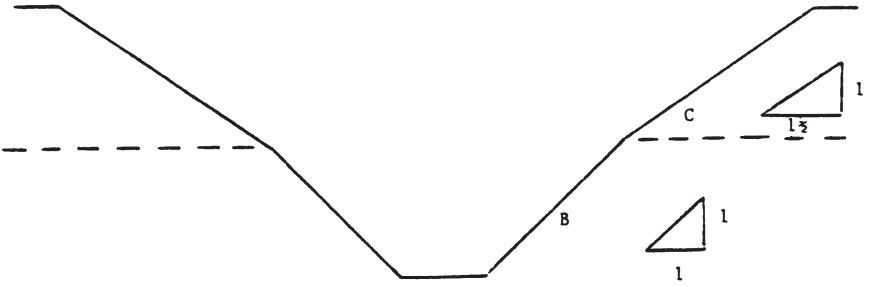
1. All excavations 20 feet or less in depth made in layered soils shall have a maximum allowable slope for each layer as set forth below.



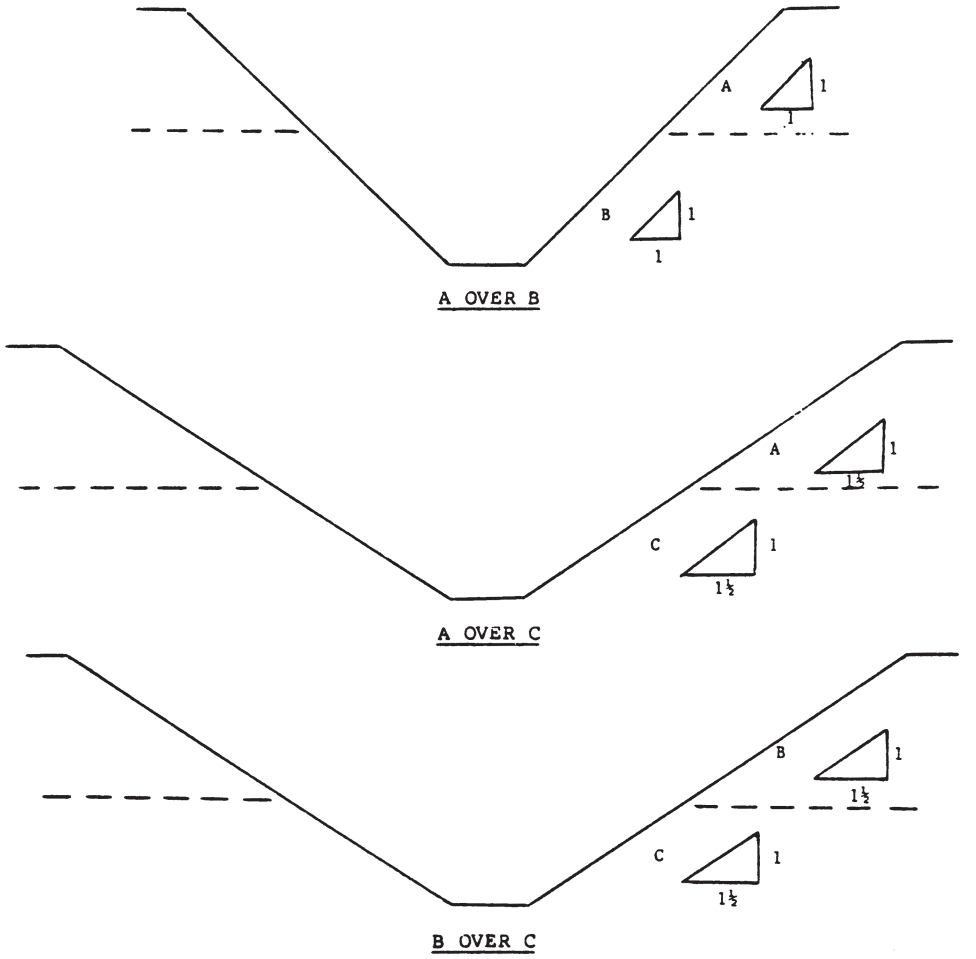
B OVER A



C OVER A



C OVER B



2. All other sloped excavations shall be in accordance with the other options permitted in §1926.652(b).

APPENDIX C TO SUBPART P OF PART 1926—TIMBER SHORING FOR TRENCHES

(a) *Scope.* This appendix contains information that can be used timber shoring is provided as a method of protection from caveins in trenches that do not exceed 20 feet (6.1 m) in depth. This appendix must be used when design of timber shoring protective systems is to be performed in accordance with §1926.652(c)(1). Other timber shoring configurations; other systems of support such as hydraulic and pneumatic systems; and other protective systems such as sloping, benching, shielding, and freezing systems must be designed in accordance with the requirements set forth in §1926.652(b) and §1926.652(c).

(b) *Soil Classification.* In order to use the data presented in this appendix, the soil type or types in which the excavation is made must first be determined using the soil classification method set forth in appendix A of subpart P of this part.

(c) *Presentation of Information.* Information is presented in several forms as follows:

(1) Information is presented in tabular form in Tables C–1.1, C–1.2, and C–1.3, and Tables C–2.1, C–2.2 and C–2.3 following paragraph (g) of the appendix. Each table presents the minimum sizes of timber members to use in a shoring system, and each table contains data only for the particular soil type in which the excavation or portion of

the excavation is made. The data are arranged to allow the user the flexibility to select from among several acceptable configurations of members based on varying the horizontal spacing of the crossbraces. Stable rock is exempt from shoring requirements and therefore, no data are presented for this condition.

(2) Information concerning the basis of the tabular data and the limitations of the data is presented in paragraph (d) of this appendix, and on the tables themselves.

(3) Information explaining the use of the tabular data is presented in paragraph (e) of this appendix.

(4) Information illustrating the use of the tabular data is presented in paragraph (f) of this appendix.

(5) Miscellaneous notations regarding Tables C–1.1 through C–1.3 and Tables C–2.1 through C–2.3 are presented in paragraph (g) of this Appendix.

(d) *Basis and limitations of the data*—(1) *Dimensions of timber members.* (i) The sizes of the timber members listed in Tables C–1.1 through C–1.3 are taken from the National Bureau of Standards (NBS) report, ''Recommended Technical Provisions for Construction Practice in Shoring and Sloping of Trenches and Excavations.'' In addition, where NBS did not recommend specific sizes of members, member sizes are based on an analysis of the sizes required for use by existing codes and on empirical practice.

(ii) The required dimensions of the members listed in Tables C–1.1 through C–1.3 refer to actual dimensions and not nominal dimensions of the timber. Employers wanting to use nominal size shoring are directed to Tables C–2.1 through C–2.3, or have this choice under §1926.652(c)(3), and are referred to The Corps of Engineers, The Bureau of Reclamation or data from other acceptable sources.

(2) *Limitation of application.* (i) It is not intended that the timber shoring specification apply to every situation that may be experienced in the field. These data were developed to apply to the situations that are most commonly experienced in current trenching practice. Shoring systems for use in situations that are not covered by the data in this appendix must be designed as specified in §1926.652(c).

(ii) When any of the following conditions are present, the members specified in the tables are not considered adequate. Either an alternate timber shoring system must be designed or another type of protective system designed in accordance with §1926.652.

(A) When loads imposed by structures or by stored material adjacent to the trench weigh in excess of the load imposed by a two-foot soil surcharge. The term ''adjacent'' as used here means the area within a horizontal distance from the edge of the trench equal to the depth of the trench.

(B) When vertical loads imposed on cross braces exceed a 240-pound gravity load distributed on a one-foot section of the center of the crossbrace.

(C) When surcharge loads are present from equipment weighing in excess of 20,000 pounds.

(D) When only the lower portion of a trench is shored and the remaining portion of the trench is sloped or benched unless: The sloped portion is sloped at an angle less steep than three horizontal to one vertical; or the members are selected from the tables for use at a depth which is determined from the top of the overall trench, and not from the toe of the sloped portion.

(e) *Use of Tables.* The members of the shoring system that are to be selected using this information are the cross braces, the uprights, and the wales, where wales are required. Minimum sizes of members are specified for use in different types of soil. There are six tables of information, two for each soil type. The soil type must first be determined in accordance with the soil classification system described in appendix A to subpart P of part 1926. Using the appropriate table, the selection of the size and spacing of the members is then made. The selection is based on the depth and width of the trench where the members are to be installed and, in most instances, the selection is also based on the horizontal spacing of the crossbraces. Instances where a choice of horizontal spacing of crossbracing is available, the horizontal spacing of the crossbraces must be chosen by the user before the size of any member can be determined. When the soil type, the width and depth of the trench, and the horizontal spacing of the crossbraces are known, the size and vertical spacing of the crossbraces, the size and vertical spacing of the wales, and the size and horizontal spacing of the uprights can be read from the appropriate table.

(f) *Examples to Illustrate the Use of Tables C–1.1 through C–1.3.*

(1) *Example 1.*

A trench dug in Type A soil is 13 feet deep and five feet wide.

From *Table C–1.1,* for acceptable arrangements of timber can be used.

Arrangement #B1

Space 4×4 crossbraces at six feet horizontally and four feet vertically.

Wales are not required.

Space 3×8 uprights at six feet horizontally. This arrangement is commonly called ''skip shoring.''

Arrangement #B2

Space 4×6 crossbraces at eight feet horizontally and four feet vertically.

Space 8×8 wales at four feet vertically.

Space 2×6 uprights at four feet horizontally.

Arrangement #B3

Space 6×6 crossbraces at 10 feet horizontally and four feet vertically.
Space 8×10 wales at four feet vertically.
Space 2×6 uprights at five feet horizontally.

Arrangement #B4

Space 6×6 crossbraces at 12 feet horizontally and four feet vertically.
Space 10×10 wales at four feet vertically.
Spaces 3×8 uprights at six feet horizontally.

(2) *Example 2.*

A trench dug in Type B soil in 13 feet deep and five feet wide. From Table C–1.2 three acceptable arrangements of members are listed.

Arrangement #B1

Space 6×6 crossbraces at six feet horizontally and five feet vertically.
Space 8×8 wales at five feet vertically.
Space 2×6 uprights at two feet horizontally.

Arrangement #B2

Space 6×8 crossbraces at eight feet horizontally and five feet vertically.
Space 10×10 wales at five feet vertically.
Space 2×6 uprights at two feet horizontally.

Arrangement #B3

Space 8×8 crossbraces at 10 feet horizontally and five feet vertically.
Space 10×12 wales at five feet vertically.
Space 2×6 uprights at two feet vertically.

(3) *Example 3.*

A trench dug in Type C soil is 13 feet deep and five feet wide.

From Table C–1.3 two acceptable arrangements of members can be used.

Arrangement #B1

Space 8×8 crossbraces at six feet horizontally and five feet vertically.
Space 10×12 wales at five feet vertically.
Position 2×6 uprights as closely together as possible.
If water must be retained use special tongue and groove uprights to form tight sheeting.

Arrangement #B2

Space 8×10 crossbraces at eight feet horizontally and five feet vertically.
Space 12×12 wales at five feet vertically.
Position 2×6 uprights in a close sheeting configuration unless water pressure must be resisted. Tight sheeting must be used where water must be retained.

(4) *Example 4.*

A trench dug in Type C soil is 20 feet deep and 11 feet wide. The size and spacing of members for the section of trench that is over 15 feet in depth is determined using Table C–1.3. Only one arrangement of members is provided.

Space 8×10 crossbraces at six feet horizontally and five feet vertically.
Space 12×12 wales at five feet vertically.
Use 3×6 tight sheeting.
Use of Tables C–2.1 through C–2.3 would follow the same procedures.

(g) *Notes for all Tables.*

1. Member sizes at spacings other than indicated are to be determined as specified in §1926.652(c), ''Design of Protective Systems.''

2. When conditions are saturated or submerged use Tight Sheeting. Tight Sheeting refers to the use of specially-edged timber planks (e.g., tongue and groove) at least three inches thick, steel sheet piling, or similar construction that when driven or placed in position provide a tight wall to resist the lateral pressure of water and to prevent the loss of backfill material. Close Sheeting refers to the placement of planks side-by-side allowing as little space as possible between them.

3. All spacing indicated is measured center to center.

4. Wales to be installed with greater dimension horizontal.

5. If the vertical distance from the center of the lowest crossbrace to the bottom of the trench exceeds two and one-half feet, uprights shall be firmly embedded or a mudsill shall be used. Where uprights are embedded, the vertical distance from the center of the lowest crossbrace to the bottom of the trench shall not exceed 36 inches. When mudsills are used, the vertical distance shall not exceed 42 inches. Mudsills are wales that are installed at the toe of the trench side.

6. Trench jacks may be used in lieu of or in combination with timber crossbraces.

7. Placement cf crossbraces. When the vertical spacing of crossbraces is four feet, place the top crossbrace no more than two feet below the top of the trench. When the vertical spacing of crossbraces is five feet, place the top crossbrace no more than 2.5 feet below the top of the trench.

TABLE C-1.1

TIMBER TRENCH SHORING -- MINIMUM TIMBER REQUIREMENTS *

SOIL TYPE A P_a = 25 X H + 72 psf (2 ft Surcharge)

DEPTH OF TRENCH (FEET)	SIZE (ACTUAL) AND SPACING OF MEMBERS **													
	CROSS BRACES							WALES		UPRIGHTS				
	HORIZ. SPACING (FEET)	WIDTH OF TRENCH (FEET)					VERT. SPACING (FEET)	SIZE (IN)	VERT. SPACING (FEET)	MAXIMUM ALLOWABLE HORIZONTAL SPACING (FEET)				
		UP TO 4	UP TO 6	UP TO 9	UP TO 12	UP TO 15				CLOSE	4	5	6	8
5 TO 10	UP TO 6	4X4	4X4	4X6	6X6	6X6	4	Not Req'd	---				2X6	
	UP TO 8	4X4	4X4	4X6	6X6	6X6	4	Not Req'd	---					2X8
	UP TO 10	4X6	4X6	4X6	6X6	6X6	4	8X8	4			2X6		
	UP TO 12	4X6	4X6	6X6	6X6	6X6	4	8X8	4				2X6	
10 TO 15	UP TO 6	4X4	4X4	4X6	6X6	6X6	4	Not Req'd	---				3X8	
	UP TO 8	4X6	4X6	6X6	6X6	6X6	4	8X8	4		2X6			
	UP TO 10	6X6	6X5	6X6	6X8	6X8	4	8X10	4			2X6		
	UP TO 12	6X6	6X6	6X6	6X8	6X8	4	10X10	4				3X8	
15 TO 20	UP TO 6	6X6	6X6	6X6	6X8	6X8	4	6X8	4	3X6				
	UP TO 8	6X6	6X6	6X6	6X8	6X8	4	8X8	4	3X6				
	UP TO 10	8X8	8X8	8X8	8X8	8X10	4	8X10	4	3X6				
	UP TO 12	8X8	8X8	8X8	8X8	8X10	4	10X10	4	3X6				
OVER 20	SEE NOTE 1													

* Mixed oak or equivalent with a bending strength not less than 850 psi.
** Manufactured members of equivalent strength may by substituted for wood.

TABLE C-1.2

TIMBER TRENCH SHORING -- MINIMUM TIMBER REQUIREMENTS *

SOIL TYPE B $P_a = 45 \times H + 72$ psf (2 ft. Surcharge)

DEPTH OF TRENCH (FEET)	SIZE (ACTUAL) AND SPACING OF MEMBERS**													
	CROSS BRACES							WALES		UPRIGHTS				
	HORIZ. SPACING (FEET)	WIDTH OF TRENCH (FEET)					VERT. SPACING (FEET)	SIZE (IN.)	VERT. SPACING (FEET)	MAXIMUM ALLOWABLE HORIZONTAL SPACING (FEET)				
		UP TO 4	UP TO 6	UP TO 9	UP TO 12	UP TO 15				CLOSE	2	3		
5 TO 10	UP TO 6	4X6	4X6	6X6	6X6	6X6	5	6X8	5			2X6		
	UP TO 8	6X6	6X6	6X6	6X8	6X8	5	8X10	5			2X6		
	UP TO 10	6X6	6X6	6X6	6X8	6X8	5	10X10	5			2X6		
	See Note 1													
10 TO 15	UP TO 6	6X6	6X6	6X6	6X8	6X8	5	8X8	5		2X6			
	UP TO 8	6X8	6X8	6X8	8X8	8X8	5	10X10	5		2X6			
	UP TO 10	8X8	8X8	8X8	8X8	8X10	5	10X12	5		2X6			
	See Note 1													
15 TO 20	UP TO 6	6X8	6X8	6X8	8X8	8X8	5	8X10	5	3X6				
	UP TO 8	8X8	8X8	8X8	8X8	8X10	5	10X12	5	3X6				
	UP TO 10	8X10	8X10	8X10	8X10	10X10	5	12X12	5	3X6				
	See Note 1													
OVER 20	SEE NOTE 1													

* Mixed oak or equivalent with a bending strength not less than 850 psi.
** Manufactured members of equivalent strength may by substituted for wood.

TABLE C-1.3

TIMBER TRENCH SHORING -- MINIMUM TIMBER REQUIREMENTS *

SOIL TYPE C P_a = 80 X H + 72 psf (2 ft. Surcharge)

DEPTH OF TRENCH (FEET)	SIZE (ACTUAL) AND SPACING OF MEMBERS**													
	CROSS BRACES									UPRIGHTS				
	HORIZ. SPACING (FEET)	WIDTH OF TRENCH (FEET)					VERT. SPACING (FEET)	SIZE (IN.)	VERT. SPACING (FEET)	MAXIMUM ALLOWABLE HORIZONTAL SPACING (FEET) (See Note 2)				
		UP TO 4	UP TO 6	UP TO 9	UP TO 12	UP TO 15				CLOSE				
5 TO 10	UP TO 6	6X8	6X8	6X8	8X8	8X8	5	8X10	5	2X6				
	UP TO 8	8X8	8X8	8X8	8X8	8X10	5	10X12	5	2X6				
	UP TO 10	8X10	8X10	8X10	8X10	10X10	5	12X12	5	2X6				
	See Note 1													
10 TO 15	UP TO 6	8X8	8X8	8X8	8X8	8X10	5	10X12	5	2X6				
	UP TO 8	8X10	8X10	8X10	8X10	10X10	5	12X12	5	2X6				
	See Note 1													
	See Note 1													
15 TO 20	UP TO 6	8X10	8X10	8X10	8X10	10X10	5	12X12	5	3X6				
	See Note 1													
	See Note 1													
	See Note 1													
OVER 20	SEE NOTE 1													

* Mixed Oak or equivalent with a bending strength not less than 850 psi.

** Manufactured members of equivalent strength may be substituted for wood.

TABLE C-2.1

TIMBER TRENCH SHORING -- MINIMUM TIMBER REQUIREMENTS *

SOIL TYPE A P_a = 25 X H ± 72 psf (2 ft. Surcharge)

DEPTH OF TRENCH (FEET)	SIZE (S4S) AND SPACING OF MEMBERS **													
	CROSS BRACES							WALES		UPRIGHTS				
	HORIZ. SPACING (FEET)	WIDTH OF TRENCH (FEET)					VERT. SPACING (FEET)	SIZE (IN.)	VERT. SPACING (FEET)	MAXIMUM ALLOWABLE HORIZONTAL SPACING (FEET)				
		UP TO 4	UP TO 6	UP TO 9	UP TO 12	UP TO 15				CLOSE	4	5	6	8
5 TO 10	UP TO 6	4X4	4X4	4X4	4X4	4X6	4	Not Req'd	Not Req'd				4X6	
	UP TO 8	4X4	4X4	4X4	4X6	4X6	4	Not Req'd	Not Req'd					4X8
	UP TO 10	4X6	4X6	4X6	6X6	6X6	4	8X8	4			4X6		
	UP TO 12	4X6	4X6	4X6	6X6	6X6	4	8X8	4				4X6	
10 TO 15	UP TO 6	4X4	4X4	4X4	6X6	6X6	4	Not Req'd	Not Req'd				4X10	
	UP TO 8	4X6	4X6	4X6	6X6	6X6	4	6X8	4		4X6			
	UP TO 10	6X6	6X6	6X6	6X6	6X6	4	8X8	4			4X8		
	UP TO 12	6X6	6X6	6X6	6X6	6X6	4	8X10	4		4X6		4X10	
15 TO 20	UP TO 6	6X6	6X6	6X6	6X6	6X6	4	6X8	4	3X6				
	UP TO 8	6X6	6X6	6X6	6X6	6X6	4	8X8	4	3X6	4X12			
	UP TO 10	6X6	6X6	6X6	6X6	6X8	4	8X10	4	3X6				
	UP TO 12	6X6	6X6	6X6	6X8	6X8	4	8X12	4	3X6	4X12			
OVER 20	SEE NOTE 1													

* Douglas fir or equivalent with a bending strength not less than 1500 psi.

** Manufactured members of equivalent strength may be substituted for wood.

TABLE C-2.2

TIMBER TRENCH SHORING -- MINIMUM TIMBER REQUIREMENTS *

SOIL TYPE B P_a = 45 X H + 72 psf (2 ft. Surcharge)

DEPTH OF TRENCH (FEET)	SIZE (S4S) AND SPACING OF MEMBERS **													
	CROSS BRACES							WALES		UPRIGHTS				
	HORIZ. SPACING (FEET)	WIDTH OF TRENCH (FEET)					VERT. SPACING (FEET)	SIZE (IN)	VERT. SPACING (FEET)	MAXIMUM ALLOWABLE HORIZONTAL SPACING (FEET)				
		UP TO 4	UP TO 6	UP TO 9	UP TO 12	UP TO 15				CLOSE	2	3	4	6
5 TO 10	UP TO 6	4X6	4X6	4X6	6X6	6X6	5	6X8	5			3X12 4X8		4X12
	UP TO 8	4X6	4X6	6X6	6X6	6X6	5	8X8	5		3X8		4X8	
	UP TO 10	4X6	4X6	6X6	6X6	6X8	5	8X10	5			4X8		
	See Note 1													
10 TO 15	UP TO 6	6X6	6X6	6X6	6X8	6X8	5	8X8	5	3X6	4X10			
	UP TO 8	6X8	6X8	6X8	8X8	8X8	5	10X10	5	3X6	4X10			
	UP TO 10	6X8	6X8	8X8	8X8	8X8	5	10X12	5	3X6	4X10			
	See Note 1													
15 TO 20	UP TO 6	6X8	6X8	6X8	6X8	8X8	5	8X10	5	4X6				
	UP TO 8	6X8	6X8	6X8	8X8	8X8	5	10X12	5	4X6				
	UP TO 10	8X8	8X8	8X8	8X8	8X8	5	12X12	5	4X6				
	See Note 1													
OVER 20	SEE NOTE 1													

* Douglas fir or equivalent with a bending strength not less than 1500 psi.
** Manufactured members of equivalent strength may be substituted for wood.

TABLE C–2.3

TIMBER TRENCH SHORING -- MINIMUM TIMBER REQUIREMENTS *

SOIL TYPE C P_a = 80 X H + 72 psf (2 ft. Surcharge)

DEPTH OF TRENCH (FEET)	SIZE (S4S) AND SPACING OF MEMBERS **												
	CROSS BRACES						WALES		UPRIGHTS	MAXIMUM ALLOWABLE HORIZONTAL SPACING (FEET)			
	HORIZ. SPACING (FEET)	WIDTH OF TRENCH (FEET)					VERT. SPACING (FEET)	SIZE (IN)	VERT. SPACING (FEET)	CLOSE			
		UP TO 4	UP TO 6	UP TO 9	UP TO 12	UP TO 15							
5 TO 10	UP TO 6	6X6	6X6	6X6	6X6	8X8	5	8X8	5	3X6			
	UP TO 8	6X6	6X6	6X6	8X8	8X8	5	10X10	5	3X6			
	UP TO 10	6X6	6X6	8X8	8X8	8X8	5	10X12	5	3X6			
	See Note 1												
10 TO 15	UP TO 6	6X8	6X8	6X8	8X8	8X8	5	10X10	5	4X6			
	UP TO 8	8X8	8X8	8X8	8X8	8X8	5	12X12	5	4X6			
	See Note 1												
	See Note 1												
15 TO 20	UP TO 6	8X8	8X8	8X8	8X10	8X10	5	10X12	5	4X6			
	See Note 1												
	See Note 1												
	See Note 1												
OVER 20	SEE NOTE 1												

* Douglas fir or equivalent with a bending strength not less than 1500 psi.

** Manufactured members of equivalent strength may be substituted for wood.

APPENDIX D TO SUBPART P OF PART 1926—ALUMINUM HYDRAULIC SHORING FOR TRENCHES

(a) *Scope.* This appendix contains information that can be used when aluminum hydraulic shoring is provided as a method of protection against cave-ins in trenches that do not exceed 20 feet (6.1m) in depth. This appendix must be used when design of the aluminum hydraulic protective system cannot be performed in accordance with §1926.652(c)(2).

(b) *Soil Classification.* In order to use data presented in this appendix, the soil type or types in which the excavation is made must

first be determined using the soil classification method set forth in appendix A of subpart P of part 1926.

(c) *Presentation of Information.* Information is presented in several forms as follows:

(1) Information is presented in tabular form in Tables D–1.1, D–1.2, D–1.3 and E–1.4. Each table presents the maximum vertical and horizontal spacings that may be used with various aluminum member sizes and various hydraulic cylinder sizes. Each table contains data only for the particular soil type in which the excavation or portion of the excavation is made. Tables D–1.1 and D–1.2 are for vertical shores in Types A and B soil. Tables D–1.3 and D1.4 are for horizontal waler systems in Types B and C soil.

(2) Information concerning the basis of the tabular data and the limitations of the data is presented in paragraph (d) of this appendix.

(3) Information explaining the use of the tabular data is presented in paragraph (e) of this appendix.

(4) Information illustrating the use of the tabular data is presented in paragraph (f) of this appendix.

(5) Miscellaneous notations (footnotes) regarding Table D–1.1 through D–1.4 are presented in paragraph (g) of this appendix.

(6) Figures, illustrating typical installations of hydraulic shoring, are included just prior to the Tables. The illustrations page is entitled ''Aluminum Hydraulic Shoring; Typical Installations.''

(d) *Basis and limitations of the data.* (1) Vertical shore rails and horizontal wales are those that meet the Section Modulus requirements in the D–1 Tables. Aluminum material is 6061–T6 or material of equivalent strength and properties.

(2) Hydraulic cylinders specifications. (i) 2-inch cylinders shall be a minimum 2-inch inside diameter with a minimum safe working capacity of no less than 18,000 pounds axial compressive load at maximum extension. Maximum extension is to include full range of cylinder extensions as recommended by product manufaturer.

(ii) 3-inch cylinders shall be a minimum 3-inch inside diameter with a safe working capacity of not less than 30,000 pounds axial compressive load at extensions as recommended by product manufacturer.

(3) Limitation of application.

(i) It is not intended that the aluminum hydraulic specification apply to every situation that may be experienced in the field. These data were developed to apply to the situations that are most commonly experienced in current trenching practice. Shoring systems for use in situations that are not covered by the data in this appendix must be otherwise designed as specified in §1926.652(c).

(ii) When any of the following conditions are present, the members specified in the Tables are not considered adequate. In this case, an alternative aluminum hydraulic shoring system or other type of protective system must be designed in accordance with §1926.652.

(A) When vertical loads imposed on cross braces exceed a 100 Pound gravity load distributed on a one foot section of the center of the hydraulic cylinder.

(B) When surcharge loads are present from equipment weighing in excess of 20,000 pounds.

(C) When only the lower portion or a trench is shored and the remaining portion of the trench is sloped or benched unless: The sloped portion is sloped at an angle less steep than three horizontal to one vertical; or the members are selected from the tables for use at a depth which is determined from the top of the overall trench, and not from the toe of the sloped portion.

(e) *Use of Tables D–1.1, D–1.2, D–1.3 and D–1.4.* The members of the shoring system that are to be selected using this information are the hydraulic cylinders, and either the vertical shores or the horizontal wales. When a waler system is used the vertical timber sheeting to be used is also selected from these tables. The Tables D–1.1 and D–1.2 for vertical shores are used in Type A and B soils that do not require sheeting. Type B soils that may require sheeting, and Type C soils that always require sheeting are found in the horizontal wale Tables D–1.3 and D–1.4. The soil type must first be determined in accordance with the soil classification system described in appendix A to subpart P of part 1926. Using the appropriate table, the selection of the size and spacing of the members is made. The selection is based on the depth and width of the trench where the members are to be installed. In these tables the vertical spacing is held constant at four feet on center. The tables show the maximum horizontal spacing of cylinders allowed for each size of wale in the waler system tables, and in the vertical shore tables, the hydraulic cylinder horizontal spacing is the same as the vertical shore spacing.

(f) *Example to Illustrate the Use of the Tables:*

(1) Example 1:

A trench dug in Type A soil is 6 feet deep and 3 feet wide. From Table D–1.1: Find vertical shores and 2 inch diameter cylinders spaced 8 feet on center (o.c.) horizontally and 4 feet on center (o.c.) vertically. (See Figures 1 & 3 for typical installations.)

(2) Example 2:

A trench is dug in Type B soil that does not require sheeting, 13 feet deep and 5 feet wide. From Table D–1.2: Find vertical shores and 2 inch diameter cylinders spaced 6.5 feet o.c. horizontally and 4 feet o.c. vertically. (See Figures 1 & 3 for typical installations.)

(3) A trench is dug in Type B soil that does not require sheeting, but does experience some minor raveling of the trench face. The

trench is 16 feet deep and 9 feet wide. From Table D–1.2: Find vertical shores and 2 inch diameter cylinder (with special oversleeves as designated by footnote #B2) spaced 5.5 feet o.c. horizontally and 4 feet o.c. vertically, plywood (per footnote (g)(7) to the D–1 Table) should be used behind the shores. (See Figures 2 & 3 for typical installations.)

(4) Example 4: A trench is dug in previously disturbed Type B soil, with characteristics of a Type C soil, and will require sheeting. The trench is 18 feet deep and 12 feet wide. 8 foot horizontal spacing between cylinders is desired for working space. From Table D–1.3: Find horizontal wale with a section modulus of 14.0 spaced at 4 feet o.c. vertically and 3 inch diameter cylinder spaced at 9 feet maximum o.c. horizontally. 3×12 timber sheeting is required at close spacing vertically. (See Figure 4 for typical installation.)

(5) Example 5: A trench is dug in Type C soil, 9 feet deep and 4 feet wide. Horizontal cylinder spacing in excess of 6 feet is desired for working space. From Table D–1.4: Find horizontal wale with a section modulus of 7.0 and 2 inch diameter cylinders spaced at 6.5 feet o.c. horizontally. Or, find horizontal wale with a 14.0 section modulus and 3 inch diameter cylinder spaced at 10 feet o.c. horizontally. Both wales are spaced 4 feet o.c. vertically. 3×12 timber sheeting is required at close spacing vertically. (See Figure 4 for typical installation.)

(g) *Footnotes, and general notes, for Tables D–1.1, D–1.2, D–1.3, and D–1.4.*

(1) For applications other than those listed in the tables, refer to §1926.652(c)(2) for use of manufacturer's tabulated data. For trench depths in excess of 20 feet, refer to §1926.652(c)(2) and §1926.652(c)(3).

(2) 2 inch diameter cylinders, at this width, shall have structural steel tube (3.5×3.5×0.1875) oversleeves, or structural oversleeves of manufacturer's specification, extending the full, collapsed length.

(3) Hydraulic cylinders capacities. (i) 2 inch cylinders shall be a minimum 2-inch inside diameter with a safe working capacity of not less than 18,000 pounds axial compressive load at maximum extension. Maximum extension is to include full range of cylinder extensions as recommended by product manufacturer.

(ii) 3-inch cylinders shall be a minimum 3-inch inside diameter with a safe work capacity of not less than 30,000 pounds axial compressive load at maximum extension. Maximum extension is to include full range of cylinder extensions as recommended by product manufacturer.

(4) All spacing indicated is measured center to center.

(5) Vertical shoring rails shall have a minimum section modulus of 0.40 inch.

(6) When vertical shores are used, there must be a minimum of three shores spaced equally, horizontally, in a group.

(7) Plywood shall be 1.125 in. thick softwood or 0.75 inch. thick, 14 ply, arctic white birch (Finland form). Please note that plywood is not intended as a structural member, but only for prevention of local raveling (sloughing of the trench face) between shores.

(8) See appendix C for timber specifications.

(9) Wales are calculated for simple span conditions.

(10) See appendix D, item (d), for basis and limitations of the data.

ALUMINUM HYDRAULIC SHORING
TYPICAL INSTALLATIONS

FIGURE NO. 1
VERTICAL ALUMINUM HYDRAULIC SHORING (SPOT BRACING)

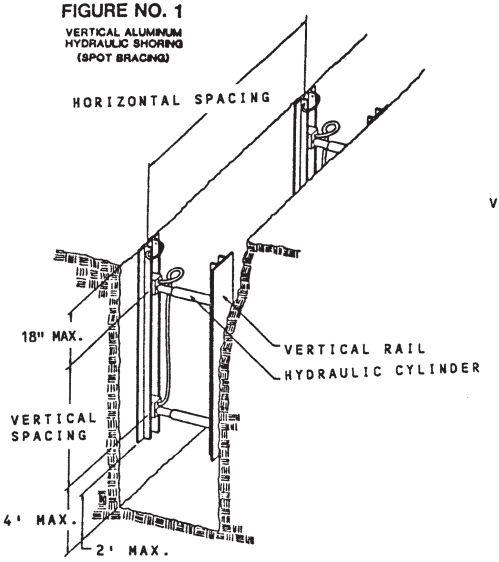


FIGURE NO. 2
VERTICAL ALUMINUM HYDRAULIC SHORING (WITH PLYWOOD)

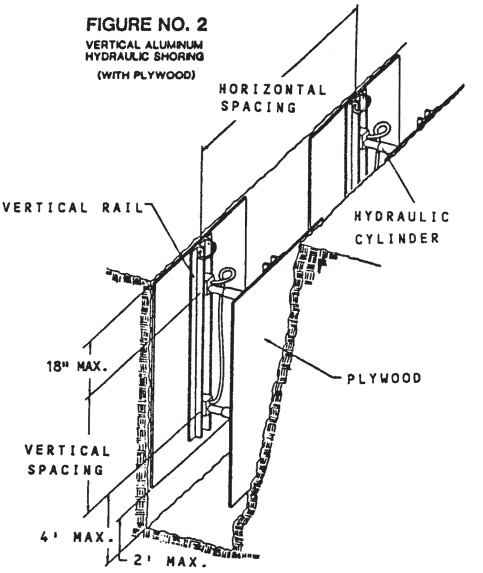


FIGURE NO. 3
VERTICAL ALUMINUM HYDRAULIC SHORING (STACKED)

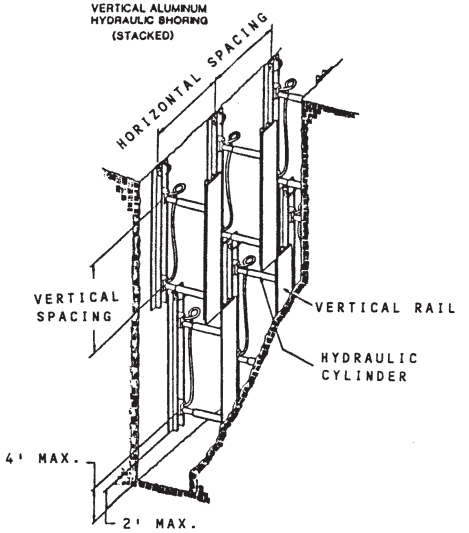


FIGURE NO. 4
ALUMINUM HYDRAULIC SHORING WALER SYSTEM (TYPICAL)

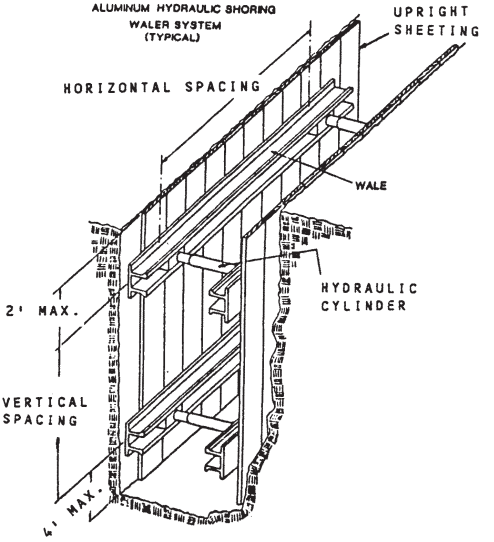


TABLE D - 1.1
ALUMINUM HYDRAULIC SHORING
VERTICAL SHORES
FOR SOIL TYPE A

DEPTH OF TRENCH (FEET)	HYDRAULIC CYLINDERS				
	MAXIMUM HORIZONTAL SPACING (FEET)	MAXIMUM VERTICAL SPACING (FEET)	WIDTH OF TRENCH (FEET)		
			UP TO 8	OVER 8 UP TO 12	OVER 12 UP TO 15
OVER 5 UP TO 10	8	4	2 INCH DIAMETER	2 INCH DIAMETER NOTE (**2**)	3 INCH DIAMETER
OVER 10 UP TO 15	8				
OVER 15 UP TO 20	7				
OVER 20	NOTE (**1**)				

Footnotes to tables, and general notes on hydraulic shoring, are found in Appendix D, Item (g)
Note (**1**): See Appendix D, Item (g) (1)
Note (**2**): See Appendix D, Item (g) (2)

TABLE D - 1.2
ALUMINUM HYDRAULIC SHORING
VERTICAL SHORES
FOR SOIL TYPE B

DEPTH OF TRENCH (FEET)	HYDRAULIC CYLINDERS				
	MAXIMUM HORIZONTAL SPACING (FEET)	MAXIMUM VERTICAL SPACING (FEET)	WIDTH OF TRENCH (FEET)		
			UP TO 8	OVER 8 UP TO 12	OVER 12 UP TO 15
OVER 5 UP TO 10	8	4	2 INCH DIAMETER	2 INCH DIAMETER NOTE (**2**)	3 INCH DIAMETER
OVER 10 UP TO 15	6.5				
OVER 15 UP TO 20	5.5				
OVER 20	NOTE (**1**)				

Footnotes to tables, and general notes on hydraulic shoring, are found in Appendix D, Item (g)
Note (**1**): See Appendix D, Item (g) (1)
Note (**2**): See Appendix D, Item (g) (2)

TABLE D - 1.3
ALUMINUM HYDRAULIC SHORING
WALER SYSTEMS
FOR SOIL TYPE B

DEPTH OF TRENCH (FEET)	WALES		HYDRAULIC CYLINDERS						TIMBER UPRIGHTS		
			WIDTH OF TRENCH (FEET)						MAX.HORIZ.SPACING (ON CENTER)		
	VERTICAL SPACING (FEET)	* SECTION MODULUS (IN^3)	UP TO 8		OVER 8 UP TO 12		OVER 12 UP TO15		SOLID SHEET	2 FT.	3 FT.
			HORIZ. SPACING	CYLINDER DIAMETER	HORIZ. SPACING	CYLINDER DIAMETER	HORIZ. SPACING	CYLINDER DIAMETER			
OVER 5 UP TO 10	4	3.5	8.0	2 IN	8.0	2 IN NOTE(2)	8.0	3 IN	——	——	3x12
		7.0	9.0	2 IN	9.0	2 IN NOTE(2)	9.0	3 IN			
		14.0	12.0	3 IN	12.0	3 IN	12.0	3 IN			
OVER 10 UP TO 15	4	3.5	6.0	2 IN	6.0	2 IN NOTE(2)	6.0	3 IN	——	3x12	——
		7.0	8.0	3 IN	8.0	3 IN	8.0	3 IN			
		14.0	10.0	3 IN	10.0	3 IN	10.0	3 IN			
OVER 15 UP TO 20	4	3.5	5.5	2 IN	5.5	2 IN NOTE(2)	5.5	3 IN	3x12	——	——
		7.0	6.0	3 IN	6.0	3 IN	6.0	3 IN			
		14.0	9.0	3 IN	9.0	3 IN	9.0	3 IN			
OVER 20	NOTE (1)										

Footnotes to tables, and general notes on hydraulic shoring, are found in Appendix D, Item (g)
Notes (**1**): See Appendix D, item (g) (1)
Notes (**2**): See Appendix D, Item (g) (2)
* Consult product manufacturer and/or qualified engineer for Section Modulus of available wales.

TABLE D - 1.4
ALUMINUM HYDRAULIC SHORING
WALER SYSTEMS
FOR SOIL TYPE C

DEPTH OF TRENCH (FEET)	WALES		HYDRAULIC CYLINDERS						TIMBER UPRIGHTS		
			WIDTH OF TRENCH (FEET)						MAX.HORIZ SPACING (ON CENTER)		
	VERTICAL SPACING (FEET)	* SECTION MODULUS (IN^3)	UP TO 8		OVER 8 UP TO 12		OVER 12 UP TO 15		SOLID SHEET	2 FT.	3 FT.
			HORIZ. SPACING	CYLINDER DIAMETER	HORIZ. SPACING	CYLINDER DIAMETER	HORIZ. SPACING	CYLINDER DIAMETER			
OVER 5 UP TO 10	4	3.5	6.0	2 IN	6.0	2 IN NOTE(2)	6.0	3 IN	3x12	—	—
		7.0	6.5	2 IN	6.5	2 IN NOTE(2)	6.5	3 IN			
		14.0	10.0	3 IN	10.0	3 IN	10.0	3 IN			
OVER 10 UP TO 15	4	3.5	4.0	2 IN	4.0	2 IN NOTE(2)	4.0	3 IN	3x12	—	—
		7.0	5.5	3 IN	5.5	3 IN	5.5	3 IN			
		14.0	8.0	3 IN	8.0	3 IN	8.0	3 IN			
OVER 15 UP TO 20	4	3.5	3.5	2 IN	3.5	2 IN NOTE(2)	3.5	3 IN	3x12	—	—
		7.0	5.0	3 IN	5.0	3 IN	5.0	3 IN			
		14.0	6.0	3 IN	6.0	3 IN	6.0	3 IN			
OVER 20	NOTE (1)										

Footnotes to tables, and general notes on hydraulic shoring, are found in Appendix D, Item (g)
Notes (**1**): See Appendix D, item (g) (1)
Notes (**2**): See Appendix D, Item (g) (2)
* Consult product manufacturer and/or qualified engineer for Section Modulus of available wales.

Figure 1. Aluminum Hydraulic Shoring

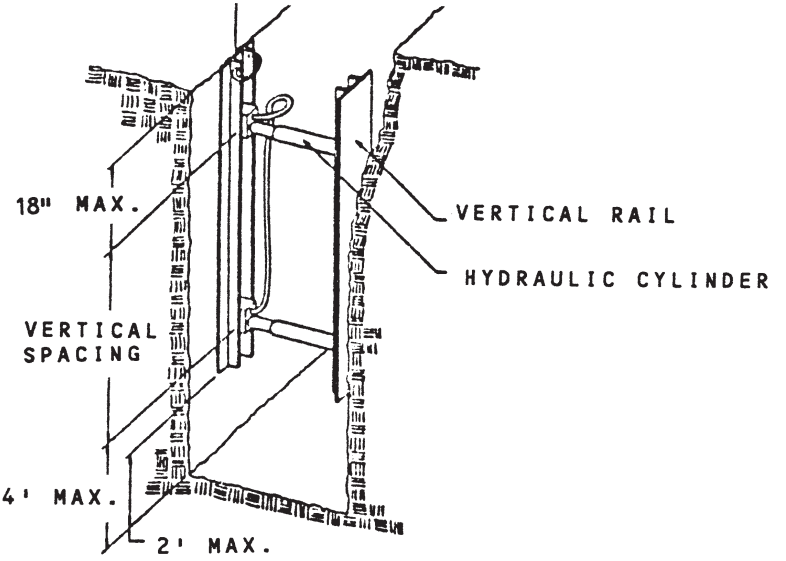


Figure 2. Pneumatic/hydraulic Shoring

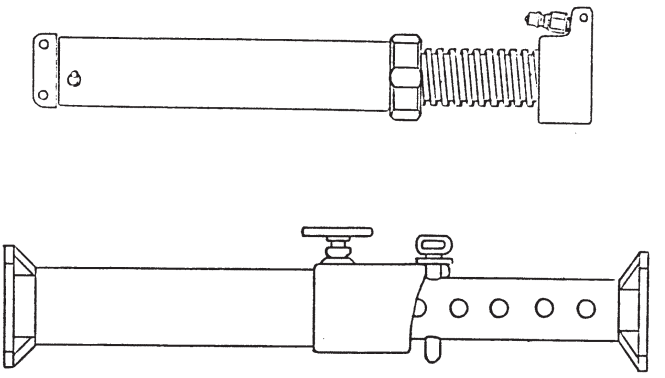


Figure 3. Trench Jacks (Screw Jacks)

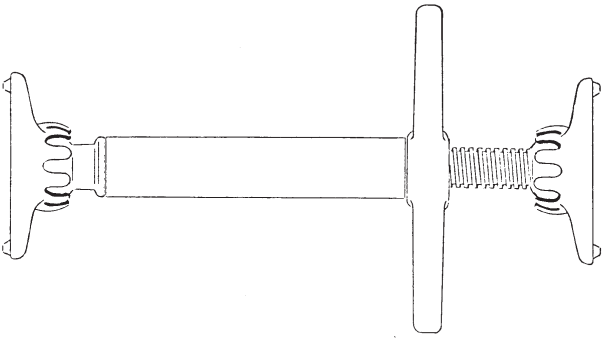
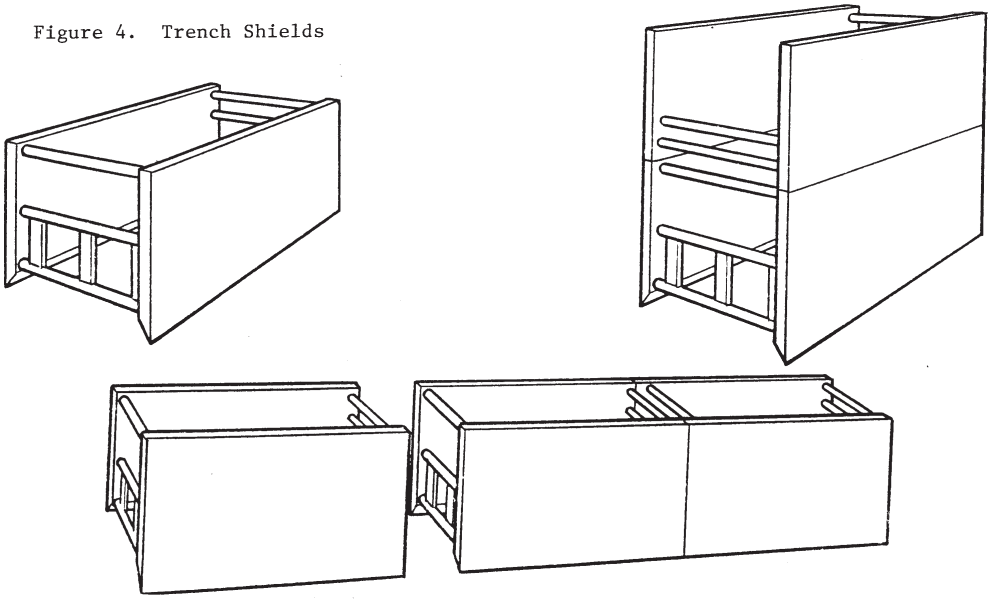


Figure 4. Trench Shields



APPENDIX F TO SUBPART P OF PART 1926—SELECTION OF PROTECTIVE SYSTEMS

The following figures are a graphic summary of the requirements contained in subpart P for excavations 20 feet or less in depth. Protective systems for use in excavations more than 20 feet in depth must be designed by a registered professional engineer in accordance with §1926.652 (b) and (c).

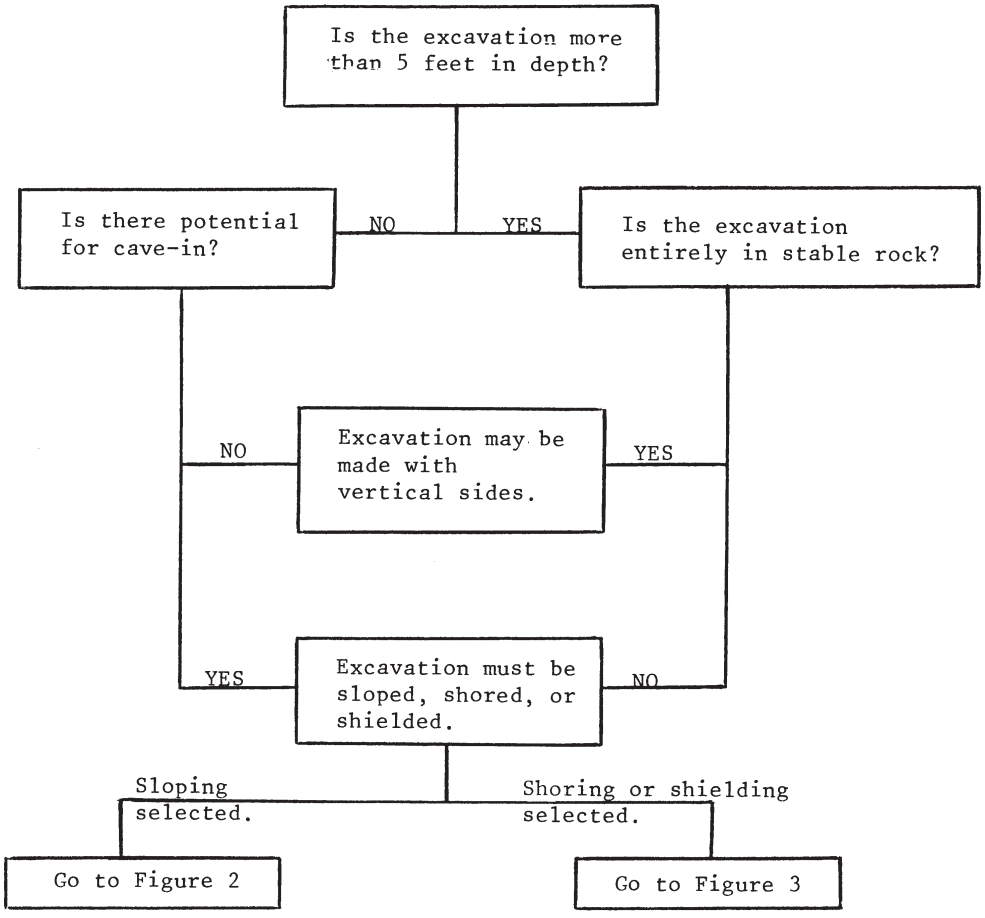


FIGURE 1 - PRELIMINARY DECISIONS

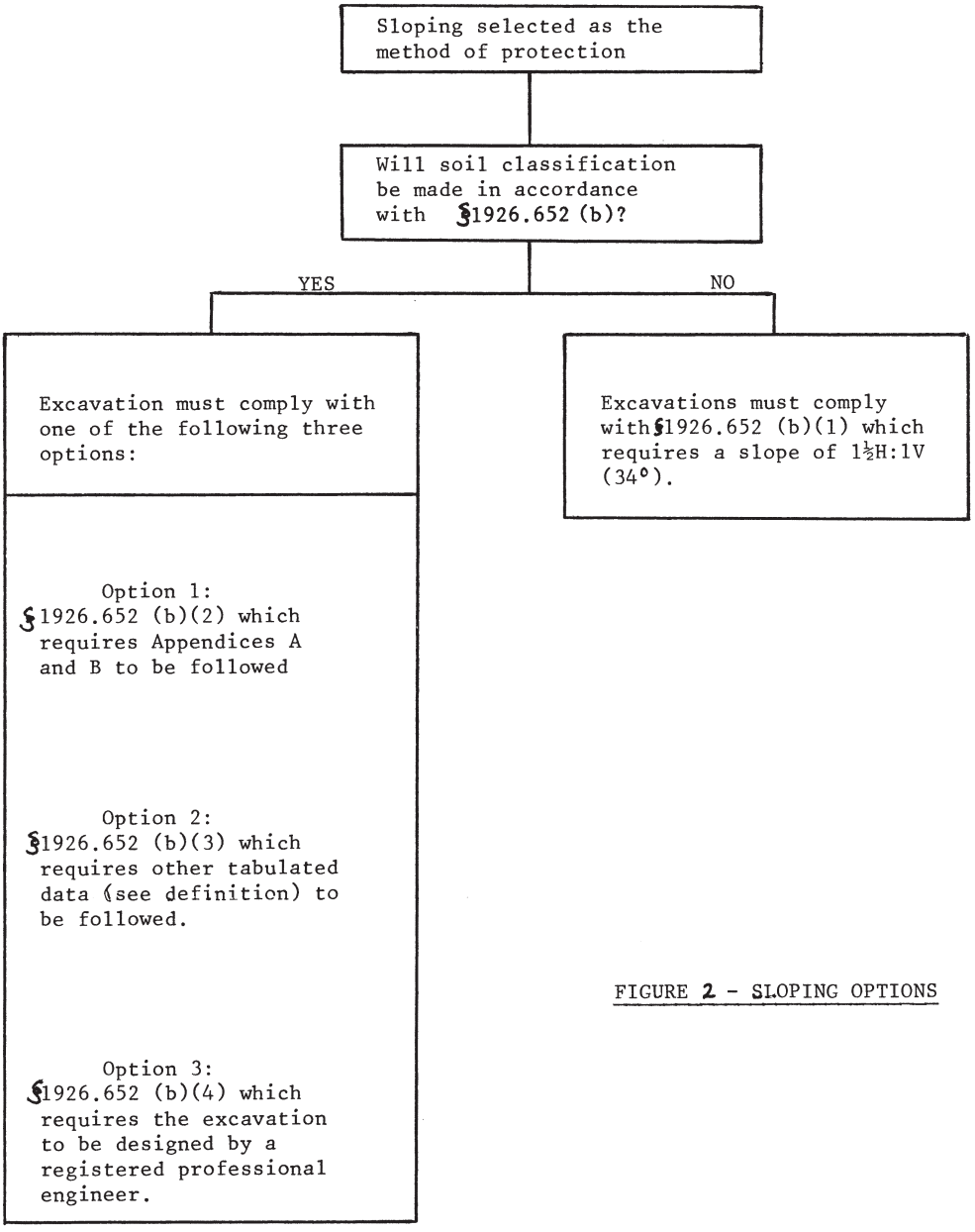


FIGURE 2 - SLOPING OPTIONS

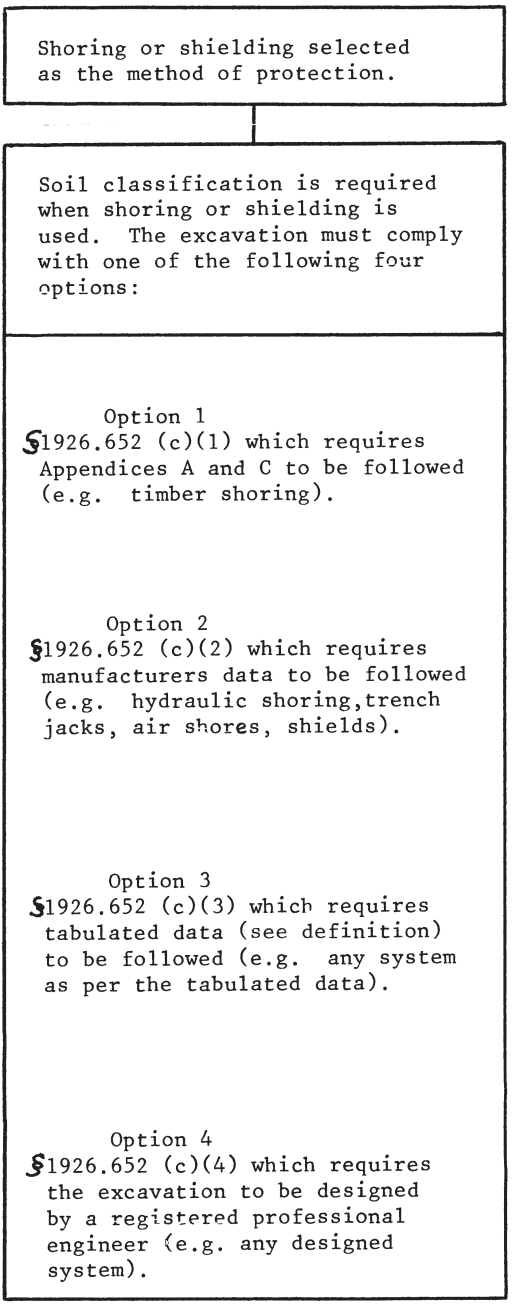


FIGURE 3 - SHORING AND SHIELDING OPTIONS

SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. Project Includes:

1.

B. Architect Identification: The Contract Documents, dated October 31, 2024, were prepared for this Project by TAGGART Architects, 600 Main Street, Suite 300, North Little Rock, Arkansas 72114.

1.3 CONTRACT

A. Project will be constructed under a general construction contract.

1.4 WORK SEQUENCE

A. Construction activities shall be sequenced so that no materials or equipment are exposed to environmental elements that may damage the material or equipment.

1. Installation of gypsum wallboard and suspended acoustical tile ceilings in an area shall not commence until building exterior wall and roof are complete.
2. Installation of wood or plastic laminate casework shall not commence until enclosure of the area is completed and HVAC systems are operational.

B. Refer to Section 092900 – GYPSUM BOARD, paragraph 2.2.C.4, for information regarding installation of interior gypsum board partitions before the building exterior envelope is complete.

1.5 WORK UNDER OTHER CONTRACTS

A. Cooperate fully with separate contractors (if any) so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract.

1.6 PRODUCTS ORDERED IN ADVANCE

A. General: Owner may have negotiated Purchase Orders with suppliers of material and equipment to be incorporated into the Work. Owner shall assign these Purchase Orders to the Contractor. Costs for receiving, handling, storage if required, and installation of material and equipment are to be included in the Contract Sum.

1. Contractor's responsibilities are the same as if Contractor had negotiated Purchase Orders, including responsibility to renegotiate purchase and to execute final Purchase-Order agreements.

1.7 OWNER-FURNISHED PRODUCTS

A. Owner will furnish office and room accessories, interior signage, and other equipment. The Work includes providing support systems to receive Owner's equipment and plumbing, mechanical, and electrical connections if necessary. See Section 114610 – OWNER FURNISHED AND INSTALLED ITEMS and Section 114620 – OWNER FURNISHED - CONTRACTOR INSTALLED ITEMS.

1. Owner will arrange for and deliver Shop Drawings, Product Data, and Samples to Contractor.
2. Owner will arrange and pay for delivery of Owner-furnished items according to Contractor's Construction Schedule.
3. After delivery, Owner or Owner’s Representative will inspect delivered items for damage. Contractor shall be present for and assist in Owner's inspection.
4. If Owner-furnished items are damaged, defective, or missing, Owner will arrange for replacement.
5. Owner will arrange for manufacturer's field services and for delivery of manufacturer's warranties to Contractor.
6. Owner will furnish Contractor the earliest possible delivery date for Owner-furnished products. Using Owner-furnished earliest possible delivery dates, Contractor shall designate delivery dates of Owner-furnished items in Contractor's Construction Schedule.
7. Contractor shall review Shop Drawings, Product Data, and Samples and return them to Architect noting discrepancies or anticipated problems in use of product.
8. Contractor is responsible for receiving, unloading, and handling Owner-furnished items at Project site.
9. Contractor is responsible for protecting Owner-furnished items from damage during storage and handling, including damage from exposure to the elements.
10. If Owner-furnished items are damaged because of Contractor's (or subcontractor's) operations, Contractor shall repair or replace them.

1.8 SPECIFICATION FORMATS AND CONVENTIONS

A. Specification Format: The Specifications are organized into Divisions and Sections using the 50 division format and six-digit numbering system from MasterFormat® 2014 of the Construction Specifications Institute (CSI).

1. Section Identification: The Specifications use section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete. Consult the Table of Contents at the beginning of the Project Manual to determine numbers and names of sections in the Contract Documents.

B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred, as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.
2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.

    a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

1.9 CONTRACT DOCUMENTS

A. The Drawings indicate the general arrangement and scope of the systems and shall be followed insofar as possible. If deviations from the layout are necessitated by field conditions, detailed layouts of the proposed departures shall be submitted in writing to the Architect for approval before proceeding with the Work.

B. The Drawings are not intended to show every vertical or horizontal offset that may be necessary to complete the system or clear obstructions and/or Work of other Contractors. Contractors shall anticipate during bidding that additional offsets may be required and include same in their proposals.

C. The Drawings, Schedules and Specifications shall be considered to be cooperative and anything appearing in the Specifications that may not be indicated on the Drawings, or vice-versa, shall be considered as part of the Contract and must be executed by the Contractor the same as though indicated by both.

D. Measurements: Contractor shall make all his/her own measurements in the field and shall be responsible for correct fitting. Contractor shall coordinate this Work with all other branches in such a manner as to cause a minimum of conflict or delay. Contractor shall coordinate his/her Work in advance with all other trades and report immediately any difficulty, which can be anticipated.

E. Adjustments to Work in the Field:

1. The Architect reserves the right to make minor adjustments (maximum of 10'-0") in location of switches, blocking, ductwork, conduit, drains, piping, outlets, and/or equipment at no additional charge if so directed prior to their installation, but the Contractor must give notice when installation will commence.
2. Where the Drawings show equipment, casework, or the like, Contractors shall lay out the Work to avoid conflicts.
3. Where offsets in piping, additional fittings, necessary drains, minor valves, traps and devices are required to complete the installation, to clear obstructions or the Work of other Contractors, or for the proper operation of the system, these shall

be deemed to be included in the Contract and shall be furnished and installed complete by the Contractor at no additional charge.

4. If sinks or other items are indicated on a plan it will be assumed that they will require all plumbing components to function properly and shall be furnished and installed complete by the Contractor at no additional charge.

F. Clearances: All installations shall be made to maintain maximum headroom and clearance around equipment. When space and/or headroom appear inadequate, Contractor shall notify Architect prior to proceeding with the installation. No claims for additional compensation will be approved for failure on the part of the Contractor or his Subcontractor to comply with this requirement.

G. Ownership: All Contract Documents, except the Contractor's executed set, are and remain the property of the Architect. Such Contract Documents shall not be used on other Work and those sets in usable condition shall be returned to the Architect, upon request, at the completion of or cessation of the Work or termination of the contract.

1.10 CONTRACTOR'S RESPONSIBILITIES:

A. Construction:

1. Labor and materials.
2. Tools, construction equipment and machinery.
3. Temporary facilities, services and protection necessary for proper execution and completion of the Work described in Section 015000 – TEMPORARY FACILITIES AND CONTROLS.

B. Taxes:

1. Pay legally required State and Federal Taxes.
2. Place exemption certificate number on invoices for materials incorporated in Work.
3. Upon completion of Work, file a notarized statement with the Owner that all purchases made under exemption certificate were entitled to be exempt.
4. Pay legally assessed penalties for improper use of exemption certificate number.

C. Compliance:

1. Comply with all Codes, Ordinances, Rules and Regulations, Orders, and other legal requirements of public authorities that bear on performance of Work.
2. Promptly submit written notice to Architect of observed variance of Contract Documents from legal requirements.

D. Discipline: Enforce strict discipline and good order among employees.

1. No smoking or tobacco use is allowed on this project.
2. No spitting on the floors, walls, or in concealed spaces is allowed.
3. Concealed spaces are not to be used for garbage and shall be remained clear of garbage and debris.

E. Safety: Job site safety and all current regulations pertaining thereto are the responsibility of all Contractors. Certain references to safety within the Contract Documents do not constitute specific instructions to the Contractor, but are included only to highlight certain aspects of the Project conditions. In no case shall instruction from the Owner or Architect make the Owner or Architect liable for safety violations.

1. Contractors employing non-English speaking persons shall provide a minimum of one person capable of speaking in both English and the employee's language during the entire time employee is on-site.

F. Documentation: Prior to Final Inspection, provide all test and proof of performance data in the proper format as required by the Contract Documents. Maintain current record (as-built) documents and provide proof of documentation before monthly payment approval.

G. Contractor's Warranty: Contractor warrants, by this acceptance of the Contract, that all Work furnished and installed will be free from any and all defects in workmanship and/or materials and that all apparatus will develop capacities and characteristics specified. That if, during a period of one year, or as otherwise specified, from date of certificate of completion and acceptance of Work, any such defects in workmanship, materials or performance appear, he will, without additional cost, remedy such defects within a reasonable time to be specified in notice from the Architect. In default thereof, Owner may have such Work done and charge cost to the Contractor.

H. Damaged Work:

1. Construction personnel shall exercise care and shall provide whatever protective measures are required to assure that their particular portions of the Work do not damage or alter portions of the Work that have been previously installed, either partially or completely.
2. All Work so damaged or altered shall be repaired or replaced to the satisfaction of the Architect by the party whose Work has been affected, and expense thereof shall be borne by the party who caused the damage or alteration.
3. Water infiltration and mold control:

    a. In the event of water or moisture infiltration, the Prime Contractor shall immediately take actions necessary to stop the infiltration at its source, remove the water or moisture and thoroughly dry any affected materials, in accordance with The Institute of Inspection, Cleaning and Restoration Certification (IICRC) S500, Standard and Reference Guide for Professional Water Damage Restoration. This action must be taken no later than 24 hours after the occurrence of the infiltration. All damaged material shall be replaced with new material unless otherwise agreed to by the Owner and Architect in writing.
    b. If water or moisture results in the development of mold or fungal growth on an exposed or unexposed material surface, the material shall be fully replaced with new material. Attempting to eliminate or contain the mold or fungal growth by applying products to the mold, covering over the mold, or otherwise "removing" the mold from the surface is not acceptable.

c. In the event of the occurrence of mold, the Prime Contractor shall employ the services of an Owner approved qualified environmental firm or industrial hygienist specializing in mold remediation and indoor air quality to determine the cause of the problem, recommend a program for remediation, confirm that the problem has been remediated and that the mold has been removed entirely.

4. Mold discovered on existing materials during construction: If mold or fungus growth is discovered on existing materials during construction activities, the Contractor shall:

   a. Notify the Owner and Architect immediately, and in writing, detailing the location, apparent extent and potential moisture source.
   b. Defer Work in the area of contamination until an abatement plan is formulated and implemented.
   c. Assist the Owner and Architect in creating and implementing a remediation plan. The plan shall conform to the New York City Guidelines on Assessment and Remediation of Fungi in Indoor Environments (available at http://www.ci.nyc.ny.us/html/doh/html/epi/moldrpt1.html).

I. Permits, Regulation, Licenses, and Inspections

1. Secure and pay all governmental taxes and fees and other costs for all permits and licenses as necessary for proper execution and completion of Work.
2. General Contractor shall obtain all Building Permits.
3. The Owner has filed the appropriate plan submission with the Department of Health. Contractors shall file all necessary Drawings, prepare all documents, and obtain all necessary approvals of all governmental departments and agencies having jurisdiction. Contractor shall obtain all required Certificates of Inspection for his Work and deliver same to the Architect before requesting for acceptance and final payment for the Work.
4. All Inspections by appropriate agencies shall be scheduled by the General Contractor.
5. All Work for the project must be performed in accordance with all Federal, State and Local Laws, Ordinances and Rules and Regulations relating to the Work. Where the Contract Documents exceed these requirements, the Contract Documents shall govern. In no case shall Work be installed contrary to or below the minimum legal standards.
6. All Federal, State and Local Laws, Ordinances, Rules, Regulations, Executive Orders, pertaining to the Work are hereby made a part of this specification, by reference, the same as if repeated herein in their entirety.
7. Contractor is responsible for scheduling all required inspections by State and Local health departments and all other Authorities Having Jurisdiction (AHJ)of this project.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 GENERAL PROVISIONS

A. Contractors shall read and be thoroughly familiar with all the material contained in the Project Manual and shall ensure that their Subcontractors are also thoroughly familiar with the same.

B. Contractors shall be aware, and shall make their Subcontractors aware, that the requirements in the sections of Division 1 pertain to all the Work and they are as binding on each section of these Specifications as if they were repeated in each section in their entirety.

3.2 INSTALLATION

A. Workmanship: All materials and equipment shall be installed and supported in a first-class workmanlike manner by mechanics skilled in their particular assigned task or trade. If workmanship is determined to be unsatisfactory, it shall be repaired or reinstalled correctly at no additional cost.

B. Reinstalling existing items: Where existing materials, equipment, fixtures, devices, and other items are indicated on the Contract Documents to be removed or received and reinstalled under the Contract, treat such existing items as if they were new and install them in accordance with the best accepted practices of the trades involved and with all provisions of the Contract Documents for similar new items.

C. Accessibility:

1. Locate all equipment that must be serviced, operated or maintained in fully accessible positions. Minor deviations from the Contract Drawings may be made to allow for better accessibility, but changes of magnitude or that involve extra cost shall not be made without prior approval. Contact Architect PRIOR to installing items where clearance is not sufficient as soon as possible.
2. Ample space shall be allowed for removal of all parts that may require replacement or service in the future.
3. Contractor shall extend all grease fittings to an accessible location.

3.3 TOILET FACILITIES

A. Construction personnel shall not use new building toilet facilities without approval of the Owner's designated representative. Use of new building toilet facilities is not allowed unless it has been specifically designated by the Owner for construction use. If a designated toilet facility is made available to construction personnel, it shall be kept clean at all times by Contractor’s personnel.

B. Contractor shall provide temporary toilet facilities for construction personnel as specified in Section 015000 – TEMPORARY FACILITIES AND CONTROLS.

3.4 COOPERATION AND COORDINATION

A. General Contractor's primary superintendent shall remain on the job full-time after commencement of the work and until all discrepancies in the Work have been corrected. Changing the superintendent is not allowed without two week prior notice to the Owner and the Architect and Owner's Approval.

B. The General Contractor shall assume full responsibility for scheduling and coordinating the Work of all Subcontractors.

C. The General Contractor shall make monthly reports to the Owner and Architect regarding the performance of each Subcontractor.

END OF SECTION 011000

SECTION 012100 - ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements governing allowances.

1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when direction will be provided to Contractor. If necessary, additional requirements will be issued by Change Order.
2. Refer to the Schedule of Allowances at the end of this Section.

B. Types of allowances include the following:

1. Lump-sum allowances.
2. Testing and inspecting allowances.

C. Related Requirements:

1. Section 012200 - UNIT PRICES for procedures for using unit prices.
2. Section 014000 - QUALITY REQUIREMENTS for procedures governing the use of allowances for testing and inspecting.

1.3 SELECTION AND PURCHASE

A. At the earliest practical date after award of the Contract, advise Architect of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.

B. At Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.

C. Purchase products and systems selected by Architect from the designated supplier.

1.4 ACTION SUBMITTALS

A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.

1.5 INFORMATIONAL SUBMITTALS

A. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.

B. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.

C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.6 COORDINATION

A. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.

1.7 LUMP-SUM ALLOWANCES

A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Architect under allowance and shall include taxes, freight, and delivery to Project site.

B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials selected by Architect under allowance shall be included as part of the allowance.

C. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.

1. If requested by Architect, retain and prepare unused material for storage by Owner. Deliver unused material to Owner's storage space as directed.

1.8 TESTING AND INSPECTING ALLOWANCES

A. Testing and inspecting allowances include the cost of engaging testing agencies, actual tests and inspections, and reporting results.

B. The allowance does not include incidental labor required to assist the testing agency or costs for retesting if previous tests and inspections result in failure. The cost for incidental labor to assist the testing agency shall be included in the Contract Sum.

C. Costs of services not required by the Contract Documents are not included in the allowance.

D. At Project closeout, credit unused amounts remaining in the testing and inspecting allowance to Owner by Change Order.

1.9 ADJUSTMENT OF ALLOWANCES

A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.

1. Include installation costs in purchase amount only where indicated as part of the allowance.
2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.
3. Submit substantiation of a change in scope of work, if any, claimed in Change Orders related to unit-cost allowances.
4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.

B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit.

1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.
2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

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

3.1 SCHEDULE OF ALLOWANCES

A. <u>ALLOWANCE NO. 1 – LANDSCAPING ALLOWANCE</u>

The contractor shall allow $25,000 (Twenty-Five Thousand Dollars) for New Courtyard Landscaping. Also included shall be the installation and repair of the existing irrigation system. The owner and Architect shall assist in the Landscape Design. The Landscape Contractor shall prepare and include Landscape and Irrigation Drawings to express the Design Intent and as required for permitting purposes.

Allowance shall include total cost of work including materials, labor, installation, taxes, insurance, permit fees, overhead and profit, and delivery.

Claims for extra costs associated with additional structural items will not be entertained until the entire allowance is first used.

At the project close-out, credit all unused amounts of the allowance to the Owner by Change Order Credit.

B. ALLOWANCE NO. 2 – TO ADD MISCELLANEOUS SCOPE OF WORK DUE TO UNKNOWN CONDITIONS

Contractor shall allow $25,000.00 (Twenty-Five Thousand Dollars) for the following:

1) Miscellaneous scope of work items determined by the architect and owner to be unknowns at the time of Bidding.

Allowance shall included total cost of work including materials, labor, installation, taxes, insurance, overhead and profit, and delivery.

Claims for extra costs associated with additional structural items will not be entertained until the entire allowance is first used.

At the project close-out, credit all unused amounts of the allowance to the Owner by Change Order Credit.

END OF SECTION 012100

SECTION 012200 - UNIT PRICES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for unit prices.

1.2 DEFINITIONS

A. Unit price is an amount proposed by bidders, stated on the Bid Form, as a price per unit of measurement for materials or services added to or deducted from the Contract Sum by appropriate modification, if estimated quantities of Work required by the Contract Documents are increased or decreased.

1.3 PROCEDURES

A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.

B. Measurement and Payment: Refer to individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.

C. 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.

D. List of Unit Prices: A list of unit prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

E. Definitions:

1. Bulk Rock: Any material encountered during rough grading or mass excavation operations that cannot be removed with a single-tooth ripper device attached to conventional earth-moving equipment such as a D-6 or D-7 bulldozer or similar equipment, and can only be removed by the use of equipment mounted pneumatic jackhammer devices. Bulk rock shall also include any existing concrete slabs, foundations, or large pieces of concrete debris discovered below grade; or any other material defined as bulk rock by the Owner’s Geo-Technical Engineer during on-site observations.
2. Trench Rock: Rocks or boulders larger than one (1) cubic yard, rock strata, or existing concrete foundations, footings, or large pieces of concrete debris encountered during trench excavation for structural foundations or underground utility lines that cannot be removed with conventional foundation excavation equipment and can only be removed by the use of equipment mounted or manually operated pneumatic jackhammer devices. Trench rock shall also be any other material defined as such by the Owner’s Geo-Technical Engineer during on-site observations. Rocks, boulders, or concrete debris smaller than one (1) cubic yard shall be classified as common excavation and shall be removed as a part of the Base Bid price.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 LIST OF UNIT PRICES

A. The Bidder agrees that the following unit prices shall govern additions or deductions to the Base Proposal during the course of the Work:

1. **Unit Price No. 1: Removal of Undesirable Soils - $ / Cubic Yard:**

The Contractor agrees to remove all undesirable soils in quantities beyond the scope of the Base Bid that are encountered during earthwork excavations at the site as determined and required by the Owner's Geo-Technical Engineer (See Allowances, Section 012100, Allowance No. 1 – Geo-Technical Inspection and Testing). The requirement to remove undesirable soils shall constitute an increase in the contract amount using the Unit Price No. 1 provided on the Bid Proposal Form. This amount shall include all costs for labor, equipment, materials, Contractor's overhead, profit, insurance, taxes, and all other related costs to remove these undesirable soils. Unit price shall also include costs of off-site disposal of removed soils. Owner's Geo-Technical Engineer shall verify all quantities of undesirable soils removed.

2. **Unit Price No. 2: Additional Structural Fill - $ / Cubic Yard:**

The Contractor agrees to replace all removed Undesirable Soils, Trench Rock, and Bulk Rock with compacted Structural Fill. The requirement to provide this additional Structural Fill material shall constitute an increase in the contract amount using the Unit Price No. 2 provided on the Bid Proposal Form. This amount shall include all costs for labor, equipment, materials, Contractor's overhead, profit, insurance, taxes, and all other related costs to replace all removed Undesirable Soils, Trench Rock, and Bulk Rock, described above, with compacted Structural Fill material as approved by the Owner's Geo-Technical Engineer. Refer to Geo-Technical Engineer's Soils and Foundation Investigations provided prior to Construction for approved fill materials.

3. **Unit Price No. 3: Removal of Trench Rock Mechanically - $ / Cubic Yard:**

Contractor agrees to excavate to the depths specified, indicated on the Drawings, and as required to perform the Work, regardless of the materials encountered during these excavations. Contractor shall refer to the Soils Investigations to be issued prior to Construction, for soil materials encountered during the Soils Investigations. The Contract Amount will not be Adjusted for Trench Rock Excavations to the depths specified, indicated on the Drawings, and as required to perform the Work. Should additional Trench Rock Excavation be required beyond that specified and indicated on the Drawings, the Contractor agrees to remove such additional Trench Rock encountered. Contractor shall obtain approval by the Architect and Owner's Geo-Technical Engineer prior to Excavating additional Trench Rock. The requirement to excavate this additional

Trench Rock shall constitute an increase in the contract amount using the Unit Price No. 3 provided on the Bid Proposal Form.

Trench Rock excavation shall be measured and paid for by the number of cubic yards of acceptably excavated rock material. The material shall be measured in place by the Owner's Geo-Technical Engineer prior to removal and shall include all authorized over depth rock excavation as determined by the Owner's Geo-Technical Engineer.

This Unit Price Amount shall include all costs for labor, equipment, materials, Contractor's overhead, profit, insurance, taxes, and all other related costs, including Off-Site Disposal, to mechanically excavate the Trench Rock encountered. Owner's Geo-Technical Engineer shall verify all quantities. Structural Fill replacing additional Trench Rock Excavation beyond that specified and indicated on the Drawings, shall be paid for separately using Unit Price No. 2.

4. **Unit Price No. 4: Removal of Bulk Rock Mechanically - $ / Cubic Yard:**

Contractor agrees to excavate to the depths specified, indicated on the Drawings, and as required to perform the Work, regardless of the materials encountered during these excavations. Contractor shall refer to the Soils Investigations to be issued prior to Construction, for soil materials encountered during the Soils Investigations. The Contract Amount will not be Adjusted for Bulk Rock Excavations to the depths specified, indicated on the Drawings, and as required to perform the Work. Should additional Bulk Rock Excavation be required beyond that specified and indicated on the Drawings, the Contractor agrees to remove such additional Bulk Rock encountered. Contractor shall obtain approval by the Architect and Owner's Geo-Technical Engineer prior to Excavating additional Bulk Rock . The requirement to Excavate this additional Bulk Rock shall constitute an increase in the contract amount using the Unit Price No. 4 provided on the Bid Proposal Form.

Bulk Rock excavation shall be measured and paid for by the number of cubic yards of acceptably excavated rock material. The material shall be measured in place by the Owner's Geo-Technical Engineer prior to removal and shall include all authorized over depth rock excavation as determined by the Owner's Geo-Technical Engineer.

This Unit Price Amount shall include all costs for labor, equipment, materials, Contractor's overhead, profit, insurance, taxes, and all other related costs, including Off-Site Disposal, to mechanically excavate the Bulk Rock encountered. Owner's Geo-Technical Engineer shall verify all quantities. Structural Fill replacing additional Bulk Rock Excavation beyond that specified and indicated on the Drawings, shall be paid for separately using Unit Price No. 2.

END OF SECTION 012200

SECTION 012300 - ALTERNATES

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 DEFINITIONS

A. Alternate: An amount proposed by General Contractor for certain work defined in the Construction Documents that may be added to the Base Bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. The cost for each alternate is the net addition to the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.3 PROCEDURES

A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.

1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.

C. Execute accepted alternates under the same conditions as other work of the Contract.

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

PART 2 – PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. ADDITIVE ALTERNATES:

1. **NO. A1 – ADD LVT-1 (LUXURY VINYL TILE) TO STAGE**: Furnish and install LVT-1 on the **STAGE G09** . Refer to Section 096519 – RESILIENT LUXURY VINYL TILE (LVT) FLOORING.

   ADD: $_____
   (This amount shall include all costs for labor, equipment, materials, Contractor's overhead, profit, insurance, taxes, and all other related costs associated with this alternate.)

END OF SECTION 012300

SECTION 012400 - PROJECT MEETINGS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section specifies requirements for Project meetings including:

1. Pre-Construction Conference.
2. Pre-Installation Conferences.
3. Progress Meetings.

1.2 CONFERENCES

A. Pre-construction Conference: Conduct a pre-construction conference after execution of the Agreement and prior to commencement of construction activities. Review responsibilities and personnel assignments.

1. Attendees: The Owner, Architect and their consultants, the Contractor and his/her superintendent, subcontractors, suppliers, manufacturers, and other concerned parties shall be represented by persons authorized to conclude matters relating to the Work.
2. Agenda: Discuss significant items that could affect progress, including the tentative construction schedule, critical sequencing, submittal of shop drawings, product data, samples, use of the premises, procedures for processing Change Orders, and equipment deliveries.

B. Pre-installation Conference: Conduct a pre-installation conference before each activity that requires coordination with other construction. The Installer and representatives of manufacturers and fabricators involved in the installation, and coordination or integration with other materials and installations that have preceded or will follow, shall attend. Advise the Architect of scheduled meeting dates.

1. Review progress of other activities and preparations for the activity under consideration at each conference, including time schedules, manufacturer's recommendations, weather limitations, substrate acceptability, compatibility problems and inspection and testing requirements.
2. Record significant discussions, agreements and disagreements of each conference, along with the approved schedule. Distribute the meeting record to everyone concerned, promptly, including the Owner and Architect.
3. Do not proceed if the conference cannot be successfully concluded. Initiate necessary actions to resolve impediments and reconvene the conference at the earliest feasible date.

C. Progress Meetings: Conduct progress meetings at weekly intervals. Notify the Owner and Architect of scheduled dates. Coordinate one of the meeting dates with preparation of the payment request. Owner and Architect will attend a minimum of one meeting in person per month. Other meetings may be schedules via teleconference. General Contractor to coordinate and conduct the Teleconference.

1. Attendees: The Owner and Architect, each subcontractor, supplier or other entity concerned with progress or involved in planning, coordination or performance of future activities shall be represented by persons familiar with the Project and authorized to conclude matters relating to progress.
2. Agenda: Review minutes of the previous progress meeting. Review significant items that could affect progress. Include topics appropriate to the current status of the Project.
3. Contractor's Construction Schedule: Review progress since the last meeting. Determine where each activity is in relation to the Contractor's Construction Schedule, whether on time or ahead or behind schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
4. Review the present and future needs of each entity present, including such items as:

    a. Time.
    b. Sequences.
    c. Deliveries.
    d. Off-site fabrication problems.
    e. Site utilization.
    f. Temporary facilities and services.
    g. Hazards and risks.
    h. Quality and Work standards.
    i. Change Orders.
    j. Documentation of information for payment requests.

A. Reporting: No later than 3 days after each meeting, distribute copies of minutes of the meeting to each party present and to parties who should have been present. Include a summary, in narrative form, of progress since the previous meeting.

PART 2 – PRODUCTS (not used)

PART 3 – EXECUTION (not used)

END OF SECTION 012400

SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

B. Related Requirements:

1. Section 016000 - PRODUCT REQUIREMENTS for requirements for submitting comparable product submittals for products by listed manufacturers.

1.2 DEFINITIONS

A. "Product" is defined to include Contractor obtained items for incorporation into the Work, regardless of whether specifically obtained for project or taken from Contractor's stock of previously purchased products. The term includes all materials that must be substantially cut, shaped, worked, mixed, finished, refined, or otherwise fabricated, processed, installed, or applied to any portion of the work. The term also includes all material, equipment or assemblies used to connect the Work to existing infrastructure or contiguous site conditions. The term "product" is also extended to include without negating their distinctive meaning, other terms used in Contract Documents such as "specialties," "systems," "structure," "finishes," "accessories," "furnishings," "special construction," and similar terms which are self-explanatory and/or which have recognized meanings in the construction industry.

B. "Option" is defined as an allowable choice among acceptable products. The factors involved in making such choices are further defined in Part 2 of this Section.

C. "Substitution" is defined as a product not identified on Drawings or in Specifications as acceptable and proposed by the Contractor, during bidding or a subsequent phase of the Work, to replace a specified product. Substitutions proposed by the Contractor and accepted by the Architect, after execution of Contract will be recorded in Bulletins and shall become part of the Work. The term "substitution" specifically excludes any changes to the Contract Documents made as a result of requests by the Owner or the Architect.

1. Substitution for Cause: Substitutions made as a result of conditions that are beyond Contractor's control, including but not limited to, situations where the specified product is no longer manufactured, is unsuitable for intended use, or is unavailable due to circumstances unforeseen by the Contractor, such as a labor strike, a natural disaster, or other event that delays production, thereby affecting the project schedule. Contractor's failure to obtain the specified product in a timely manner (such as Contractor-caused submittal delay, long-lead times not being taken into consideration, or similar items) is not a justifiable reason for requesting a Substitution for Cause.
2. Substitution for Convenience: Substitutions made as a result of conditions that benefit the Contractor, Owner, or both, such as lower cost in labor, material or both; quicker delivery times; or other benefits to the Owner, and meet conditions as described in paragraph 2.1.B. Unless shared savings is a part of the contact, any cost saving shall go to the Owner.

1.3 INTENT OF CONTRACT DOCUMENTS

A. Throughout the Contract Documents, products are referred to or identified by trade name or number, manufacturer's name or number, or in some like manner. When so identified, it is intended that the named product be provided. Any product other than the product identified will be classified as a substitution.

B. It is the further intent of the Contract Documents that all products be:

1. New;
2. The best of their respective kinds;
3. Furnished in ample quantities to facilitate proper and timely execution of the Work; and
4. Of one manufacturer for each specific purpose.

1.4 ACTION SUBMITTALS

A. Substitution Requests: **Substitution Requests shall not be submitted and will not be considered prior to the Bid Date. General Contractor selected will make all substitution requests once Construction is started.** Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request Form: Use Substitution Request form which is most familiar to the General Contractor and contains all required information.
2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
e. Samples, where applicable or requested.
f. Certificates and qualification data, where applicable or requested.
g. List of similar installations for completed projects with project names and addresses and names and addresses of Architects and Owners.
h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
i. Research reports evidencing compliance with building code in effect for Project, from ICC Evaluation Service (ICC-ES).

j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
k. Cost information, including a proposal of change, if any, in the Contract Sum.
l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

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

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied:

a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
b. Requested substitution will not adversely affect Contractor's construction schedule.
c. Requested substitution has received necessary approvals of Authorities Having Jurisdiction (AHJ).
d. Requested substitution is compatible with other portions of the Work.

e. Requested substitution has been coordinated with other portions of the Work.
f. Requested substitution provides specified warranty.
g. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Architect will consider requests for substitution if received within 60 calendar days after commencement of the Work or the issuance of the Notice to Proceed whichever occurs later.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied:

a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
b. Requested substitution does not require extensive revisions to the Contract Documents.
c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
d. Requested substitution will not adversely affect Contractor's construction schedule.
e. Requested substitution has received necessary approvals of Authorities Having Jurisdiction (AHJ).
f. Requested substitution is compatible with other portions of the Work.
g. Requested substitution has been coordinated with other portions of the Work.
h. Requested substitution provides specified warranty.
i. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications.

1.3 MINOR CHANGES IN THE WORK

A. Architect will issue supplemental instructions authorizing Minor Changes in the Work, not involving adjustment to the Contract Sum or the Contract Time.

1.4 WORK CHANGE PROPOSAL REQUESTS

A. Owner-Initiated Work Change Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Work Change Proposal Requests issued by Architect are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change. If work is underway that will be affected, notify the Architect Immediately.
2. Within 7 days (but as soon as possible) after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

a. Include a list of quantities of products required or eliminated and unit costs for labor, material, equipment and services, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
c. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

B. Contractor-Initiated Work Change Proposals: If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by submitting a request for a change to Architect.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs for labor, material, equipment and services, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
5. Comply with requirements in Section 016000 - PRODUCT REQUIREMENTS if the proposed change requires substitution of one product or system for product or system specified.

C. Work Changes Proposal Request Form: AIA® Document G709™ - 2001

1.5 ALLOWANCES

A. Allowance Adjustment: To adjust allowance amounts, base each Change Order proposal on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.

1. Include installation costs in purchase amount only where indicated as part of the allowance.
2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.
3. Submit substantiation of a change in scope of work, if any, claimed in Change Orders related to unit-cost allowances.
4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.

B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the Purchase Order amount or Contractor's handling, labor, installation, overhead, and profit. Submit claims within 14 days of receipt of the Change Order or Construction Change Directive authorizing work to proceed. Owner will reject claims submitted later than 14 days after such authorization.

1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.
2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

1.6 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA® Document G701.

1.7 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: AIA® Document G714™ - 2007.
   1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.

1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including the following:

a. Application for Payment forms with Continuation Sheets.
b. Submittals Schedule.

2. Submit the Schedule of Values to Architect at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
3. Subschedules: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values correlated with each phase of payment.

B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the Schedule of Values:

a. Project name and location.
b. Name of Architect.
c. Architect's project number.
d. Contractor's name and address.
e. Date of submittal.

2. Arrange the Schedule of Values in tabular form with separate rows and columns to indicate the following for each item listed:

a. Related Specification Section or Division. (column)
b. Description of the Work. (column)
c. Labor cost (row)

d. Material cost (row).
e. Change Orders (numbers) that affect value. (row)
f. Dollar value. (column)

1) Percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.

3. Provide a breakdown of the Contract Sum in accordance with the List of Items at the end of this section.
4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
5. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

a. Differentiate between items stored on-site and items stored off-site. Include evidence of insurance or bonded warehousing if required.

6. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
7. Allowances: Provide a separate line item in the Schedule of Values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
8. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.
b. General Conditions will be billed proportionately to the percentage of the work that is complete throughout the construction period. At no point are the General Conditions to be greater than 15% of percent of completion.
c. Project Close-out Documents (Record Drawings and Operations and Maintenance manuals) shall be listed as a separate pay item with value equal to lesser of 3% of the Contract Sum or $25,000.

9. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.4 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.

1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction Work covered by each Application for Payment is the period indicated in the Agreement.

C. Payment Application Forms: To be determined.

D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.

1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.
2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.

E. Transmittal: Submit 3 signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

F. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from every entity who is lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.

1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
2. When an application shows completion of an item, submit final or full waivers.
3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
4. Submit final Application for Payment with or preceded by final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
5. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to Owner.

G. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.
2. Schedule of Values.
3. Contractor's Construction Schedule (preliminary if not final).
4. Products list.
5. Schedule of unit prices.
6. Submittals Schedule (preliminary if not final).
7. List of Contractor's staff assignments.
8. List of Contractor's principal consultants.
9. Copies of building permits.

10. Copies of authorizations and licenses from Authorities Having Jurisdiction (AHJ) for performance of the Work.
11. Initial progress report.
12. Certificates of insurance and insurance policies.
13. Performance and payment bonds.
14. Data needed to acquire Owner's insurance.
15. Initial settlement survey and damage report if required.

H. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

I. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements including completion of incomplete work items and the punch list.
2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
3. Updated final statement, accounting for final changes to the Contract Sum.
4. AIA Document G706, "Contractor's Affidavit of Payments of Debits and Claims."
5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
6. AIA Document G707, "Consent of Surety to Final Payment."
7. Evidence that claims have been settled.
8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
9. Final, liquidated damages settlement statement, if applicable.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 LIST OF PAYMENT ITEMS

A. Payment Items include:

1. General Conditions
2. Insurance
3. Close-Out Documents
4. Performance Bond
5. Building Permits

END OF SECTION 012900

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. General coordination procedures.
2. Coordination drawings.
3. Requests for Information (RFIs).
4. Project Web site.
5. Project meetings.

B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.

C. Related Requirements:

1. Section 013200 - CONSTRUCTION PROGRESS DOCUMENTATION for preparing and submitting Contractor's construction schedule.
2. Section 017300 - EXECUTION for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
3. Section 017700 - PROJECT CLOSEOUT for coordinating closeout of the Contract.

1.3 DEFINITIONS

A. Request for Information (RFI): Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:

1. Name, address, and telephone number of entity performing subcontract or supplying products.
2. Number and title of related Specification Section(s) covered by subcontract.
3. Drawing number and detail references, as appropriate, covered by subcontract.

B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance

at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

1. Post copies of list in project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

1.5 GENERAL COORDINATION PROCEDURES

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

B. Coordination: Each contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its operations with operations, included in different Sections, that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components with other contractors to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

C. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

D. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's construction schedule.
2. Preparation of the schedule of values.
3. Installation and removal of temporary facilities and controls.

4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.

E. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

1.6 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.

1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:

a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
b. Coordinate the addition of trade-specific information to the coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
f. Indicate required installation sequences.
g. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

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

1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Mechanical and Plumbing Work: Show the following:

    a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
    b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
    c. Fire-rated enclosures around ductwork.

7. Electrical Work: Show the following:

    a. Runs of vertical and horizontal conduit 1-1/4 inches (32 mm) in diameter and larger.
    b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
    c. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
    d. Location of pull boxes and junction boxes, dimensioned from column center lines.

8. Fire-Protection System: Show the following:

    a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.

9. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make changes as directed and resubmit.

10. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 013300 - SUBMITTAL PROCEDURES.

1.7 REQUESTS FOR INFORMATION (RFIs)

A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

1. Project name.
2. Project number.
3. Date.
4. Name of Contractor.
5. Name of Architect.
6. RFI number, numbered sequentially.
7. RFI subject.
8. Specification Section number and title and related paragraphs, as appropriate.
9. Drawing number and detail references, as appropriate.
10. Field dimensions and conditions, as appropriate.
11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
12. Contractor's signature.
13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

C. RFI Forms: AIA Document G716 – 2004 – “Request for Information”.

1. Attachments shall be electronic files in Adobe Acrobat PDF format.

D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.

1. The following Contractor-generated RFIs will be returned without action:

a. Requests for approval of submittals.
b. Requests for approval of substitutions.
c. Requests for approval of Contractor's means and methods.

d. Requests for coordination information already indicated in the Contract Documents.
e. Requests for adjustments in the Contract Time or the Contract Sum.
f. Requests for interpretation of Architect's actions on submittals.
g. Incomplete RFIs or inaccurately prepared RFIs.

2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 - CONTRACT MODIFICATION PROCEDURES.

a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.

E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log monthly. Include the following:

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect.
4. RFI number including RFIs that were returned without action or withdrawn.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's response was received.

F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.

1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
2. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

1.8 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.

B. Preconstruction Conference: Schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.

1. Conduct the conference to review responsibilities and personnel assignments.
2. Attendees: Authorized representatives of Owner Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect progress, including the following:

    a. Tentative construction schedule.
    b. Phasing.
    c. Critical work sequencing and long-lead items.
    d. Designation of key personnel and their duties.
    e. Lines of communications.
    f. Procedures for processing field decisions and Change Orders.
    g. Procedures for RFIs.
    h. Procedures for testing and inspecting.
    i. Procedures for processing Applications for Payment.
    j. Distribution of the Contract Documents.
    k. Submittal procedures.
    l. Preparation of record documents.
    m. Use of the premises.
    n. Work restrictions.
    o. Working hours.
    p. Owner's occupancy requirements.
    q. Responsibility for temporary facilities and controls.
    r. Procedures for moisture and mold control.
    s. Procedures for disruptions and shutdowns.
    t. Construction waste management and recycling.
    u. Parking availability.
    v. Office, work, and storage areas.
    w. Equipment deliveries and priorities.
    x. First aid.
    y. Security.
    z. Progress cleaning.

4. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.

2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

    a. Contract Documents.
    b. Options.
    c. Related RFIs.
    d. Related Change Orders.
    e. Purchases.
    f. Deliveries.
    g. Submittals.
    h. Review of mockups.
    i. Possible conflicts.
    j. Compatibility requirements.
    k. Time schedules.
    l. Weather limitations.
    m. Manufacturer's written instructions.
    n. Warranty requirements.
    o. Compatibility of materials.
    p. Acceptability of substrates.
    q. Temporary facilities and controls.
    r. Space and access limitations.
    s. Regulations of Authorities Having Jurisdiction (AHJ).
    t. Testing and inspecting requirements.
    u. Installation procedures.
    v. Coordination with other work.
    w. Required performance results.
    x. Protection of adjacent work.
    y. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 30 days prior to the scheduled date of Substantial Completion.

1. Conduct the conference to review requirements and responsibilities related to Project closeout.
2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:

a. Preparation of record documents.
b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
c. Submittal of written warranties.
d. Requirements for preparing operations and maintenance data.
e. Requirements for delivery of material samples, attic stock, and spare parts.
f. Requirements for demonstration and training.
g. Preparation of Contractor's punch list.
h. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
i. Submittal procedures.
j. Coordination of separate contracts.
k. Owner's partial occupancy requirements.
l. Installation of Owner's furniture, fixtures, and equipment.
m. Responsibility for removing temporary facilities and controls.

4. Minutes: Entity conducting meeting will record and distribute meeting minutes.

E. Progress Meetings: Conduct progress meetings at monthly intervals.

1. Coordinate dates of meetings with preparation of payment requests.
2. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

1) Review schedule for next period.

b. Review present and future needs of each entity present, including the following:

1) Interface requirements.
2) Sequence of operations.
3) Resolution of BIM component conflicts.
4) Status of submittals.
5) Deliveries.

6) Off-site fabrication.
7) Access.
8) Site utilization.
9) Temporary facilities and controls.
10) Progress cleaning.
11) Quality and work standards.
12) Status of correction of deficient items.
13) Field observations.
14) Status of RFIs.
15) Status of proposal requests.
16) Pending changes.
17) Status of Change Orders.
18) Pending claims and disputes.
19) Documentation of information for payment requests.

4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.

a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

F. Coordination Meetings: Conduct Project coordination meetings at weekly regular intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.

1. Attendees: Each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meetings shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
b. Schedule Updating: Revise combined Contractor's construction schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.

c. Review present and future needs of each contractor present, including the following:

1) Interface requirements.
2) Sequence of operations.
3) Resolution of BIM component conflicts.
4) Status of submittals.
5) Deliveries.
6) Off-site fabrication.
7) Access.
8) Site utilization.
9) Temporary facilities and controls.
10) Work hours.
11) Hazards and risks.
12) Progress cleaning.
13) Quality and work standards.
14) Change Orders.

3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Contractor's Construction Schedule.
2. Submittals Schedule.
3. Daily construction reports.
4. Field condition reports.

B. See Section 012900 - PAYMENT PROCEDURES for submitting the Schedule of Values.

1.2 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

1. Critical activities are activities on the critical path. They must start and finish on the planned early start and finish times.
2. Predecessor Activity: An activity that precedes another activity in the network.
3. Successor Activity: An activity that follows another activity in the network.

B. Cost Loading: The allocation of the schedule of values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum unless otherwise approved by Architect.

C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

E. Float: The measure of leeway in starting and completing an activity.

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

F. Fragnet: A partial or fragmentary network that breaks down activities into smaller activities for greater detail.

G. Major Area: A story of construction, a separate building, or a similar significant construction element.

H. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

1.3 SUBMITTALS

A. Submittals Schedule: Submit three copies of schedule. Arrange the following information in a tabular format:

1. Scheduled date for first submittal.
2. Specification Section number and title.
3. Submittal category (action or informational).
4. Name of subcontractor.
5. Description of the Work covered.
6. Scheduled date for Architect's final release or approval.

B. Preliminary Network Diagram: Submit two opaque copies, large enough to show entire network for entire construction period. Show logic ties for activities.

C. Contractor's Construction Schedule: Submit two opaque copies of initial schedule, large enough to show entire schedule for entire construction period.

1. Submit an electronic copy of schedule, using software indicated, on CD-R, and labeled to comply with requirements for submittals. Include type of schedule (Initial or Updated) and date on label.

D. CPM Reports: Concurrent with CPM schedule, submit three copies of each of the following computer-generated reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.

1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
3. Total Float Report: List of all activities sorted in ascending order of total float.

E. Daily Construction Reports: Submit two copies at monthly intervals.

F. Field Condition Reports: Submit two copies at time of discovery of differing conditions.

1.4 COORDINATION

A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.

B. Coordinate Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittals Schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from parties involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 SUBMITTALS SCHEDULE

A. Preparation: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, resubmittal, ordering, manufacturing, fabrication, and delivery when establishing dates.

1. Coordinate Submittals Schedule with list of subcontracts, the Schedule of Values, and Contractor's Construction Schedule.
2. Submit concurrently with the first complete submittal of Contractor's Construction Schedule.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Substantial Completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

B. Activities: Treat each story or separate area as a separate numbered activity for each principal element of the Work. Comply with the following:

1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
3. Submittal Review Time: Include review and resubmittal times indicated in Section 013300 - SUBMITTAL PROCEDURES in schedule. Coordinate submittal review times in Contractor's Construction Schedule with Submittals Schedule.
4. Startup and Testing Time: Include not less than five (5) days for startup and testing.

5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
6. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.

C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.

1. Phasing: Arrange list of activities on schedule by phase.
2. Work under More Than One Contract: Include a separate activity for each contract.
3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
4. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Section 011000 - SUMMARY. Delivery dates indicated stipulate the earliest possible delivery date.
5. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Section 011000 - SUMMARY. Delivery dates indicated stipulate the earliest possible delivery date.
6. Work Restrictions: Show the effect of the following items on the schedule:

    a. Coordination with existing construction.
    b. Limitations of continued occupancies.
    c. Uninterruptible services.
    d. Partial occupancy before Substantial Completion.
    e. Use of premises restrictions.
    f. Provisions for future construction.
    g. Seasonal variations.
    h. Environmental control.

7. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:

    a. Subcontract awards.
    b. Submittals.
    c. Purchases.
    d. Mockups.
    e. Fabrication.
    f. Sample testing.
    g. Deliveries.
    h. Installation.
    i. Tests and inspections.
    j. Adjusting.
    k. Curing.
    l. Building flush-out.
    m. Startup and placement into final use and operation.

8. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:

    a. Structural completion.
    b. Temporary enclosure and space conditioning.
    c. Permanent space enclosure.
    d. Completion of mechanical installation.
    e. Completion of electrical installation.
    f. Substantial Completion.

D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion.

E. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using fragnets to demonstrate the effect of the proposed change on the overall project schedule.

F. Cost Correlation: Superimpose a cost correlation timeline, indicating planned and actual costs. On the line, show planned and actual dollar volume of the Work performed as of planned and actual dates used for preparation of payment requests.

1. See Section 012900 - PAYMENT PROCEDURES for cost reporting and payment procedures.

G. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:

1. Unresolved issues.
2. Unanswered Requests for Information.
3. Rejected or unreturned submittals.
4. Notations on returned submittals.
5. Pending modifications affecting the Work and Contract Time.

H. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.

2.3 STARTUP CONSTRUCTION SCHEDULE

A. Bar-Chart Schedule: Submit startup, horizontal, bar-chart-type construction schedule within seven days of date established for the Notice to Proceed.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction

activities for first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

2.4 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

A. General: Prepare network diagrams using AON (activity-on-node) format.

B. Preliminary Network Diagram: Submit diagram within 4 days of date established for the Notice to Proceed. Outline significant construction activities for the first 60 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

C. CPM Schedule: Prepare Contractor's Construction Schedule using a computerized, cost- and resource-loaded, time-scaled CPM network analysis diagram for the Work.

1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than 30 days after date established for the Notice to Proceed.

a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates, regardless of Architect's approval of the schedule.

2. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
3. Use "one workday" as the unit of time. Include list of nonworking days and holidays incorporated into the schedule.

D. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the preliminary network diagram, prepare a skeleton network to identify probable critical paths.

1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:

a. Preparation and processing of submittals.
b. Mobilization and demobilization.
c. Purchase of materials.
d. Delivery.
e. Fabrication.
f. Utility interruptions.
g. Installation.
h. Work by Owner that may affect or be affected by Contractor's activities.

2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.

3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.

    a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.

E. Initial Issue of Schedule: Prepare initial network diagram from a list of straight "early start-total float" sort. Identify critical activities. Prepare tabulated reports showing the following:

1. Contractor or subcontractor and the Work or activity.
2. Description of activity.
3. Principal events of activity.
4. Immediate preceding and succeeding activities.
5. Early and late start dates.
6. Early and late finish dates.
7. Activity duration in workdays.
8. Total float or slack time.
9. Average size of workforce.

F. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:

1. Identification of activities that have changed.
2. Changes in early and late start dates.
3. Changes in early and late finish dates.
4. Changes in activity durations in workdays.
5. Changes in the critical path.
6. Changes in total float or slack time.
7. Changes in the Contract Time.

2.5 REPORTS

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

1. List of subcontractors at Project site.
2. Equipment at Project site.
3. Material deliveries.
4. High and low temperatures and general weather conditions.
5. Accidents.
6. Stoppages, delays, shortages, and losses.
7. Meter readings and similar recordings.
8. Orders and requests of authorities having jurisdiction.
9. Services connected and disconnected.
10. Equipment or system tests and startups.

B. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit with a request for interpretation. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Scheduling Consultant: Engage a consultant to provide planning, evaluation, and reporting using CPM scheduling.

1. In-House Option: Owner may waive the requirement to retain a consultant if Contractor employs skilled personnel with experience in CPM scheduling and reporting techniques. Submit qualifications.
2. Meetings: Scheduling consultant shall attend all meetings related to Project progress, alleged delays, and time impact.

B. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
3. As the Work progresses, indicate final completion percentage for each activity.

C. Distribution: Distribute copies of approved schedule to Architect, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 013200

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other miscellaneous submittals.

1.2 DEFINITIONS

A. Action Submittals: Written and graphic information that requires Architect's responsive action.

B. Informational Submittals: Written information that does not require Architect's approval. Submittals may be rejected for not complying with requirements.

1.3 SUBMITTAL PROCEDURES

A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
b. Architect will reject all partial submittals.

B. Submittals Schedule: Comply with requirements in Section 013200 - CONSTRUCTION PROGRESS DOCUMENTATION for list of submittals and time requirements for scheduled performance of related construction activities.

C. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal.

1. Initial Review: Allow fifteen (15) days for initial review of each submittal. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
2. If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Allow fifteen (15) days for processing each resubmittal.
4. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing.

D. Identification: Place a permanent label or title block on each submittal for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Provide a space approximately 4 by 5 inches (100 by 125 mm) on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
3. Include the following information on label for processing and recording action taken:

    a. Project name.
    b. Date.
    c. Name and address of Architect.
    d. Name and address of Contractor.
    e. Name and address of subcontractor.
    f. Name and address of supplier.
    g. Name of manufacturer.
    h. Unique identifier, including revision number.
    i. Number and title of appropriate Specification Section.
    j. Drawing number and detail references, as appropriate.
    k. Other necessary identification.

E. Deviations: Highlight, encircle, or otherwise identify deviations from the Contract Documents on submittals.

F. Additional Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions of the Contract Documents, initial submittal may serve as final submittal.

1. Additional copies submitted for maintenance manuals will not be marked with action taken and will be returned.

G. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return submittals, without review, received from sources other than Contractor.

1. Include Contractor's certification stating that information submitted complies with requirements of the Contract Documents.

H. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, Authorities Having Jurisdiction (AHJ), and others as necessary for performance of construction activities. Show distribution on transmittal forms.

I. Use for Construction: Use only final submittals with mark indicating action taken by Architect in connection with construction.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

A. General: Prepare and submit Action Submittals required by individual Specification Sections.

1. Number of Copies: Submit three (3) copies of each submittal, unless otherwise indicated. Architect will return a minimum of one (1) copy. Mark up and retain one returned copy as a Project Record Document.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:

a. Manufacturer's written recommendations.
b. Manufacturer's product specifications.
c. Manufacturer's installation instructions.
d. Manufacturer's catalog cuts.
e. Wiring diagrams showing factory-installed wiring.
f. Printed performance curves.
g. Operational range diagrams.
h. Compliance with recognized trade association standards.
i. Compliance with recognized testing agency standards.

C. Shop Drawings: Prepare **Project-Specific** information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data. Clearly indicate all items to be considered for this Project where more than one item is available in the information submitted.

1. Preparation: Include the following information, as applicable:

a. Dimensions.
b. Identification of products.
c. Fabrication and installation drawings.
d. Roughing-in and setting diagrams.
e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
f. Shopwork manufacturing instructions.
g. Templates and patterns.
h. Schedules.
i. Notation of coordination requirements.
j. Notation of dimensions established by field measurement.

2. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.

3. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches (215 by 280 mm) but no larger than 30 by 40 inches (750 by 1000 mm).

D. Coordination Drawings: Comply with requirements in Section 013100 - PROJECT MANAGEMENT AND COORDINATION.

E. Samples: Prepare physical units of materials or products, including the following:

1. Comply with requirements in Section 014000 - "QUALITY REQUIREMENTS" for mockups.

2. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

   a. Submit one (1) full set of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected. **Electronic submittals of color selection is not allowed**.

3. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from the same material to be used for the Work, cured and finished in manner specified, and physically identical with the product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

   a. Submit three (3) sets of Samples. Architect will retain one (1) Sample sets; remainder will be returned, if requested.

4. Preparation: Mount, display, or package Samples in manner specified to facilitate review of qualities indicated. Prepare Samples to match Architect's sample where so indicated. **Attach label on unexposed side**.
5. Submit Samples for review of kind, color, pattern, and texture for a final check of these characteristics with other elements and for a comparison of these characteristics between final submittal and actual component as delivered and installed.
6. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

F. Product Schedule or List: Prepare a written summary indicating types of products required for the Work and their intended location.

G. Delegated-Design Submittal: Comply with requirements in Section 014000 - QUALITY REQUIREMENTS.

H. Submittals Schedule: Comply with requirements in Section 013200 - CONSTRUCTION PROGRESS DOCUMENTATION.

I. Application for Payment: Comply with requirements in Section 012900 - PAYMENT PROCEDURES.

J. Schedule of Values: Comply with requirements in Section 012900 - PAYMENT PROCEDURES.

K. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design.

2.2 INFORMATIONAL SUBMITTALS

A. General: Prepare and submit Informational Submittals required by other Specification Sections.

1. Number of Copies: Submit two (2) copies of each submittal, unless otherwise indicated. Architect will not return copies.
2. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
3. Test and Inspection Reports: Comply with requirements in Section 014000 - QUALITY REQUIREMENTS.

B. Contractor's Construction Schedule: Comply with requirements in Section 013200 - CONSTRUCTION PROGRESS DOCUMENTATION.

C. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of Architects and Owners, and other information specified.

D. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements.

E. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on American Welding Society (AWS) forms. Include names of firms and personnel certified.

F. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements and, where required, is authorized for this specific Project.

G. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements. Include evidence of manufacturing experience where required.

H. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements.

I. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements.

J. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

K. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements.

L. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

M. Research/Evaluation Reports: Prepare written evidence, from a model code organization acceptable to Authorities Having Jurisdiction (AHJ), that product complies with building code in effect for Project.

N. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements in Section 017700 – PROJECT CLOSEOUT.

O. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

P. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer.

Q. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections.

R. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Review each submittal and check for compliance with the Contract Documents. Submittal drawings (shop, erection or setting drawings) and schedules, required for work of various trades, shall be checked **before** submission by technically qualified employees of Contractor for accuracy, completeness and compliance with contract requirements. **These drawings and schedules shall be stamped and signed by Contractor certifying to such check and approval.**

B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

A. General: Architect will not review submittals that do not bear Contractor's approval stamp and that obviously have not been reviewed by the Contractor for accuracy, completeness and compliance with contract requirements. **Non-reviewed and non-stamped submittals will be returned without action.** Returned plans will have to be reviewed and corrected by the Contractor before resubmitting. No additional time will be considered if this requirement is not met.

B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:

1. APPROVED
2. APPROVED AS NOTED
3. REVISE AND RESUBMIT
4. NOT APPROVED

C. Informational Submittals: Architect will review each submittal and will not return it, or will reject and return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

D. Submittals not required by the Contract Documents will not be reviewed and may be discarded.

END OF SECTION 013300

`SECTION 013319 – FIELD TESTING REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes, but is not limited to, services performed by an independent testing laboratory. Laboratory services covered under this section are for testing materials used for field constructed elements of the work. Performance testing of manufactured items and shop fabricated materials shall be covered under their respective specification section.

B. All testing performed under this item shall be for the protection and benefit of the Owner and shall not be construed by the Contractor as a comprehensive quality control program intended to protect the Contractor, his subcontractors, or his suppliers. The testing frequency and types of testing shall be at the discretion of the Owner.

C. Inspections, tests, and related actions specified in this section and elsewhere in the contract documents are not intended to limit the Contractor's own quality control procedures and testing, which facilitate overall compliance with requirements of the contract documents. Requirements for the Contractor to provide quality control services as required by the Owner's Representative, the Owner, governing authorities, or other authorized entities are not limited by the provisions of this Section.

D. The Contractor is required to cooperate with the independent testing laboratories performing required inspections, test, and similar services and the Owner's Representative.

E. Materials and installed work may require testing or retesting at anytime during progress of work. Retesting of rejected materials or installed work shall be done at Contractor's expense.

F. Coordinate requirements of this section with requirements specified in other sections of Division 31 – EARTHWORK and Division 32 – EXTERIOR IMPROVEMENTS.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Supplementary Conditions and Division 1 Specifications sections, apply to work of this section.

B. The Contract Documents may include testing requirements furnished under other Sections. Work elements which may include other testing requirements are:

1. Water distribution systems.

1.3 SELECTION AND PAYMENT

A. The Owner will employ and pay for services of an independent testing laboratory to perform specified testing separate and apart from this contract. Payment for the samples or materials submitted shall be considered incidental to the related work bid item.

B. Employment of testing laboratory in no way relieves the Contractor of the obligation to perform work in accordance with requirements of the contract documents.

C. The testing laboratory and their personnel shall be under the direction of the Owner's Representative, regardless of who employs their services.

1.4 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. **ASTM C-31** - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
2. **ASTM C-39** - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
3. **ASTM C-40** - Test Method for Organic Impurities in Fine Aggregates for Concrete.
4. **ASTM C-42** - Standard Test Methods for Obtaining and Testing Drilled Cored and Sawed Beams of Concrete.
5. **ASTM C-88** - Standard Test Method for Soundness of Aggregate by use of Sodium Sulfate or Magnesium Sulfate.
6. **ASTM C-94** - Standard Specification for Ready-Mixed Concrete.
7. **ASTM C-117** - Standard Test Method for Materials Finer than 75-um (No. 200) Sieve in Mineral Aggregates by Washing.
8. **ASTM C-136** - Standard Method for Sieve Analysis of Fine and Course Aggregate.
9. **ASTM C-142** - Test Method for Clay Lumps and Friable Particles in Aggregate.
10. **ASTM C-143** - Standard Test Method for Slump of Hydraulic Cement Concrete.
11. **ASTM C-172** - Standard Practice for Sampling Freshly Mixed Concrete.
12. **ASTM C-173** - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
13. **ASTM C-231** - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
14. **ASTM C-535 -** Standard Test Method for Resistance to Degradation of Large-Size Corse Aggregate by Abrasion and Impact in the Los Angeles Machine.
15. **ASTM C-924** – Standard Practice for Testing Concrete Pipe Sewer Lines by Low-Pressure Air Test Method (Withdrawn 2013).
16. **ASTM C-1064** - Standard Test Method for Temperature of Freshly Mixed Portland Cement Concrete.
17. **ASTM C-1103** - Standard Practice for Joint Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines.
18. **ASTM D-698** - Standard Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5-lb. (2.49-kg) Rammer and 12-inc. (305-mm) Drop.
19. **ASTM D-2487** - Standard Test Method for Classification of Soils for engineer purposes.
20. **ASTM D-2940** - Standard Specification for Graded Aggregate Material for Bases or Subbases for Highways or Airports.
21. ASTM D-4253 - Standard Test Method for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.
22. **ASTM D-4254** - Standard Test Method for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.

B. Arkansas Department of Transportation (ARDOT):

1. All current regulations regarding asphalt and concrete pavement design, materials, and testing.

C. Uni-Bell PVC Pipe Association:

1. **UNI-B-6-98** - for Low Pressure Air Testing of Installed Sewer Pipe.

1.5 QUALITY ASSURANCE

A. Except as otherwise indicated, the testing laboratory engaged shall be prequalified by the Arkansas Department of Transportation (ARDOT) for the types of services specified herein.

B. The field personnel utilized to perform all field-testing and preparation shall be certified for those tests being performed.

1.6 RESPONSIBILITIES

A. Testing Laboratory Responsibilities:

1. Provide qualified personnel at the site. Cooperate with the Owner's Representative and Contractor in performance of services.
2. Perform specified sampling and testing of products in accordance with the specified standards.
3. Ascertain compliance of materials and mixes with requirements of the contract documents.
4. Immediately notify the Owner's Representative and Contractor of observed irregularities or nonconformance of work or products.
5. Perform additional tests required by the Owner's Representative.
6. Testing personnel are to report to the Owner's Representative upon arrival on site for instructions and requirements. Prior to leaving the site, furnish the Owner's Representative all test results whether in a formal or informal format.
7. Attend preconstruction meetings and progress meetings.

B. Contractor Responsibilities:

1. Provide access to materials proposed to be used which require testing.
2. Cooperate with laboratory personnel and provide access to the work.
3. Provide incidental labor and facilities:

a. To provide access to work to be tested.
b. To obtain and handle samples at the site or at the source of products to be tested.
c. To facilitate tests.
d. To provide storage and curing of test samples as required by the testing laboratory.

4. Notify the Owner's Representative 24 hours prior to expected time for operations requiring testing services for scheduling purposes. Materials will not be permitted to be placed without the proper testing being performed in conformance with this Section.
5. Provide, coordinate with Civil requirements specified in Division 31, 32, and Division 33. Bear the cost of the following tests:

    a. Sewer deflection testing as specified herein.
    b. Leakage testing of sewers and water mains as specified herein.
    c. Infiltration and/or exfiltration testing as specified herein.
    d. Low pressure air testing as specified herein.
    e. Hydrostatic testing – pressure pipe.
    f. Post construction internal pipe televising.

1.7 LIMITS OF LABORATORY AUTHORITY

A. The laboratory may not release, revoke, alter, or enlarge the requirements of the contract documents.

B. The laboratory may not approve or accept any portion of the work.

C. The laboratory may not assume any duties of the Contractor.

D. The laboratory has no authority to stop the work.

1.8 SCHEDULE OF TESTS

A. Testing anticipated on this project shall include, but is not limited to:

1. Earthwork

    a. Special backfill material sieve analysis per ASTM C-136, one test per source.
    b. On-site trench backfill analysis per ASTM D-2487, as directed by Owner's Representative.
    c. Pipe bedding and cover sieve analysis per ASTM C-136, one test per source.
    d. Soil compaction per ASTM D-698.

        1) Embankment testing shall be at least one (1) test/5,000 S.F. of each lift;
        2) Trench backfill testing shall be at least one (1) test/50 L.F. of each lift;
        3) Subgrade and/or subbase testing shall be at least one (1) test/200 L.F. of pavement or 5,000 S.F. of slabs subject to greater frequency due to soil conditions or Owner's Representative direction.

    e. Backfill compaction per ASTM D-4253 and D-4254, one test per 50 L.F. of each lift.

2. Concrete

a. Concrete aggregate deleterious substances per ASTM C-40, ASTM C-117, and ASTM C142, one test per source.
b. Concrete aggregate abrasion per ASTM C-535, one test per source.
c. Sodium sulfate soundness of coarse aggregate per ASTM C-88, one test per source.
d. Sampling Fresh Concrete: ASTM C-172, except modified for slump to comply with ASTM C 94.

1) When cylinders and/or beam samples are made, the slumps and air test shall be made using concrete from the same batch.
2) Slump: ASTM C-143; one test at point of discharge for each day's pour of each type of concrete; additional tests when concrete consistency seems to have changed.
3) Air Content: ASTM C-173, volumetric method of lightweight concrete; ASTM C-231 pressure method for normal weight concrete; at least one for each pour of each type of air-entrained concrete, and each time a set of compression test specimens is made.
4) Concrete Temperature: ASTM C-1064, test hourly when air temperature is 40º F. (4º C.) and below, and when 80º F. (27º C.) and above; and each time a set of compression test specimens is made.
5) Compression Test Specimen: ASTM C-31; one set of 4 standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field-cure test specimens are required.
6) Compressive Strength Tests: ASTM C-39; one set for each day's pour exceeding 5 cubic yards plus additional sets for each 50 cubic yards over and above the first 25 cubic yards of each concrete class placed in any one day; one specimen tested at 7 days, two specimens tested at 28 days, and one specimen retained in reserve for later testing if required. A strength test shall be the average of the strengths of two cylinders made from the same sample of concrete and tested at 28 days.

a) When frequency of testing will provide less than 5 strength tests for a given class of concrete, conduct testing from at least 5 randomly selected batches or from each batch if fewer than 5 are used.

b) Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength, and no individual strength test result falls below specified compressive strength by more than 500 psi.

7) Two (2) tests beams shall be made for each 250 square yards of concrete pavement and/or slabs on grade placed.

a) For traffic to be allowed on pavement or slab, the modulus of rupture shall meet minimum ARDOT requirements.

8) When cylinders and/or beam samples are made, the slumps and air test shall be made using concrete from the same batch.

e. Nondestructive Testing: Penetration resistance, sonoscope, or other nondestructive devices may be permitted but shall not be used as the sole basis for acceptance or rejection.

f. Additional Tests: The testing service will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by Owner's Representative. Testing service may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed.

1) Contractor shall pay for such tests conducted, and any other additional testing as may be required, when unacceptable concrete is verified.

3. Pavement

a. Aggregate base sieve analysis per ASTM D-2940, one test per source.

b. Sodium sulfate soundness of aggregate base per ASTM C-88, one test per source.

c. Percent of fractured pieces for aggregate base per ARDOT Requirements, one test per source.

4. Asphalt

a. Provide testing for mixture acceptance in accordance with Arkansas Department of Transportation (ARDOT) Procedures. The person performing the testing must meet current ARDOT certification for bituminous concrete testing.

5. Sewers

a. Deflection Testing

1) All thermoplastic gravity sanitary sewer pipe shall be tested for allowable deflection.

2) Deflection tests shall be performed before final acceptance and no sooner than thirty (30) days after installation of final backfill.

3) Maximum allowable pipe deflection shall be five (5) percent of the average inside diameter for the size and class of pipe specified.

4) Acceptance testing shall be performed with a non-adjustable “go, no-go” mandrel with a minimum of eight (8) contact points. Adjustable mandrels for acceptance testing shall be used only with permission of the Owner’s Representative.
5) The mandrel size shall be ninety-five (95) percent of the average inside diameter for the size and class of pipe specified.
6) If the "go, no-go" mandrel will not pass through a section of pipe a deflectometer or adjustable mandrel may be used to determine the extent and/or severity of the nonacceptable area. A “go, no-go” mandrel shall be re-run through the pipe section for final acceptance testing at no additional cost to the Owner.
7) The Contractor or subcontractor performing the test shall be experienced and qualified to perform deflection testing with the equipment and procedures utilized. The contractor shall provide all labor, materials, tools and equipment necessary to clean and test all sections of sewer pipe, locate deficient areas, repair, deficient areas, and retest all repaired areas.
8) All sewer runs shall be cleaned prior to testing.
9) The acceptance test shall be performed without mechanical pulling devices.
10) All pipe failing the deflection test shall be exposed, repaired or replaced and retested at no additional cost to the Owner.

b. Leakage Testing

1) Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
2) The Contractor shall perform sufficient tests to determine that the installation of all pipe materials have been as specified and that test results are in accordance with those required for approval of the installation.
3) The Contractor shall furnish all pressure gauges, suitable pump or pumps, pipes, test heads, and any other apparatus and materials used for these tests. These tests are to be considered as part of the work, and no additional compensation shall be made.
4) The tests shall be conducted under the direction of the Owner’s Representative or an appointed agent. Any testing done without direction and supervision as specified shall not be considered as a proper means of approval.
5) The Contractor may obtain water for testing as may be required by observing the rules and regulations enforced in the municipality in which the work is being done.
6) In addition to requirements of these specifications, comply with manufacturer's instructions and recommendations for work.

c. Infiltration and Exfiltration Testing

1) All sewers shall be tested using an exfiltration test or, where specifically allowed in writing by the Owner's Representative, an infiltration test.
2) All sewers shall be tested. No visible leakage in the sewers or manholes shall be permitted.
3) Bulkheads shall be used to isolate the test sections as required to perform the work. All service laterals, stubs and fittings shall be plugged or capped at the connection to the test section.
4) Each manhole run shall be tested separately.

d. Exfiltration Testing

1) The test shall be performed first with a minimum head of water of three (3) feet above the top of the high end of the sewer or two (2) feet above the high end of the highest lateral in the section or sections to be tested, or three (3) feet above the existing groundwater elevation, whichever is higher.
2) The exfiltration test shall be conducted between two manholes by sealing the downstream end of the test section and all inlet sewers at the upstream manhole with pipe stoppers.
3) The average internal pressure in the system shall not exceed 11.6 feet of water or 5 psi and the maximum internal pipe pressure at the lowest end shall not exceed 23 feet of water or 10 psi.
4) Water shall be added to the pipe section at a steady rate from the upstream manhole to allow air to escape from the sewer until the water is at the specified level above the crown of the pipe. The water may stand in the pipe and manhole up to seventy-two (72) hours prior to measurement of leakage to allow for absorption by the pipe and bleeding of air. After absorption into the pipe and manhole has stabilized, the water in the upstream manhole shall be brought to test level.
5) The leakage rate shall be determined by measurement of the drop in water elevation measured in the upstream manhole and the loss of water calculated. The test period shall be a minimum of sixty (60) minutes duration. Use the following table to determine loss of water as measured in the manhole:

		Volume of Leakage	
Water Level Change in Test Manhole		4 Ft. Dia. MH	5 Ft. Dia. MH
(Inches)	(Feet)	(Gals.)	(Gals.)
	0.01	0.98	1.53
	0.02	1.96	3.06
	0.03	2.94	4.59
	0.04	3.92	6.12
	0.05	4.90	7.65
	0.06	5.87	9.18

Water Level Change in Test Manhole		Volume of Leakage 4 Ft. Dia. MH	5 Ft. Dia. MH
(Inches)	(Feet)	(Gals.)	(Gals.)
	0.07	6.85	10.71
	0.08	7.83	12.24
	0.09	8.81	13.77
	0.10	9.79	15.30
	0.11	10.77	16.83
	0.12	11.75	18.36
	0.13	12.72	19.89
	0.14	13.71	21.42
	0.16	14.69	22.90
	0.17	15.67	24.48

e. Infiltration Testing

1) An infiltration test shall be conducted for all sections of sewer, only when the ground water level is two (2) feet or more above the elevation of the inside crown of pipe at the upstream limit of the section being tested.
2) The use of well point pumps or other dewatering devices shall have been discontinued for 24 hours prior to testing to permit the groundwater table to return to a static condition.
3) The leakage rate shall be measured by a weir, by determination of the time required to fill a container of known volume, or other measuring device approved by the Owner's Representative in the lower end of the sewer section to be tested.
4) The incoming sewer or sewers in the upper end of the test section shall be securely sealed.

f. Allowable Leakage

1) The maximum allowable leakage for either infiltration or exfiltration shall be 100 gallons per inch of internal pipe diameter per mile per day.
2) If actual leakage measured exceeds the limits specified, the Contractor must locate and repair or remove and replace the defective pipe sections to the satisfaction of the Owner's Representative and retest the section accordingly at no additional cost to the Owner.
3) All sanitary manholes shall be tested separately by using an exfiltration test (or infiltration test where groundwater conditions permit) to two (2) feet above the highest joint with no measurable leakage for a one hour test.

g. Low Pressure Air Testing

1) PVC sanitary sewers 54-inch diameter and less may be air tested as specified. If the groundwater level is two (2) feet or more above the top of the pipe at the upstream end or if the air pressure required for the test is greater than 5 psig, the air test method should not be used for RCP sanitary sewers.
2) Each manhole run shall be tested separately, unless otherwise approved by the Owner's Representative, as the construction progresses. Backfill shall be brought to final grade before testing. Testing shall be done prior to surface restoration, and preferably with not more than four (4) manhole runs constructed ahead of testing.
3) Test equipment consists of valves and pressure gages to control airflow and to monitor pressure within the test section.
4) The sewer shall be flushed and cleaned prior to testing to clean out any debris. The pipe surface should be wet for more consistent results.
5) The section of pipe to be tested shall be plugged at each end and the ends of laterals, stubs and fittings to be included in the test section shall be plugged and securely braced to prevent air leakage, and possible blowouts.
6) Equipment used shall meet the following minimum requirements and be approved by the Owner's Representative:

    a) Pneumatic plugs shall have a sealing length equal to or greater than the diameter of the pipe to be inspected.
    b) Pneumatic plugs shall resist internal test pressures without requiring external bracing or blocking.
    c) All air used shall pass through a single control panel.
    d) Three (3) individual hoses shall be used for the following connections:

        i. From control panel to pneumatic plugs for inflation.
        ii. From control panel to sealed line for introducing the low pressure air.
        iii. From sealed line to control panel for continually monitoring the air pressure rise in the sealed line.

7) All pneumatic plugs shall be seal tested before being used in the actual test installation. One length of pipe shall be laid on the ground and sealed at both ends with the pneumatic plugs to be used for the test. The sealed pipe shall be pressurized to 9 psig. The plugs must hold against this pressure without having to be braced. No persons shall be allowed in the alignment of the pipe during plug testing.

8) After a manhole to manhole run of pipe has been backfilled and cleaned, and the pneumatic plugs are checked by the above procedure, the plugs shall be placed in the line at each manhole. Low pressure air shall be slowly introduced into this sealed line until the internal air pressure reaches approximately 4 psig greater than the average groundwater back pressure, but not greater than 9 psig for PVC pipe or 5 psig for RCP.

9) In areas where groundwater is known to exist, the Contractor must determine the average groundwater back pressure. The Contractor shall install a 1/2-inch diameter capped pipe nipple, approximately 10 inches long, through the manhole wall on top of one of the sanitary sewer lines entering the manhole. This shall be done at the time the sanitary sewer line is installed or install an 8-inch diameter stand pipe outside of the manhole backfilled with a column of clean stone of 2-inch minimum diameter to subgrade. Immediately prior to the performance of the low pressure air test, the ground water back pressure shall be determined by removing the pipe cap, blowing air through the pipe nipple into the ground so as to clear it, and then connecting a clear plastic tube to the nipple. The plastic tube shall be vertical and a measurement of the height, in feet of water over the invert of the pipe shall be taken after the water has stopped rising in this plastic tube. This height, divided by 2.307, will equal the average groundwater back pressure.

10) At least two (2) minutes shall be allowed for the air to stabilize when the specified internal air pressure has been obtained. When the pressure has stabilized and is at or above 3.5 psig, the air hose from the control panel to the air supply shall be disconnected. The portion of the line being tested shall be termed "acceptable" if the time required in minutes for the pressure to decrease from 3.5 to 2.5 psig (greater than the average groundwater back pressure calculated).

11) If a one (1) psi drop in pressure does not occur within the test time, the line has passed. If the pressure drop is more than one (1) psi during the test time, the line is presumed to have failed the test. If the line fails the test, segmented testing may establish the location of any leaks.

12) The Contractor must repair the leak or remove and replace the defective pipe section and re-test the section to the satisfaction of the Owner's Representative at no additional cost to the Owner.

13) The pneumatic plugs must be installed in such a way as to prevent blowouts. Inasmuch as a force of 250 pounds is exerted on an 8-inch plug by an internal pipe pressure of 5 psi, it should be realized that sudden expulsion of a poorly installed plug or a plug, which is partially deflated before the pipe pressure is released, can be dangerous.

14) The Contractor shall internally restrain or externally brace the plugs to the manhole wall as an added safety precaution throughout the test.

15) Pressurizing equipment shall include a regulator or relief valve set at no higher than 9 psig for PVC pipe or 5 psig for RCP pipe to avoid over-pressurizing and damaging an otherwise acceptable line.
16) No one shall be allowed in the trench or manholes during testing.
17) Plugs shall not be removed until all pressure has been released.
18) All sanitary manholes shall be tested separately by using an exfiltration test (or infiltration test where groundwater conditions permit) to two (2) feet above the highest joint with no measurable leakage for a one hour test.
19) Testing concrete pipe sewer lines by the low pressure air test method will be per ASTM C924-02 and C1103.

h. Hydrostatic Testing – Pressure Pipe

1) The pipe to be tested must be sufficiently backfilled to prevent movement while under test pressure.
2) Joint restraint at fittings shall be permanent and constructed to withstand test pressure. If concrete thrust blocks are used, sufficient time must be allowed before testing to permit the concrete to cure. A cure time of seven (7) days is recommended when Type I Portland Cement is used; three (3) days is recommended when Type III high-early Portland Cement is used.
3) Test ends shall be restrained to withstand the appreciable thrusts that are developed under test pressure.
4) Air pressure testing of installed pressure pipe is expressly prohibited.
5) Any testing performed without the knowledge of the Owner's Representative shall not be considered a test for the purpose of this specification.
6) After the pipe is laid and before backfill is placed around the joints, such lengths of the force main as determined by the responsible agency shall be tested under a hydrostatic pressure of 1.25 times the working pressure at the highest point along the test section, but, in no case, shall such force mains be tested at less than 150 pounds per square inch.
7) Each section of pipeline shall be slowly filled with water and the specified test pressure, measured at the point of lowest elevation, shall be applied by means of a booster pump connected to the pipe in a manner satisfactory to the Owner's Representative. The duration of the test shall be for a minimum of sixty (60) minutes.
8) No pipe installation will be accepted unless the leakage rate for the section of pipe being tested does not exceed a rate as shown on hydrostatic test chart, during a 24hour test duration.
9) The Contractor shall furnish suitable means for determining the quantity of water lost by leakage during the test.

PART 2 – PRODUCTS – NOT USED

PART 3 – EXECUTION

3.1 SEQUENCING AND SCHEDULING

A. The Contractor shall coordinate the sequence of work activities so as to accommodate required testing and shall allow sufficient time for testing of materials by the laboratory so as to cause no delay in the work or the work of any other Contractor. In addition, the Contractor shall coordinate his work so as to avoid the necessity of removing and replacing work to accommodate inspections and tests.

3.2 LABORATORY TEST RESULTS

A. The testing laboratory shall submit a certified written report of each inspection, test, or similar service concurrently to the Owner, Owner's Representative, and Contractor.

B. Written reports of each inspection, test, or similar service shall include, but not be limited to, the following:

1. Name of testing laboratory.
2. Project name and construction contract reference number.
3. Dates and locations of samples and tests or inspections.
4. Date of report.
5. Names of individuals making the inspection or test.
6. Designation of the work and test method.
7. Test results.
8. Notation of significant ambient conditions at the time of sample taking and testing.

END OF SECTION 013319

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner or Authorities Having Jurisdiction (AHJ) are not limited by provisions of this Section.
4. Specific test and inspection requirements are not specified in this Section.

C. References

1. NIST – National Institute of Standards and Technology.
2. NRTL – Nationally Recognized Testing Laboratory.
3. NVLAP – National Voluntary Laboratory Accreditation Program.
4. CFR – Code of Federal Regulation:

a. 29CFR 1910.7 – Occupational Safety and Health Administration – “Definition and Requirements for a Nationally Recognized Testing Laboratory.”

1.3 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.

C. Product Testing: Tests and inspections that are performed by a Nationally Recognized Testing Laboratory (NRTL), a National Voluntary Laboratory Accreditation Program (NVLAP), or a testing agency qualified to conduct product testing and acceptable to Authorities Having Jurisdiction (AHJ), to establish product performance and compliance with specified requirements.

D. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.

E. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

F. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency, employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).

G. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of Authorities Having Jurisdiction (AHJ).

1.4 CONFLICTING REQUIREMENTS

A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.5 ACTION SUBMITTALS

A. Shop Drawings: For mockups, provide plans, sections, and elevations, indicating materials and size of mockup construction.

1. Indicate manufacturer and model number of individual components.
2. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

1.6 INFORMATIONAL SUBMITTALS

A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.

B. Qualification Data: For Contractor's quality-control personnel.

C. Contractor's Statement of Responsibility: When required by Authorities Having Jurisdiction (AHJ), submit copy of written statement of responsibility sent to Authorities Having Jurisdiction (AHJ) before starting work on the following systems:

1. Seismic-force-resisting system, designated seismic system, or component listed in the designated seismic system quality-assurance plan prepared by Architect.
2. Main wind-force-resisting system or a wind-resisting component listed in the wind-force-resisting system quality-assurance plan prepared by Architect.

D. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article 1.9 of this section, to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

E. Schedule of Tests and Inspections: Prepare in tabular form and include the following:

1. Specification Section number and title.
2. Entity responsible for performing tests and inspections.
3. Description of test and inspection.
4. Identification of applicable standards.
5. Identification of test and inspection methods.
6. Number of tests and inspections required.
7. Time schedule or time span for tests and inspections.
8. Requirements for obtaining samples.
9. Unique characteristics of each quality-control service.

1.7 CONTRACTOR'S QUALITY-CONTROL PLAN

A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice to Proceed, and not less than five days prior to preconstruction conference. Submit in format acceptable to Architect. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities. Coordinate with Contractor's construction schedule.

B. Quality-Control Personnel Qualifications: Engage qualified full-time personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.

1. Project quality-control manager may also serve as Project superintendent.

C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.

D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:

1. Contractor-performed tests and inspections including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections.
2. Special inspections required by Authorities Having Jurisdiction (AHJ) and indicated on the "Statement of Special Inspections."
3. Owner-performed tests and inspections indicated in the Contract Documents.

E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements and approved mockups.

F. Monitoring and Documentation: Maintain testing and inspection reports including log of approved and rejected results. Include work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of Authorities Having Jurisdiction (AHJ).

1.8 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:

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

B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of technical representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.

4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of factory-authorized service representative making report.
2. Statement that equipment complies with requirements.
3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
4. Statement whether conditions, products, and installation will affect warranty.
5. Other required items indicated in individual Specification Sections.

D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.9 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.

F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

1. Requirements of Authorities Having Jurisdiction (AHJ) shall supersede requirements for specialists.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329 – "Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection"; and with additional qualifications specified in individual Sections; and, where required by Authorities Having Jurisdiction (AHJ), that is acceptable to authorities.

1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:

1. Contractor responsibilities include the following:

   a. Provide test specimens representative of proposed products and construction.
   b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
   c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.

2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

1.10 QUALITY CONTROL

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

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
2. Payment for these services will be made from testing and inspecting allowances, as authorized by Change Orders.
3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.

1. Unless otherwise indicated, provide quality-control services specified and those required by Authorities Having Jurisdiction (AHJ). Perform quality-control services required of Contractor by Authorities Having Jurisdiction (AHJ), whether specified or not.
2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.

    a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.

3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
6. Submit additional copies of each written report directly to Authorities Having Jurisdiction (AHJ), when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 013300 - SUBMITTAL PROCEDURES.

D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

E. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

F. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform any duties of Contractor.

G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.

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

1.11 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Engage a qualified testing agency to conduct special tests and inspections required by Authorities Having Jurisdiction (AHJ) as the responsibility of Owner.

B. Special Tests and Inspections: Conducted by a qualified testing agency as required by Authorities Having Jurisdiction (AHJ), as indicated in individual Specification, and as follows:

1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviews the completeness and adequacy of those procedures to perform the Work.
2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to Authorities Having Jurisdiction (AHJ).
4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6. Retesting and reinspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 ACCEPTABLE TESTING AGENCIES

A. Provide name of Testing Agency for Architect and Owner approval.

3.2 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

3.3 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 017300 - EXECUTION.

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

B. Related Requirements:

1. Section 011000 - SUMMARY for work restrictions and limitations on utility interruptions.
2. Division 31 – EARTHWORK for disposal of ground water at Project site.
3. Division 32 - EXTERIOR IMPROVEMENTS for Asphalt Concrete Paving and Materials for construction and maintenance of asphalt pavement for temporary roads and paved areas, if required.
4. Division 32 – EXTERIOR IMPROVEMENTS for Portland Cement Concrete Paving for construction and maintenance of concrete pavement for temporary roads and paved areas, if required.

C. Abbreviations:

1. HEPA – High Efficiency Particulate Air (filter).
2. HVAC – Heating, Ventilation, and Air Conditioning.
3. MERV – Minimum Efficiency Reporting Value.
4. OD – Outer Diameter.

1.3 REFERENCE STANDARDS

A. American National Standards Institute (ANSI):

1. **ICC/ANSI A117.1** – Accessible and Usable Buildings and Facilities.

B. American Society for Testing and Materials (ASTM):

1. **ASTM E84** – Standard Test Method for Surface Burning Characteristics of Building Materials.
2. **ASTM E136** – Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C.

C. National Fire Protection Association (NFPA):

1. **NFPA 70E** – Standard for Electrical Safety in the Workplace.
2. **NFPA 241** – Standard for Safeguarding Construction, Alteration, and Demolition Operations.

3. **NFPA 701** – Standard Methods of Fire Tests for Flame Propagation of Textiles and Films.

D. National Electrical Contractors Association (NECA).

E. National Electrical Manufacturers Association (NEMA).

F. Underwriters Laboratories (UL).

G. Environmental Protection Agency (EPA).

1.4 USE CHARGES

A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, testing agencies, and Authorities Having Jurisdiction (AHJ).

B. Sewer Service: Pay sewer-service use charges for sewer usage by all entities for construction operations.

C. Water Service: Pay water-service use charges for water used by all entities for construction operations.

D. Electric Power Service: Pay electric-power-service use charges for electricity used by all entities for construction operations.

1.5 INFORMATIONAL SUBMITTALS

A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

B. Erosion and Sedimentation-Control Plan: Show compliance with requirements of EPA Construction General Permit or Authorities Having Jurisdiction (AHJ), whichever is more stringent.

C Fire-Safety Program: Show compliance with requirements of NFPA 241 and Authorities Having Jurisdiction (AHJ). Indicate Contractor personnel responsible for management of fire-prevention program.

D. Moisture-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage.

1. Describe delivery, handling, and storage provisions for materials subject to water absorption or water damage.
2. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.

3. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, stucco, polished concrete, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.

E. Dust and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Identify further options if proposed measures are later determined to be inadequate. Include the following:

1. Locations of dust-control partitions at each phase of work.
2. HVAC system isolation schematic drawing.
3. Location of proposed air-filtration system discharge.
4. Waste handling procedures.
5. Other dust-control measures.

1.6 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70E.

B. Tests and Inspections: Arrange for Authorities Having Jurisdiction (AHJ) to test and inspect each temporary utility before use. Obtain required certifications and permits.

C. Accessible Temporary Egress: Comply with applicable provisions in ICC/ANSI A117.1.

1.7 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Chain-Link Fencing: Minimum 2-inch (50-mm), 0.148-inch- (3.8-mm-) thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized-steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with 1-5/8-inch- (42-mm-) OD top rails, with galvanized barbed-wire top strand.

B. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil (0.25-mm) minimum thickness, with flame-spread rating of 15 or less per ASTM E 84 and passing NFPA 701 Test Method 2.

C. Dust-Control Adhesive-Surface Walk-off Mats: Provide mats minimum 36 by 60 inches (914 by 1624 mm).

D. Insulation: Un-faced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

2.2 TEMPORARY FACILITIES

A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect, and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:

1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
2. Conference room of sufficient size to accommodate meetings of ten (10) individuals. Provide electrical power service and 120-V ac duplex receptacles, with no fewer than one receptacle on each wall. Furnish room with conference table, chairs, and 4-foot- (1.2-m-) square tack and marker boards.
3. Drinking water and private toilet.
4. Coffee machine and supplies.
5. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F (20 to 22 deg C).
6. Lighting fixtures capable of maintaining average illumination of 20 fc (215 lx) at desk height.
7. One copy of all required Code Books and/or Manuals, including the International Building Code, Underwriters Laboratory, and any other Codes referenced on the Life Safety Plan Drawing Sheet under “Code Data” section.

C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

1. Store combustible materials apart from building.

2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to Authorities Having Jurisdiction (AHJ), and marked for intended location and application.

3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of Eight (8) at each return-air grille in system and remove at end of construction and clean HVAC system as required in Section 017700 – PROJECT CLOSEOUT.

C. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

1. Locate facilities to limit site disturbance as specified in Section 011000 - SUMMARY.

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.

1. Connect temporary sewers to private system indicated as directed by Authorities Having Jurisdiction (AHJ).

C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.

D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of Authorities Having Jurisdiction (AHJ) for type, number, location, operation, and maintenance of fixtures and facilities.

E. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

F. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.

G. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.

1. Install electric power service underground unless otherwise indicated.
2. Connect temporary service to Owner's existing power source, as directed by Owner.

H. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
2. Install lighting for Project identification sign, if required.

I. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install one (1) telephone line for each field office.

1. Provide additional telephone lines for the following:

    a. Provide a dedicated telephone line for each facsimile machine in each field office.

2. At each telephone, post a list of important telephone numbers.

    a. Police and fire departments.
    b. Ambulance service.
    c. Contractor's home office.
    d. Contractor's emergency after-hours telephone number.
    e. Architect's office.
    f. Engineers' offices.
    g. Owner's office.
    h. Principal subcontractors' field and home offices.

3. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

J. Electronic Communication Service: Provide a desktop computer in the primary field office adequate for use by Architect and Owner to access Project electronic documents and maintain electronic communications.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet (9 m) of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas within construction limits indicated on Drawings.

1. Provide dust-control treatment that is nonpolluting and non-tracking. Reapply treatment as required to minimize dust.

C. Temporary Use of Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.

1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
2. Prepare subgrade and install sub-base and base for temporary roads and paved areas according to Division 31 - EARTHWORK for earth moving.
3. Recondition base after temporary use, including removing contaminated material, re-grading, proof-rolling, compacting, and testing.
4. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course according to Division 32 – EXTERIOR IMPROVEMENTS for Asphalt Concrete Paving and Materials.

D. Traffic Controls: Comply with requirements of Authorities Having Jurisdiction (AHJ).

1. Protect existing site improvements to remain including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.

E. Vehicular Access and Parking: Conduct the Work so as to ensure the least possible obstruction to vehicular traffic and inconvenience to the general public and the residents in the vicinity of the Work and to ensure the protection of persons, property and natural resources. No existing road or street shall be closed to the public except with the permission of the Owner and local Authorities Having Jurisdiction (AHJ).

F. Dewatering Facilities and Drains: Comply with requirements of Authorities Having Jurisdiction (AHJ). Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
2. Remove snow and ice as required to minimize accumulations.

G. Waste Disposal Facilities: Comply with requirements specified in Section 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

H. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of Authorities Having Jurisdiction (AHJ). Comply with progress cleaning requirements in Section 017300 - EXECUTION.

I. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

1. Comply with work restrictions specified in Section 011000 - SUMMARY.

C. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to requirements of EPA Construction General Permit or Authorities Having Jurisdiction (AHJ), whichever is more stringent.

1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant- protection zones.
2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

D. Storm Water Control: Comply with requirements of Authorities Having Jurisdiction (AHJ). Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of storm water from heavy rains.

E. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

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

G. Site Enclosure Fence: Prior to commencing earthwork, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.

1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.

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

I. Barricades, Warning Signs, and Lights: Comply with requirements of Authorities Having Jurisdiction (AHJ) for erecting structurally adequate barricades, including warning signs and lighting.

J. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weather tight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.

3.5 MOISTURE AND MOLD CONTROL

A. Contractor's Moisture-Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.

B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:

1. Protect porous materials from water damage.
2. Protect stored and installed material from flowing or standing water.
3. Keep porous and organic materials from coming into prolonged contact with concrete.
4. Remove standing water from decks.
5. Keep deck openings covered or dammed.

C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:

1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
2. Keep interior spaces reasonably clean and protected from water damage.
3. Periodically collect and remove waste containing cellulose or other organic matter.
4. Discard or replace water-damaged material.
5. Do not install material that is wet.
6. Discard, replace, or clean stored or installed material that begins to grow mold.
7. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.

D. Additional Requirements:

1. Refer to Section 011000 – SUMMARY, paragraph 1.10.H for more specific requirements concerning water infiltration and mold control.
2. Refer to Section 092900 – GYPSUM BOARD, paragraph 2.2.B.4 for special interior gypsum board that shall be installed if exterior building envelope is not complete and interior of building is susceptible to water intrusion and potential damage to regular gypsum board partitions.

3.6 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Operate Project-identification-sign lighting daily from dusk until 12:00 midnight.

D. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

E. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.

2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by Authorities Having Jurisdiction (AHJ).
3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 – PROJECT CLOSEOUT

END OF SECTION 015000

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for selecting products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; product substitutions; and comparable products.

B. Related Requirements:

1. See Section 017700 – PROJECT CLOSEOUT for submitting warranties for contract closeout.
2. See Section 012500 – SUBSTITUTION PROCEDURES for specific requirements regarding substitutions.

C. See Divisions 2 through 28 Sections for specific requirements for warranties on products and installations specified to be warranted.

D. Where National Standard Publications are referenced, they refer to the latest published edition as of the date of bidding, unless stated otherwise.

1.2 DEFINITIONS

A. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation, shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
3. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that are equivalent or exceed those of specified product.

B. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

C. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers.

D. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.

E. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.

1.3 SUBMITTALS

A. Product List: Submit a list, in tabular from, showing specified products. Include generic names of products required. Include manufacturer's name and proprietary product names for each product.

1. Coordinate product list with Contractor's Construction Schedule and the Submittals Schedule.
2. Completed List: Within fourteen (14) days after date of commencement of the Work, submit three (3) copies of completed product list. Include a written explanation for omissions of data and for variations from Contract requirements.
3. Architect's Action: Architect will respond in writing to Contractor within seven (7) days of receipt of completed product list. Architect's response will include a list of unacceptable product selections and a brief explanation of reasons for this action. Architect's response, or lack of response, does not constitute a waiver of requirement that products comply with the Contract Documents.

B. Substitution Requests:

1. General:

a. Materials, products, and equipment described in the Contract Documents establish a standard of required function and a minimum desired quality or performance level, or other minimum dimensions and capacities, to be met by any proposed substitution. Acceptability of substitutions will not be considered during bidding period.
b. The burden of proof of equality rests with the General Contractor (Prime Bidder) and final decision with the Architect.
c. The Architect will make no decisions until after award of contract.
d. Any proposal for substitution shall be submitted within thirty (30) days after the award of the contract. Substitutions for materials or methods as specified may only be incorporated into the work after a written order from Architect has been obtained. The offering of a substitute shall be construed as including necessary modifications to design, required appurtenances, and all new building systems, for functioning of said substitution. In no case will an article other than as specified be considered if brought on site without previous authority.
e. Contractor may be involved to submit items similar to certain of those specified but of different monetary value. If Architect approves such substitution and amount to be added to or deducted from the Contract agreed upon, it then shall be treated as above.

f. Should a substitution be accepted and should the substitute material prove defective or otherwise unsatisfactory for the service intended, and within the warranty period, the Contractor shall replace this material or equipment with that originally specified, without cost to the Owner.

2. Procedures: Refer to Section 012500 – SUBSTITUTION PROCEDURES for details requirements regarding substitution requests..

C. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 013300 - SUBMITTAL PROCEDURES. Show compliance with requirements.

D. Proof of Compliance:

1. When Proofs of Compliance for materials and equipment are called for in the Specifications, or requested by the Architect, such proofs of Compliance shall be furnished by the Contractor in one or more of the following ways:

a. Certificates of Compliance shall be Notarized statements from the manufacture certifying that the materials conform to the respective type, class or grade of the reference standards named in the Specifications. In the case of stock-labeled products of standard manufacture which have a record of satisfactory performance in similar work over a period of not less than five (5) years, the Architect may, at his option, accept a Certificate of Compliance in lieu of other forms of proof named hereinafter.
b. Mill Certificates shall be the manufacturer's certified mill and laboratory certificates.
c. Testing Laboratory Certificates shall be certifications from a testing laboratory, bureau or agency, certifying that the materials or products or equipment have been tested within a period of acceptable to the Architect; they conform to the reference Standards named in the Specifications; and give the values of each test as called in the Specifications.
d. Report of Actual Laboratory Tests shall be the reported results of actual tests of a material, product or equipment made by a testing laboratory, bureau, or agency approved by the Architect. The report shall state the values obtained for each reference Standard name in the Specifications and shall be submitted to the Architect in such form as approved by him.

2. The cost of all testing of materials and equipment required to meet the requirements of this Article shall be paid for by the Contractor.
3. If any material, or product or equipment, fails to meet the requirements of the Contract Documents, any previous approvals will be withdrawn and such material, or product or equipment, shall be subject to removal and replacement by the Contractor with material, or product or equipment, meeting the Contract requirements; or, at the discretion of the Architect, the defective materials and equipment may be permitted to remain in-place subject to proper adjustment of the Contract Sum as determined by the Architect.

1.4 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
5. Store products to allow for inspection and measurement of quantity or counting of units.
6. Store materials in a manner that will not endanger Project structure.
7. Store products that are subject to damage by the elements, under cover in a weather-tight enclosure above ground, with ventilation adequate to prevent condensation.
8. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
9. Protect stored products from damage.

1.6 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Refer to Divisions 2 through 28 Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 017700 – PROJECT CLOSEOUT.

PART 2 - PRODUCTS

2.1 PRODUCT OPTIONS

A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, that are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Architect reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Where products are accompanied by the term "match sample," sample to be matched is Architect's.
6. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.

B. Product Selection Procedures: Procedures for product selection include the following:

1. Product: Where Specification paragraphs or subparagraphs titled "Product" name a single product and manufacturer, provide the product named.

a. Substitutions may be considered.

2. Manufacturer/Source: Where Specification paragraphs or subparagraphs titled "Manufacturer" or "Source" name single manufacturers or sources, provide a product by the manufacturer or from the source named that complies with requirements.

a. Substitutions may be considered.

3. Visual Selection Specification: Where Specifications include the phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product (and manufacturer) that complies with other specified requirements.

a. Standard Range: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, or texture from manufacturer's product line that does not include premium items.

2.2 PRODUCT SUBSTITUTIONS

A. Timing: Architect will consider requests for substitution if received within seven (7) days after the Notice to Proceed. Requests received after that time may be considered or rejected at discretion of Architect.

B. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

1. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
2. Requested substitution does not require extensive revisions to the Contract Documents.
3. Requested substitution is consistent with the Contract Documents and will produce indicated results.
4. Substitution request is fully documented and properly submitted.
5. Requested substitution will not adversely affect Contractor's Construction Schedule.
6. Requested substitution has received necessary approvals of Authorities Having Jurisdiction (AHJ).
7. Requested substitution is compatible with other portions of the Work.
8. Requested substitution has been coordinated with other portions of the Work.
9. Requested substitution provides specified warranty.

2.3 COMPARABLE PRODUCTS

A. Where products or manufacturers are specified by name, submit the following, in addition to other required submittals, to obtain approval of an unnamed product:

1. Evidence that the proposed product does not require extensive revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of Architects and Owners, if requested.
5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. Field engineering and surveying.
3. Installation of the Work.
4. Cutting and patching.
5. Coordination of Owner-installed products.
6. Progress cleaning.
7. Starting and adjusting.
8. Protection of installed construction.

B. Related Requirements:

1. Section 011000 – SUMMARY for limits on use of Project site.
2. Section 017700 – PROJECT CLOSEOUT for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

1.2 INFORMATIONAL SUBMITTALS

A. Certificates: Submit certificate signed by a professional engineer, licensed in the state where the Project is located, certifying that location and elevation of improvements comply with requirements.

B. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

C. Certified Surveys: Submit two copies signed by professional engineer, licensed in the state where the Project is located.

D. Final Property Survey: Submit 10 copies showing the Work performed and record survey data.

1.3 QUALITY ASSURANCE

A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural element during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety
4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
5. Refer to Section 017329 – CUTTING AND PATCHING for additional information.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

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

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, electrical systems, and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to local utility and Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with Authorities Having Jurisdiction (AHJ).

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a Request For Information (RFI) to Architect according to requirements in Section 013100 - PROJECT MANAGEMENT AND COORDINATION.

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.

B. General: Engage a professional engineer, licensed in the state where the Project is located, to lay out the Work using accepted surveying practices.

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
2. Establish limits on use of Project site.
3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.

4. Inform installers of lines and levels to which they must comply.
5. Check the location, level and plumb, of every major element as the Work progresses.
6. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
7. Close site surveys with an error of closure equal to or less than the standard established by Authorities Having Jurisdiction (AHJ).

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.

B. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with Authorities Having Jurisdiction (AHJ) for type and size of benchmark.

1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.

C. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.

3.5 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

C. Temporary Support: Provide temporary support of work to be cut.

D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

E. Adjacent Occupied Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.

G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.

5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.

I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in National Fire Protection Association (NFPA) 241 – "Standard for Safeguarding Construction, Alteration, and Demolition Operations" for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F (27 deg C).
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways.

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.8 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Manufacturer's Field Service: Comply with qualification requirements in Section 014000 - QUALITY REQUIREMENTS.

3.9 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 017300

SECTION 017329 - CUTTING AND PATCHING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes procedural requirements for cutting and patching.

B. See Divisions 2 through 33 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.

1.2 SUBMITTALS

A. Cutting and Patching Proposal: Submit a proposal describing procedures at least **10** days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:

1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
3. Products: List products to be used and firms or entities that will perform the Work.
4. Dates: Indicate when cutting and patching will be performed.
5. Utility Services and Mechanical/Electrical Systems: List services/systems that cutting and patching procedures will disturb or affect. List services/systems that will be relocated and those that will be temporarily out of service. Indicate how long services/systems will be disrupted.
6. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure.
7. Architect's Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

1.3 QUALITY ASSURANCE

A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.

B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.

C. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.

D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

1.4 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

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

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.

1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.
2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Temporary Support: Provide temporary support of Work to be cut.

B. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.

3.3 PERFORMANCE

A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.

D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

END OF SECTION 017329

SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for the following:

1. Recycling nonhazardous construction waste.
2. Disposing of nonhazardous construction waste.

B. While this Project will not pursue actual LEED (Leadership in Energy and Environmental Design) Certification, Owner's goal is to incorporate as many waste management procedures as possible during construction that will allow for maximum recycling of construction materials.

1.2 DEFINITIONS

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.

C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to Authorities Having Jurisdiction (AHJ).

D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.3 PERFORMANCE GOALS

A. General: Develop waste management plan that results in end-of-Project rates for salvage/recycling of 50 to 75 percent by weight of total waste generated by the Work.

B. Salvage/Recycle Goals: Owner's goal is to salvage and recycle as much nonhazardous construction waste as possible.

1.4 SUBMITTALS

A. Waste Management Plan: Submit 3 copies of plan within 30 days of date established for the Notice to Proceed.

B. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.

C. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.

D. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

E. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

1.5 QUALITY ASSURANCE

A. Waste Management Conference: Conduct conference at Project site.

1.6 WASTE MANAGEMENT PLAN

A. General: Develop plan consisting of waste identification and waste reduction work plan. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

B. Waste Identification: Indicate anticipated types and quantities of construction waste generated by the Work. Include estimated quantities and assumptions for estimates.

1. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
2. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
3. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

A. General: Implement waste management plan as approved by Architect and Owner. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

B. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.

1. Distribute waste management plan to everyone concerned within three days of submittal return.
2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

C. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
2. Comply with Section 015000 - TEMPORARY FACILITIES AND CONTROLS for controlling dust and dirt, environmental protection, and noise control.

3.2 RECYCLING CONSTRUCTION WASTE, GENERAL

A. General: Recycle paper and beverage containers used by on-site workers.

B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Owner.

C. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical.

1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.

    a. Inspect containers and bins for contamination and remove contaminated materials if found.

2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
3. Stockpile materials away from construction area.
4. Store components off the ground and protect from the weather.
5. Remove recyclable waste off Owner's property and transport to recycling receiver or processor.

3.3 RECYCLING CONSTRUCTION WASTE

A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
2. Polystyrene Packaging: Separate and bag materials.
3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.

4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

B. Wood Materials:

1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.

3.4 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to Authorities Having Jurisdiction (AHJ).

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

C. Disposal: Transport waste materials off Owner's property and legally dispose of them.

END OF SECTION 017419

SECTION 017700 - PROJECT CLOSEOUT

PART 1 - GENERAL

1.1 GENERAL

A. Substantial Completion: Before requesting inspection for certification of Substantial Completion, complete the following:

1. In the Application for Payment that coincides with the date Substantial Completion is claimed, show 100 percent completion for the portion of the Work claimed substantially complete.
2. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications and similar documents.
3. Submit record drawings, maintenance manuals, final project photographs, damage or settlement survey, property survey, and similar record information.
4. Change-over permanent locks and transmit keys to the Owner.
5. Complete start-up testing of systems, and instruction of the Owner's personnel. Remove temporary facilities from the site, along with construction tools, mock-ups, and similar elements.
6. Complete final clean up. Touch-up and repair and restore marred exposed finishes.

B. Inspection Procedures: On receipt of a request for inspection, the Architect will proceed or advise the Contractor of unfulfilled requirements. The Architect will prepare the Certificate of Substantial Completion following inspection, or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.

1. The Architect will repeat inspection when requested and when assured that the Work has been substantially completed.
2. Results of the completed inspection will form the basis of requirements for final acceptance.
3. Repeated inspections when the building is not ready will be billed back to the Contractor and subtracted from the final pay application.

C. Final Acceptance: Before requesting inspection for certification of final acceptance and final payment, complete the following:

1. Submit final payment request with releases.
2. Submit a final statement, accounting for changes to the Contract Sum.
3. Submit a copy of the final inspection list stating that each item has been completed or otherwise resolved for acceptance.
4. Submit consent of surety to final payment.
5. Submit evidence of continuing insurance coverage complying with insurance requirements.

D. Reinspection Procedure: The Architect will reinspect the Work upon receipt of notice that the Work has been completed, except items whose completion has been delayed because of circumstances acceptable to the Architect.

1. Upon completion of reinspection, the Architect will prepare a certificate of final acceptance, or advise the Contractor of work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.
2. If necessary, reinspection will be repeated. If Architect is called out for reinspection and building is not ready, Contractor will be billed for the visit. Funds will be deducted from final payment.

E. Record Document Submittals: Do not use Record Documents for construction purposes; protect from loss in a secure location; provide access to Record Documents for the Architect's reference.

F. Record Drawings: Maintain a clean, undamaged set of black line white-prints of Contract Drawings and Shop Drawings. Mark-up these drawings to show the actual installation. Mark whichever drawing is most capable of showing conditions accurately. Give particular attention to concealed elements that would be difficult to measure and record at a later date. Two copies of record drawings will be required at project close out.

1. Organize record drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates and other identification on the cover.

G. Record Specifications: Maintain one copy of the Project Manual, including addenda. Mark to show variations in actual Work performed in comparison with the Specifications and modifications. Give particular attention to substitutions, selection of options and similar information on elements that are concealed or cannot be readily discerned later by direct observation. Note related record drawing information and Product Data.

1. Upon completion of the Work, submit record Specifications to the Architect for the Owner's records.

H. Maintenance Manuals: Organize maintenance data into sets of manageable size. Bind in individual heavy-duty 2-inch, 3-ring vinyl-covered binders, with pocket folders for folded sheet information. Mark identification on front and spine of each binder. Include the following information:

1. Emergency instructions.
2. Spare parts list.
3. Copies of warranties.
4. Wiring diagrams.
5. Recommended "turn around" cycles.
6. Inspection procedures.
7. Shop Drawings and Product Data.
8. Fixture lamping schedule.

I. Operating and Maintenance Instructions: Arrange for the installer of equipment that requires regular maintenance to meet with the Owner's personnel to provide instruction in proper operation and maintenance. Include a detailed review of the following:

1. Maintenance manuals.
2. Spare parts and materials.
3. Tools.

4. Lubricants.
5. Control sequences.
6. Hazards.
7. Warranties and bonds.
8. Maintenance agreements and similar continuing commitments.

J. As part of instruction for operating equipment, demonstrate the following procedures:

1. Start-up and shutdown.
2. Emergency operations.
3. Noise and vibration adjustments.
4. Safety procedures.

K. Final Cleaning: Employ experienced workers for final cleaning. Clean each surface to the condition expected in a commercial building cleaning and maintenance program. Complete the following before requesting inspection for certification of Substantial Completion:

1. Remove labels that are not permanent labels.
2. Clean transparent materials. Remove glazing compound. Replace chipped or broken glass.
3. Clean exposed hard-surfaced finishes to a dust-free condition, free of stains, films and similar foreign substances. Restore reflective surfaces to their original reflective condition. Leave concrete floors broom clean. Vacuum carpeted surfaces.
4. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps.
5. Clean the site of rubbish, litter and other foreign substances. Remove stains, spills and other foreign deposits.

L. Removal of Protection: Remove temporary protection and facilities.

M. Compliance: Comply with regulations of Authorities Having Jurisdiction (AHJ) and safety standards for cleaning. Remove waste materials from the site and dispose of in a lawful manner.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION 017700

SECTION 018200 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:

1. Demonstration of operation of systems, subsystems, and equipment.
2. Training in operation and maintenance of systems, subsystems, and equipment.

B. Related Sections include the following:

1. Section 013100 - PROJECT MANAGEMENT AND COORDINATION for requirements for preinstruction conferences.

1.3 SUBMITTALS

A. Instruction Program: Submit two copies of outline of instructional program for demonstration and training, including a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.

1. At completion of training, submit one complete training manuals for Owner's use.
2. Provide Owner 2 DVD of training on operation of equipment.

B. Qualification Data: For firms and persons specified in "Quality Assurance" Article 1.4 below to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of Architects and Owners, and other information specified.

C. Attendance Record: For each training module, submit list of participants and length of instruction time.

D. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

E. Demonstration and Training DVD: Submit two copies at end of each training module.

1.4 QUALITY ASSURANCE

A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.

B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 014000 - QUALITY REQUIREMENTS, experienced in operation and maintenance procedures and training.

C. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Section 013100 - PROJECT MANAGEMENT AND COORDINATION. Review methods and procedures related to demonstration and training including, but not limited to, the following:

1. Inspect and discuss locations and other facilities required for instruction.
2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
3. Review required content of instruction.
4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

1.5 COORDINATION

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

B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections, and as follows:

1. Motorized doors, including automatic entrance doors.
2. Lighting equipment and controls.

B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following:

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:

    a. System, subsystem, and equipment descriptions.
    b. Performance and design criteria if Contractor is delegated design responsibility.
    c. Operating standards.
    d. Regulatory requirements.
    e. Equipment function.
    f. Operating characteristics.
    g. Limiting conditions.
    h. Performance curves.

2. Documentation: Review the following items in detail:

    a. Emergency manuals.
    b. Operations manuals.
    c. Maintenance manuals.
    d. Project Record Documents.
    e. Identification systems.
    f. Warranties and bonds.
    g. Maintenance service agreements and similar continuing commitments.

3. Emergencies: Include the following, as applicable:

    a. Instructions on meaning of warnings, trouble indications, and error messages.
    b. Instructions on stopping.
    c. Shutdown instructions for each type of emergency.
    d. Operating instructions for conditions outside of normal operating limits.
    e. Sequences for electric or electronic systems.
    f. Special operating instructions and procedures.

4. Operations: Include the following, as applicable:

    a. Equipment or system break-in procedures.
    b. Routine and normal operating instructions.
    c. Regulation and control procedures.
    d. Safety procedures.
    e. Instructions on stopping.
    f. Normal shutdown instructions.
    g. Operating procedures for emergencies.
    h. Special operating instructions and procedures.

5. Adjustments: Include the following:

    a. Alignments.
    b. Checking adjustments.
    c. Noise and vibration adjustments.

6. Troubleshooting: Include the following:

    a. Diagnostic instructions.
    b. Test and inspection procedures.

7. Maintenance: Include the following:

    a. Inspection procedures.
    b. Types of cleaning agents to be used and methods of cleaning.
    c. List of cleaning agents and methods of cleaning detrimental to product.
    d. Procedures for routine cleaning
    e. Procedures for preventive maintenance.
    f. Procedures for routine maintenance.
    g. Instruction on use of special tools – if any.

8. Repairs: Include the following:

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

PART 3 - EXECUTION

3.1 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a combined training manual.

B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.

B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

1. Architect will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.
2. Owner will furnish an instructor to describe Owner's operational philosophy.
3. Owner will furnish Contractor with names and positions of participants.

C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

1. Schedule training with Owner, through Contractor, with at least seven days' advance notice.

D. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a demonstration performance-based test.

E. Demonstration and Training Videotape: Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.

1. At beginning of each training module, record each chart containing learning objective and lesson outline.

F. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

END OF SECTION 018200

SECTION 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. In the event of conflict between these Specifications and Drawings, the Drawings shall govern.

1.2 SUMMARY

A. Section Includes:

1. Demolition and removal of selected structure.
2. Demolition and removal of selected site elements.

B. Related Requirements:

1. Section 011000 - SUMMARY for general information regarding the Project.
2. Section 017300 - EXECUTION for cutting and patching procedures.
3. Division 31 – EARTHWORK for site clearing and removal of above- and below-grade improvements not part of selective demolition.

C. Reference Standards:

1. American National Standards Institute (ANSI)/American Society of Safety Engineers (ASSE):

a. ANSI/ASSE A10.6 – Safety and Health Program Requirements for Demolition Operations.

2. National Fire Protection Association (NFPA):

a. NFPA 241 – Standard for Safeguarding Construction, Alteration, and Demolition Operations.

3. Code of Federal Regulation (CFR):

a. 40 CFR 82 – Protection of Stratospheric Ozone.

1.3 DEFINITIONS

A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.

B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and store.

C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.

D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.

E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

1.4 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

1.5 SUBMITTALS

A. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.

B. Schedule of Selective Demolition Activities: Indicate the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity.
2. Interruption of utility services. Indicate how long utility services will be interrupted.
3. Coordination for shutoff, capping, and continuation of utility services.

1.6 CLOSEOUT SUBMITTALS

A. Inventory: Submit a list of items that have been removed and salvaged.

B. As-Built Survey identifying location of removed and capped utilities.

1.7 FIELD CONDITIONS

A. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

B. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

C. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
3. Owner will provide material safety data sheets for suspected hazardous materials that are known to be present in buildings and structures to be selectively demolished because of building operations or processes performed there.

D. Storage or sale of removed items or materials on-site is not permitted.

E. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

1.8 COORDINATION

A. Arrange selective demolition schedule.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing Environmental Protection Agency (EPA) notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of Authorities Having Jurisdiction (AHJ).

B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.

C. Verify that hazardous materials, if found, have been remediated before proceeding with building demolition operations.

D. Survey of Existing Conditions: Record existing conditions by use of measured drawings, preconstruction photographs and/or video, and templates.

1. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.

2. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Arrange to shut off utilities with utility companies.
2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.

    a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
    b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
    c. Equipment to Be Removed: Disconnect and cap services and remove equipment.

3.3 PROTECTION

A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection to ensure safe passage of people around selective demolition area.
2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.

B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

1. Strengthen or add new supports when required during progress of selective demolition.

C. Remove temporary barricades and protections where hazards no longer exist.

3.5 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
5. Maintain fire watch during and for at least 2 hours after flame-cutting operations.
6. Maintain adequate ventilation when using cutting torches.
7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
8. Dispose of demolished items and materials promptly. Comply with requirements in Section 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

C. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

3.6 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least 3/4 inch at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.

B. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, and then remove concrete between saw cuts.

C. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.

D. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove.

3.7 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to Authorities Having Jurisdiction (AHJ).

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Comply with requirements specified in Section 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

B. Burning: Do not burn demolished materials.

3.8 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119

SECTION 031000 - CONCRETE FORMWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of Contract, including general and supplementary conditions and Division-1 Specification Sections, apply to work specified in this Section.

1.2 DESCRIPTION

A. Work Included:

1. Formwork for structural concrete.
2. Form ties and accessories; design; construction and removal of forms, including shoring, bracing, cribbing, centering and screeds.

1.3 RELATED WORK SPECIFIED ELSEWHERE:

A. Sections of Division 3, CONCRETE, as well as all other sections involving interface with concrete work.

1.4 QUALITY ASSURANCE

A. Comply with the following minimum standards of American Concrete Institute (ACI):

1. **ACI 347R-14** – Guide to Formwork for Concrete.
2. **ACI 318-14** – Building Code Requirements for Structural Concrete and Commentary.
3. **ACI 301-10** – Specifications for Structural Concrete.

1.5 SUBMITTALS

A. Shop Drawings: Show all control and construction joint locations.

1.6 JOB CONDITIONS

A. Design loads: Do not place, handle or store products, equipment or other materials on structure before concrete has reached its design strength, and in such a manner as to not exceed design loads. Any area damaged by construction operations must be repaired or replaced at no cost to the Owner.

PART 2 - PRODUCTS

2.1 FORM MATERIALS FOR STRUCTURAL CONCRETE

A. Lumber: Western wood products or southern forest products grading. Common or utility grades for non-exposed surfaces. Structural or construction grades for whalers, braces and supports.

B. Plywood: The Engineered Wood Association (APAP), exterior grades, PS-I, B-B PLYFORM.

2.2 FORM MATERIALS FOR ARCHITECTURAL CONCRETE

A. Chamfer Strips: Triangular fillet in cross section ¾" X ¾" measuring approximately 1-inch on beveled face. Milled from clear straight grain wood surfaced each side, or extruded vinyl type, securely fastened in place to prevent leakage.

2.3 ACCESSORIES

A. Furnish hairpin clips, bands, clamps, braces, adjustable shoring jacks fasteners, form ties, and other components necessary to execute installation of formwork. No aluminum devices or fasteners (including nails) will be permitted.

B. Form Ties: Non-corrosive, non-staining; minimum working strength as required by concrete sections being contained with full liquid concrete and construction loads; adjustable in length to permit complete tightening of forms and of such types as to leave no metal closer than 1-1/2-inch to the surface, spacing as required to maintain formwork and finish concrete within tolerances.

C. Form Release: non-staining liquid which will impart a waterproof film to prevent adhesion of concrete and will not stain, cause imperfections, or leave a paint-impeding coating on the face of the concrete. When finished surface is to be painted or to receive other surface treatment, the material applied to form surfaces shall be compatible with the type of paint or surface treatment to be used.

1. Form release for exposed concrete shall be nox-crete^{tm} as manufactured by Nox-Crete Products Group, Omaha, Nebraska; www.nox-crete.com, or approved equivalent.

PART 3 - EXECUTION

3.1 DESIGN

A. Formwork and its supports shall carry adequately all liquid concrete, workers and equipment, in absolute safety, under loads imposed during construciton.

B. Design and placement of forms: ACI 347, Chapter 2, and ACI 318, Chapter 6, Forms, embedded pipes and construction joints.

C. Tolerances for structural concrete: ACI-347, Chapter 3 -Construction, Section 3.3.1, Class B maximum, unless otherwise indicated.

3.2 CONSTRUCTION

A. Construct forms to slopes, lines and dimensions shown, plumb and straight and sufficiently tight to prevent leakage; securely brace and shore forms to prevent displacement and to safely support construction loads.

3.3 BUILT-IN AND EMBEDDED ITEMS

A. Provide for installation of fastening devices required for attachment of other work. Properly locate in cooperation with other trades; secure and maintain in position before concrete is poured.

B. Coordination: Ascertain requirements and extent, location and details of items to be embedded or built into concrete. Templates or setting diagrams shall be furnished by the various trades or manufacturers when items are to be set, embedded or blocked-out by this trade. Ensure that anchors reach adequate penetration and engage with reinforcing.

3.4 OPENINGS AND SLEEVES

A. All mechanical and electrical piping, conduits and ductwork and other items passing through the concrete shall be sleeved and located prior to pouring concrete. Location, size and spacing of all sleeves and openings shall be as submitted and approved by the Architect. Absolutely no coring or drilling through concrete framing shall be permitted without the written approval of the Architect for each instance. In the event that additional openings are required through any hardened concrete, the Contractor shall be required to employ the services of a testing agency for the location of the steel reinforcement. Both the testing agency and method used to identify the reinforcement shall be subject to the approval of the Architect. In addition, all testing and subsequent coring or drilling shall be conducted in the presence of the testing/inspection agency. The cost of all testing shall be paid by the Contractor.

3.5 LINES AND LEVELS

A. Check the lines and levels of the completed formwork for all exposed walls, spandrels, and other structural members, before concrete is placed. Make whatever corrections or adjustments to the formwork to correct any deviations which exceed specified tolerances allowed.

3.6 CLEANING FORMWORK

A. Force debris to and out of clean-out panels with a jet stream of compressed air. Clean-out all debris. Hose form thoroughly with water and air-jet out any standing water when weather permits.

3.7 FORM REMOVAL

A. Remove forms in accordance with ACI 301, Paragraph 4.5, ACI Building Code requirements for Reinforced Concrete, NO. 318, Chapter 6, Section 6.2. Removal strength of concrete for stripping shall be determined in accordance with ACI 301, Paragraph 4.7.

B. Appearance: No steel spreaders, ties or other metal shall project from or be visible on any concrete surface.

C. Stripping: ACI 347, Paragraphs 3.6 and 3.7, and plan approved by the Structural Engineer prior to initiating striping as per ACI 347, Paragraph 1.5.

3.8 SHORING

A. Leave shoring and bracing in place until concrete member will safely support its own weight, plus any loads that may be placed upon it.

3.9 INSPECTION

A. Inspection Provisions: Do not place any concrete before the forms, the size and arrangement for reinforcing steel, and the size and location of all inserts and embedded items have been inspected. Notify the testing/inspection agency for inspection of forms and reinforcing steel 24 hours prior to placement of any concrete.

END OF SECTION 031000

SECTION 031500 - EXPANSION AND CONTRACTION JOINTS

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Furnish and place all expansion joint, isolation joint, and water stop materials and associated items required as indicated on the Drawings for all cast-in-place concrete.

B. Provide all construction joints, contraction joints (scored joints) and associated items required as indicated on the Drawings for all cast-in-place concrete.

1.2 QUALITY ASSURANCE

A. Provide at least one person who shall be present at all times during execution of this portion of the work and who shall be thoroughly familiar with the type of materials being placed and the best methods for achieving the finished joints and who shall direct all work under this section.

1.3 SAMPLES

A. The Contractor shall submit samples of all joint materials to the Architect and Structural Engineer for approval prior to starting the work.

PART 2 - PRODUCTS

2.1 EXPANSION JOINT MATERIALS

A. Pre-molded expansion joint filler shall conform to one of the following:

1. American Society for Testing and Materials (ASTM):

a. **ASTM D 1751-18** - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving & Structural Construction (Non-extruding & Resilient Bituminous Types).
b. **ASTM D 1752-18** - Standard Specification for Preformed Sponge Rubber, Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.

2.2 ISOLATION JOINT MATERIALS

A. Isolation joint materials shall be same as specified for expansion joints.

PART 3 - EXECUTION

3.1 GENERAL

A. Intersection of joints should generally be 90^{o} to each other. Joints shall be provided so that there are no concrete areas between joints or at the ends of joints that would have an angle of less than 45^{o}.

B. The Contractor shall provide isolation joints in floor slabs at columns, footings and walls to separate the floor slab from any connection with the building or appurtenances.

C. The Contractor shall provide isolation joints around all floor drains in unheated buildings.

D. The isolation joints shall be of same material as specified for expansion joints.

3.2 EXPANSION AND ISOLATION JOINTS

A. Expansion and isolation joints shall be located as shown on the Drawings and as specified in this, or other sections of Division 32 – EXTERIOR IMPROVEMENTS of these specifications.

B. Expansion joints for exterior concrete flatwork shall be provided so that no concrete area between expansion joints is more than 150 square feet.

C. Selection of expansion joint material shall be as follows:

1. All expansion joint material for exterior concrete work (flatwork, curbs, walls, and other similar structures) shall be non-extruding and resilient bituminous types unless otherwise noted on the Drawings.
2. All expansion joint material for interior concrete slabs for unheated areas shall be non-extruding & bituminous types unless otherwise noted on the Drawings.
3. All expansion joint and isolation joint material for interior concrete slabs for heated areas shall be non-extruding and non-bituminous types unless otherwise noted on the Drawings. These joints shall be protected by sealant as specified in Section 079200 – JOINT SEALANTS.

D. Expansion and isolation joints shall be butt type except as detailed or noted on the Drawings.

3.3 CONSTRUCTION JOINTS

A. Joints not shown on the Drawings shall be so made and located by the Contractor’s equipment and procedures so as to least impair the strength of the structure. Joint locations shall be subject to the Owner's, Architect, or Structural Engineer approval.

B. All construction joints shall be keyed joints, unless otherwise shown or noted on the Drawings.

C. All reinforcing steel and mesh shall be continued across construction joints not intended for expansion or contraction of the structure. Additional reinforcing, and inclined dowels shall be provided as directed by the Architect or Structural Engineer.

D. The surface of the concrete at all joints shall be thoroughly cleaned and all laitance removed.

E. When required or permitted, bond for butt construction joints shall be obtained by one of the following methods:

1. The use of an approved adhesive.

2. The use of an approved chemical retarder which delays but does not prevent setting of the surface mortar. Retarded mortar shall be removed within 24 hours after placing to produce a rough exposed aggregate bonding surface.
3. By roughening the surface of the concrete in an approved manner which will expose the aggregate uniformly and will not leave laitance, loosened particles of the aggregate or damaged concrete at the surface.

3.4 CONTRACTION JOINTS

A. Contraction (scored) joints may be tooled or sawed approximately equal to one-quarter (1/4) the thickness of the member. Refer to Structural Drawings for additional information.

END OF SECTION 031500

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Cast-in-place concrete work, complete, unless otherwise specified, including formwork, reinforcing steel, mix design, placement procedures, and finishes. Furnish reinforcing steel bars for masonry work and tie bars after they are in place.

B. Refer to Structural Drawings, Sheet S001 – GENERAL NOTES, for additional requirements.

1.2 RELATED WORK SPECIFIED IN OTHER DIVISIONS AND SECTIONS:

A. Excavation and filling, including base course and cushion fill; Division 31 - EARTHWORK.

B. Soil treatment for termite control; Section 313116 – TERMITE CONTROL.

C. Site Concrete Work, Division 32 – EXTERIOR IMPROVEMENTS.

D. Portland Cement Concrete Paving, Division 32 – EXTERIOR IMPROVEMENTS.

E. Furnishing of structural steel base plates, anchor bolts and other metal accessories for insertion in concrete, Section 055000 – METAL FABRICATIONS.

F. Joint Sealants, Section 079200 – JOINT SEALANTS.

G. Vapor Retarder for slab-on-grade, Section 072615 – UNDER SLAB VAPOR RETARDER (15-MIL).

H. Slab Joints: Section 031500 – EXPANSION AND CONTRACTION JOINTS.

I. Concrete Curing and Densifier: Section 033500 – CONCRETE FINISHING.

J. Epoxy Flooring: Section 096726 – FLOOR COATING SYSTEM.

1.3 REFERENCE STANDARDS

A. American Association of State and Highway Transportation Officials (AASHTO):

1. **AASHTO M182** – Standard Specification for Burlap Cloth Made from Jute or Kenaf and Cotton Mats.

B. American Concrete Institute (ACI):

1. **ACI 117-10** – Specification for Tolerances for Concrete Construction and Materials (ACI 117-10) and Commentary (ACI 117R-10) [Reapproved 2015].
2. **ACI 211** – Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.

3. **ACI 301** – Specifications for Structural Concrete.
4. **ACI 304** – Guide for Measuring, Mixing, Transporting, and Placing Concrete.
5. **ACI 305** – Guide to Hot Weather Concreting.
6. **ACI 306** – Guide to Cold Weather Concreting.
7. **ACI 309** – Guide for Consolidation of Concrete.
8. **ACI 318** – Building Code Requirements for Structural Concrete and Commentary.
9. **ACI 347** – Guide to Formwork for Concrete.

C. American Society for Testing and Materials (ASTM):

1. **ASTM A185** – Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete (Withdrawn 2013). *[Replaced by ASTM A1064.]*
2. **ASTM A615** – Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
3. **ASTM A1064** – Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
4. **ASTM C31** – Standard Practice for Making and Curing Concrete Test Specimens in the Field.
5. **ASTM C33** – Standard Specification for Concrete Aggregates.
6. **ASTM C42** – Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
7. **ASTM C94** – Standard Specification for Ready-Mixed Concrete.
8. **ASTM C143** - Standard Test Method for Slump of Hydraulic-Cement Concrete.
9. **ASTM C150** – Standard Specification for Portland Cement.
10. **ASTM C171** – Standard Specification for Sheet Materials for Curing Concrete.
11. **ASTM C173** – Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
12. **ASTM C231** - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
13. **ASTM C260** – Standard Specification for Air-Entraining Admixtures for Concrete.
14. **ASTM C330** – Standard Specification for Lightweight Aggregates for Structural Concrete.
15. **ASTM C881** – Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
16. **ASTM D1751** – Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
17. **ASTM D1752** – Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.
18. **ASTM E1155** – Standard Test Method for Determining FF Floor Flatness and FL Floor Levelness Numbers.

D. US Army Corps of Engineers (COE):

1. **CRD C621** – Specification for Non-Shrink Grout.

E. Concrete Steel Reinforcing Institute (CRSI).

1.4 SUBMITTALS:

A. Product Data: Submit manufacturer's product data for reinforcement and forming accessories, admixtures, patching compounds, waterstops, joint systems, curing compounds, and other concrete products as requested by Architect.

B. Shop Drawings: Submit, prior to installation, shop drawings of reinforcing steel, including bar cutting lists, typical bar bend diagrams, construction of forms including jointing, reveals, location and pattern of form tie placement, and construction joint schedule with details.

C. Design Mix: Prior to placement of concrete, submit concrete mix designs proposed by the concrete supplier, for class of concrete, including recent test results substantiating the quality of concrete produced by each mix.

D. Reports: Weekly reports of all compression, slump, and air content tests from the testing laboratory.

E. Samples: Submit samples of concrete stain and sealer in color selected by Architect for approval, if specified for use.

1.5 QUALITY ASSURANCE:

A. Codes And Standards: Comply with the provisions of the following codes, specifications and standards of America Concrete Institute (ACI) and Concrete Reinforcing Steel Institute (CRSI), except where more stringent requirements are indicated or specified, and except as accepted or directed by Architect during unusual climatic conditions.

1. ACI 301 "Specifications for Structural Concrete."
2. ACI 318 "Building Code Requirements for Structural Concrete."
3. CRSI "Manual of Standard Practice."

B. Local Codes and Ordinances: Wherever provisions of the 2012 Arkansas Fire Prevention Code (International Building Code 2012 (IBC)) or the local current ordinances are more stringent than the above specifications and standards, the local codes and ordinances shall govern.

C. Concrete Testing Service: Engage a testing laboratory acceptable to Owner and Architect to perform material evaluation tests and to design concrete mixes.

1. Tests, including retesting of rejected materials for installed work, shall be paid for by the Contractor. Testing requirements are specified in FIELD SAMPLING AND TESTING paragraph 3.14 of this section.

PART 2 - PRODUCTS

2.1 FORM MATERIALS:

A. Forms For Exposed Finish Concrete: Plywood, metal, metal-framed plywood faced, or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces.

B. Forms For Unexposed Finish Concrete: Use plywood, lumber, metal, or other acceptable material. If lumber is used, it must be dressed on at least 2 edges and 2 sides for a tight fit.

C. Form Coatings: Commercial formulation form coating compound with maximum VOC of 350 mg/l that will not bond with, stain, nor adversely affect concrete surfaces, will not impair subsequent treatments of concrete surfaces.

D. Form Ties: Factory-fabricated, adjustable-length, removable or snap-off metal form ties, designed to prevent form deflection and to prevent spalling concrete upon removal. Provide units that will leave no metal closer than 1-1/2" to exposed surface.

1. Provide ties that, when removed, will leave holes not larger than 1" diameter in concrete surface.

2.2 REINFORCING MATERIALS:

A. Reinforcing Bars: ASTM A 615(S1), Grade 60, deformed billet steel bars of grades indicated on drawings, free from loose rust, scale and other coatings that may reduce bond.

B. Mesh or Fabric Reinforcement: ASTM A 185, welded wire fabric, of sizes and types as indicated on drawings. Use flat sheets.

C. Supports For Reinforcement: Bolsters, chairs, spacers, and other devices necessary for properly spacing, supporting, and fastening reinforcement in place.

1. For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs.
2. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs that are plastic protected (CRSI, Class 1) or stainless steel protected (CRSI, Class 2).
3. For footings, support reinforcing steel with wire, metal chairs, bolsters or other approved device; do not use bricks, rocks or stones.

2.3 CONCRETE MATERIALS:

A. Portland Cement: ASTM C 150, Type I.

B. Concrete Aggregates: ASTM C 33 for normal weight concrete, and ASTM C 330 for light weight concrete. Provide aggregates from a single source for exposed concrete.

1. Fine Aggregate: Clean, sharp, natural or manufactured sand, free from loam, clay, lumps, or other deleterious substances.
2. Coarse Aggregate: Clean, uncoated, processed, locally available aggregate, containing no clay, mud, loam or foreign matter; maximum size of 1-1/2" at foundations and 1" at slabs.

C. Water: Clean and free from injurious amounts of oils, acids, alkalis, salts, organic materials, or other substances that may be deleterious to concrete or reinforcing.

D. Admixtures:

1. Air Entrained Admixture: ASTM C 260; compatible with other required admixtures.
2. Other Admixtures: Do not use other admixtures unless accepted by Architect; added chlorides will not be accepted.

E. Miscellaneous Materials:

1. Connectors: Provide metal connectors required for placement in cast-in-place concrete, for the attachment of structural and non-structural members.
2. Vapor Retarder: Refer to Section 072615 – UNDERSLAB VAPOR RETARDER (15-MIL).
3. Expansion Joint Filler: ASTM D 1751, non-extruding premoulded material, 1/2" thick, unless otherwise noted, composed of fiberboard impregnated with asphalt, except use ASTM D 1752, Type II, resin-bound cork for walks and other exposed areas.
4. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd., complying with AASHTO M 182, Class 2.
5. Moisture-Retaining Cover: One of the following, complying with ASTM C 171; waterproof paper, polyethylene film, polyethylene-coated burlap.
6. Liquid Curing/Densifier Compound: Refer to Section 033500 – CONCRETE FINISHING.
7. Non-Shrink Grout: CRD-C 621, factory pre-mixed grout.

    a. Non-Metallic Shrinkage-Resistant Grout: Conspec "100 Non-Shrink Grout (Non-Metallic)", Euclid "Euco N.S.", L & M "Crystex", Master Builders "Masterflow 713", W. R. Meadows "Sealtight CG-86 Grout", or approved equivalent.

8. Bonding Agent: Polyvinyl acetate or acrylic base.

    a. Polyvinyl Acetate (Interior Only): Euclid "Euco Weld", L & M "Everweld", or approved equivalent.
    b. Acrylic or Styrene Butadiene: Euclid "SBR Latex", L & M "Everbond", Conspec "Strongbond", Master Builders "Acryl-Set", Sonneborn "Sonocrete", or approved equivalent.

9. Epoxy Adhesive: ASTM C 881, two component materials suitable for use on dry or damp surfaces. Provide material type, grade, and class to suit project requirements.

    a. Conspec "Spec-Bond 100", Euclid "Euco Epoxy System #452 or #620", L & M "Epabond", Master Builders "Concresive Standard Liquid", or approved equivalent.

10. Concrete Curing Compound:

    a. W.R. Meadows® SealTight® 1100 resin-based, water emulsion concrete curing compound, clear, VOC compliant (www.wrmeadows.com).

b. Or approved equivalent.

11. Concrete Curing and Sealing Compounds. Furnish and install one of the following products at interior concrete floor slabs not scheduled to receive concrete curing and densifier speciried in Section 033500 – CONCRETE FINISHING:

a. BASF Group, Master Builders® Solutions, MasterKure CC1315WB, transparent, high solids, water-based, modified acrylic curing, sealing, and dustproofing compound, VOC compliant (www.master-builders-solutions.basf.us).
b. Euclid Chemical AQUA-CURE VOX, water-based, low odor cure and seal for concrete (www.euclidchemical.com).
c. Conspec "Cure & Seal."
d. Laticrete International, Inc. L&M™ Dress & Seal™.
e. BASF Sonneborn® Kure-N-Seal™.
f. W.R. Meadows CS-309™-25.
g. Or approved equivalent.

12. Concrete Stain and Sealer. Furnish and install the following only on interior concrete floor slabs indicated on the Finish Schedule to be stained concrete.

a. Basis of Design: Scofield®/Sika Corporation (www.scofield.com):

1) Stain: LITHOCHROME® Chemstain® Classic, penetrating acid stain, VOC compliant. Color as selected by Architect.
2) Sealer: Scofield® CureSeal-W™ water-based, clear, semi-gloss sealer, VOC compliant, color matched to concrete stain color.

b. Or approved equivalent.

13. Waterstop: CETCO® WATERSTOP-RX®, www.cetco.com, or approved equivalent. Install in locations as shown on structural drawings.

2.4 PROPORTIONING OF MIXES:

A. Concrete minimum ultimate strength at 28 days: refer to Structural Drawings, Sheet S001, for additional information.

B. Mix Designs:

1. Prepare design mixes for each type of concrete, in accordance with ACI 301 and ACI 318.
2. Proportion design mixes by weight for class of concrete required, complying with ACI 211.

C. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, as approved by Architect and Structural Engineer. Laboratory test data for revised mix design and strength results must be submitted to and approved by Architect and Structural Engineer before using in work.

D. Provide test results from the concrete supplier for proposed design mix, to establish the following:

1. Gross weight and yield per cu. yd of trial mixtures.
2. Measured slump.
3. Measured air content.
4. Compressive strength developed at 7 days and 28 days, from not less than 3 test cylinders cast for each 7- and 28-day test, and for each design mix.

E. Submit written reports to Architect for design mixes at least 15 calendar days prior to the start of work.

2.5 ADMIXTURES

A. Use air-entrained admixtures in strict compliance with manufacturer's directions at all concrete exposed to weather.

2.6 SLUMP LIMITS: 4" to +/- 1".

2.7 BATCHING AND MIXING

A. Concrete may be ready-mixed or job-mixed at the Contractor's option, in accordance with the governing building code and with the referenced ACI 318. No hand mixing allowed.

B. Job-Site Mixing:

1. Mix materials for concrete in appropriate drum-type batch machine mixer. For mixers of one cu. yd. or smaller capacity, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released. For mixers of capacity larger than one cu. yd., increase minimum 1-1/2 minutes of mixing time by 15 seconds for each additional cu. yd. or fraction thereof.
2. Provide batch ticket for each batch discharged and used in work, indicating project identification name and number, date, mix type, mix time, quantity, and amount of water introduced.

C. Ready-Mix Concrete:

1. Comply with requirements of ASTM C 94, and as specified.
2. When air temperature is between 85°F and 90°F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes, and when air temperature is above 90°F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORM WORK:

A. Coordinate installation of joint materials, vapor barrier/retarder, and other related materials with placement of forms and reinforcing steel.

B. Design, erect, support, brace, and maintain formwork to support vertical and lateral loads, and static and dynamic loads that might be applied until such loads can be supported by the concrete structure. Construct formwork so concrete members and structures are of correct size, shape, alignment elevations, and position.

C. Construct forms in accordance with ACI 347, to sizes, shapes, lines and dimensions indicated, and to obtain accurate alignment, location, grades, level and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, molding, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in work. Solidly butt joints and provide back-up at joints to prevent leakage of cement paste.

D. Fabricate forms for easy removal without hammering or prying against the concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces.

E. Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Securely brace temporary openings and set tightly to forms to prevent loss of concrete mortar. Locate temporary openings on forms at inconspicuous location.

F. Chamfer exposed corners and edges 3/4" unless otherwise indicated, using wood, metal, PVC or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.

G. Preparation of Form Surfaces: Coat the contact surfaces of forms with a form-coating compound where applicable before reinforcement is placed.

H. Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses, and chases from trades providing such ties. Accurately place and securely support items built in to form.

I. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt or other debris just before concrete is placed. Retighten forms after concrete placement, if required, to eliminate mortar leaks.

3.2 VAPOR RETARDER INSTALLATION:

A. Following leveling and tamping of granular base for slabs-on-grade, place vapor retarder in position with longest dimension parallel with direction of pour.

B. Lap joints 6" and seal with manufacturers recommended mastic or pressure sensitive tape.

C. Seal all penetrations and edges as recommended by Manufacturer.

3.3 PLACING REINFORCEMENT:

A. Comply with the Concrete Reinforcing Steel Institute (CRSI) recommended practice for "Placing Reinforcing Bars" for details and methods of reinforcement placement and supports, and as herein specified.

1. Avoid cutting or puncturing vapor retarders during reinforcement placement and concreting operations.

B. Clean reinforcement of loose rust, mill scale, dirt, and other materials or coatings which reduce or destroy bond with concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers as required.

D. Place reinforcement to obtain minimum coverages indicated, or if not indicated, in compliance with CRSI. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

E. Do not place bars more than 2" beyond the last leg of continuous support. Do not use supports to hold runways for conveying equipment.

F. Install mesh welded wire fabric reinforcement in as long lengths as practicable, lapping pieces at least one mesh plus 2" but in no case less than 8". Lace splices with wire. Offset end laps to prevent continuous laps in either direction. Lift mesh to middle third of slab by use of hooks.

3.4 JOINTS AND INSERTS:

A. Joints: Provide construction and expansion joints. Locate and install joints, which are not shown on the Drawings, so as not to impair the strength and appearance of structure. Submit joint schedule and details to Architect.

1. Waterstops: Provide waterstops in construction joints as indicated. Install to form continuous diaphragm in each joint. Support and protect exposed waterstops during progress of work. Field-fabricate joints in waterstops according to manufacturer's printed instructions.

B. Inserts: Set and build into work anchorage devices and other embedded items required for other work that is attached to, or supported by, concrete. Properly locate embedded items in cooperation with other trades, and secure in position before concrete is poured. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached thereto.

3.5 PREPARATION OF FORM SURFACES

A. Coat contact surfaces of forms with an approved nonresidual, low-VOC, form-coating compound before reinforcement is placed. Do not allow excess form-coating material to accumulate in forms or to come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions.

3.6 CONCRETE PLACEMENT:

A. Comply with ACI 304, "Guide for Measuring, Mixing, Transporting, and Placing Concrete", and as herein specified.

B. Pre-Placement Inspection: Before placing concrete, clean and inspect formwork, reinforcing steel, and items to be embedded or cast-in. Notify other crafts in ample time to permit the installation of their work, and cooperate with them in setting such work, as required. Make sure soil treatment for termite control has been applied to cushion fill before vapor retarder and concrete are installed. Coordinate the installation of joint materials and vapor retarders with placement of forms and reinforcing steel.

C. Notify Architect 48 hours before placing any concrete.

D. Conveying: Convey concrete from the mixer to the place of final deposit by methods which will prevent the separation or loss of materials. Provide equipment for chuting, pumping, and pneumatically conveying concrete of proper size and design as to insure a practically continuous flow of concrete at the point of delivery and without segregation of the materials. Keep open troughs and chutes clean and free from coatings of hardened concrete. Do not allow concrete to drop freely more than 10 feet. All equipment and methods used for conveying are subject to the approval of Architect.

E. Depositing: Deposit concrete continuously or in layers of such thickness that no concrete will be placed on hardened concrete so as to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete near or in its final location to avoid segregation due to rehandling or flowing, and displacement of the reinforcement.

F. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers not deeper than 24" and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.

1. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete in accordance with ACI 309.
2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix.

G. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or section is completed.

1. Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Bring slab surfaces to correct level with straightedge and strike off. Use bull floats or darbies to smooth surface, free of humps and hollows. Do not disturb slab surfaces prior to beginning finishing operations.

3. Maintain reinforcing in proper position during concrete placement.

H. Cold Weather Placing: Comply with the requirements of ACI 306 and as follows:

1. Protect concrete work from physical damage and reduced strength that could be caused by frost, freezing actions, and low temperatures.
2. When air temperature has fallen to or is expected to fall below 40ºF, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50ºF and not more than 80ºF at point of placement.

    a. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
    b. Do not use calcium chloride, salt, and other materials containing antifreeze agents or chemical accelerators unless otherwise accepted for mix designs.

I. Hot Weather Placing: When hot weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with the requirements of ACI 305 and as follows:

1. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90º`F. Mixing water may be chilled, or chopped ice may be used to control temperature provided water equivalent of ice is calculated to total amount of mixing water. Use of liquid nitrogen to cool concrete is Contractor's option.
2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedment in concrete. Fog spray forms, reinforcing steel, and subgrade just before concrete is placed.
3. When acceptable to Architect, and when required by high temperatures, low humidity, or other adverse placing conditions, use an approved water-reducing retarding admixture.

3.7 FINISH OF FORMED SURFACES:

A. Rough Form Finish: For formed concrete surfaces not exposed-to-view in the finish work or by other construction, unless otherwise indicated. This is the concrete surface having texture imparted by form facing material used, with tie holes and defective areas repaired and patched and fins and other projections exceeding 1/4" in height rubbed down or chipped off.

B. Smooth Form Finish: For formed concrete surfaces exposed-to-view, or that are to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, painting or other similar system. This is as-cast concrete surface obtained with selected form facing material, arranged orderly and symmetrically with a minimum of seams. Repair and patch defective areas with fins or other projections completely removed and smoothed.

C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces, strike-off smooth and finish with texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.8 SLAB FINISHES:

A. General: Refer to Structural Drawings, Sheet S001 – General Notes, "Slab Flatness and Levelness" for specific Floor Flatness (FF) and Floor Levelness (FL) requirements. F-number requirements vary depending on locations of concrete slabs and final floor finishes to be installed on slabs.

B. Float Finish:

1. Apply float finish to slab surfaces to receive trowel finish and other finishes specified.
2. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating when surface water has disappeared, or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats, or by hand-floating if area is small or inaccessible to power units. Finish surfaces to tolerances as shown on Structural Drawings and as measured according to ASTM E1155 and ACI 117. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to uniform, smooth, granular texture.

C. Trowel Finish:

1. Apply where exposed-to-view, and where slab surfaces are to be covered with tile, paint, resilient flooring, carpet, or other thin film finish coating system.
2. After floating, begin first trowel finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and finish surfaces to tolerances as shown on Structural Drawings and as measured according to ASTM E1155 and ACI 117. Grind smooth surface defects which would telegraph through applied floor covering.

D. Trowel And Fine Broom Finish: Where tile is to be installed with thin-set mortar, apply trowel finish as specified, then immediately follow with slightly scarifying surface by fine brooming.

E. Non-Slip Broom Finish: Apply at exterior concrete steps, ramps, walks, and mowing strips, and as indicated; specified in Division 32 – EXTERIOR IMPROVEMENTS.

3.9 CONCRETE CURING AND PROTECTION:

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures; maintain concrete above 50°F. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less that 7 days. Begin final curing procedures immediately following initial curing and before concrete has dried. Continue final curing for at least 7 days in accordance with ACI 301 procedures. Avoid rapid drying at end of final curing period.

B. Curing Methods: Perform curing of concrete by moist curing, by moisture-retaining cover curing, and by combinations thereof, as specified.

1. Provide moisture curing by keeping concrete surface continuously wet by covering with water, by water-fog spray, or by covering concrete surface with specified absorptive cover, thoroughly saturating cover with water and keeping continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4" lap over adjacent absorptive covers.
2. Provide moisture-cover curing by covering concrete surface with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3" and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
3. Provide curing and sealing compound on exterior slabs, walks, and curbs, as follows:

    a. Apply specified curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours). Apply uniformly in continuous operation by power-spray or roller in accordance with manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.
    b. Use membrane curing compounds that will not affect surfaces to be covered with finish materials applied directly to concrete.

C. Curing Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces, by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.

D. Curing Unformed Surfaces: Cure unformed surfaces, such as slabs, floor toppings, and other flat surfaces by application of appropriate curing compound. Final cure concrete surfaces to receive finish flooring by moisture-retaining cover, unless otherwise directed.

3.10 REMOVAL OF FORMS:

A. Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of work, may be removed after cumulatively curing at not less than 50°F for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form-removal operations, and provided curing and protection operations are maintained.

B. Formwork supporting weight of concrete, such as beam soffits, joists, slabs, and other structural elements, may be removed after 14 days if concrete has attained at least 75% of design minimum compressive strength of in-place concrete by testing field-cured specimens representative of concrete location or members.

3.11 REUSE OF FORM:

A. Clean and repair surfaces of forms to be reused in work. Split, frayed, delaminated or otherwise damaged form material will not be acceptable for exposed surfaces. Apply new form-coating compound as specified for new formwork.

B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use "patched" forms for exposed concrete surfaces except as acceptable to Architect.

3.12 MISCELLANEOUS ITEMS:

A. Filling In: Fill in holes and openings left in concrete for the passage of work by other trades after their work is in place. Mix, place, and cure concrete to blend with in-place construction. Provide all other miscellaneous concrete filling required to complete work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to hard, dense finish and corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations. Set anchor bolts for machines and equipment to template at correct elevations, complying with certified diagrams or templates of manufacturer furnishing machines and equipment.

3.13 CONCRETE SURFACE REPAIRS:

A. Repair and patch defective areas with cement mortar of the same type and class as the original concrete, immediately after removal of forms. Cut out honeycomb, rock pockets, voids over 1/2" diameter, and holes left by tie rods and bolts, down to solid concrete but in no case to a depth of less than 1". Make edges of cuts perpendicular to the concrete surface, before placing cement mortar in the same manner as adjacent concrete. Proprietary patching compounds may be used when acceptable to Architect.

1. Smooth, Exposed-To-View Surfaces: Blend cements so that, when dry, patching mortar will match color of surrounding concrete. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.
2. Concealed Formed Surfaces: Repair defects that adversely affect the durability of the concrete. If defects cannot be repaired remove and replace the concrete.
3. Other repair methods may be used, subject to acceptance by Architect.

3.14 FIELD SAMPLING AND TESTING:

A. The following samples and tests will be performed by an independent testing laboratory approved by Owner and Architect. Refer to paragraph 1.5 C. of this section for responsibility for payment of tests.

B. Samples:

1. Field samples shall be made and cured in accordance with ASTM C 31, for each concrete strength, at the rate of 4 test cylinders and one slump test for each 50 cubic yards of concrete from each day's pour. In accordance with ASTM C 173 Volumetric Method, or ASTM C 231 Pressure Method, make air content check for each set of test cylinders. Air content and slump shall be checked and recorded at both truck discharge and point of placement for pumped concrete from the first load each day.
2. Test cylinders as follows: One at 7 days, two at 28 days, and reserve the remaining for testing after a longer period as required by Architect, if the 28 day tests do not meet the required strength.
3. The taking of samples from small pours of 10 cubic yards or less may be omitted at the discretion of the Architect.
4. Additionally, test slump every 25 cu. yds, recording location for report.
5. When early form removal is requested, field cure cylinders tested at 7 or less days to determine sufficient strength.

C. Testing:

1. Where average strength of any group of 3 cylinders falls below the minimum compressive strength or if individual cylinder falls more than 500 psi below minimum compressive strength specified, the Architect shall have the right to require that test specimens be cut from the structure. Specimens shall be selected by Architect from location in structure represented by test specimen or specimens which failed.
2. Specimens shall be secured, prepared, and tested in accordance with ASTM C 42, within a period of 60 days after placing concrete.
3. Concrete shall be considered to meet the strength requirement of this specification if it meets the strength requirements of paragraph 5.6.4 of ACI 318.
4. Should laboratory analysis indicate that the proper concrete mix has not been used by the Contractor, all such concrete poured using the improper mix shall be subject to rejection.
5. The cost of cutting specimens from the structure, patching the resulting holes, and making the laboratory analysis shall be borne by the Contractor.

6. The holes from which the cored samples are taken shall be packed solid with no slump concrete proportioned in accordance with the ACI 211 "Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete". The patching concrete shall have the same design strength as the specified concrete.
7. If any of the specimens cut from the structure fail to meet the requirements outlined in paragraph 5.6.4 of ACI 318, the Architect shall have the right to require any and all defective concrete to be replaced, and all costs resulting therefrom shall be borne by the Contractor.

D. Contractor Sampling: In addition to the slump tests specified above, the contractor shall keep a cone (mold) and rod apparatus on the job site for random testing of batches. When concrete does not meet the specified slump requirements, and when directed by the Architect, immediately perform a slump test in accordance with ASTM C 143. Concrete not meeting the slump requirements shall be removed from the job site.

3.15 PROTECTION:

A. No wheeling, working, or walking on finished surfaces will be allowed for 16 hours after the concrete is placed.

B. Provide plywood or other acceptable protective cover at all traffic areas throughout the job.

C. Protect exposed concrete floors, steps, and walks from paint and other materials or equipment which may mar or damage these surfaces.

3.16 CLEAN-UP

A. Do not allow debris to accumulate. Clean up all concrete and cement materials, equipment and debris upon completion of any portion of the concrete work, and upon completion of entire cast-in-place concrete work.

END OF SECTION 033000

SECTION 033500 - CONCRETE FINISHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Single application cure-densifier-hardener for new concrete floors indicated on the Room Finish Schedule, Sheet A601, as “SC” – Sealed Concrete.
2. Precautions for avoiding staining concrete before and after application.

B. Related Sections:

1. Section 033000 - CAST-IN-PLACE CONCRETE.

1.2 REFERENCE STANDARDS

A. American National Standards Institute (ANSI):

1. **ANSI B101.1** - Test Method for Measuring Wet SCOF of Common Hard-Surface Floor Materials.
2. **ANSI B101.3** - Test Method for Measuring Wet DCOF of Common Hard-Surface Floor Materials.

B. American Society for Testing and Materials International (ASTM):

1. **ASTM C39** – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
2. **ASTM C779** - Standard Test Method for Abrasion Resistance of Horizontal Concrete Surfaces.
3. **ASTM C805** - Standard Test Method for Rebound Number of Hardened Concrete.
4. **ASTM D3359** - Standard Test Methods for Rating Adhesion by Tape Test.
5. **ASTM F150-06(2018)** - Standard Test Method for Electrical Resistance of Conductive and Static Dissipative Resilient Flooring.
6. **ASTM G23** - Practice for Operating Light-Exposure Apparatus (Carbon-Arc Type) With and Without Water for Exposure of Nonmetallic Materials [*Superseded by ASTM G152].*
7. **ASTM G152** – Standard Practice for Operating Open Flame Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials.

C. National Floor Safety Institute (NFSI):

1. Certified as High Traction by the National Floor Safety Institute (NFSI), Phase 2 testing.

D. USGBC LEED Version 4:

1. Indoor VOC Emission Test; California Department of Public Health CDPH/EHLB/Standard Method Version 1.2, 2017.

1.3 SUBMITTALS

A. General: Submit listed submittals in accordance with Conditions of the Contract and Section 013300 - SUBMITTAL PROCEDURES.

B. Product Data: Submit product data, including manufacturer's Spec-Data® sheet, installation instructions and technical bulletins for specified products.

C. Certificates: Manufacturer's certification that the installer is acceptable.

D. Maintenance Data: Maintenance instructions, including precautions for avoiding staining after application.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Acceptable to the manufacturer.

B. Regulatory Requirements: In accordance with Section 014000 – QUALITY REQUIREMENTS.

1.5 DELIVERY, STORAGE & HANDLING

A. General: Comply with Section 016000 – PRODUCT REQUIREMENTS.

B. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

C. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.

D. Handling: Protect materials from dirt, corrosion, oil, grease and other contaminants.

PART 2 - PRODUCTS

2.1 MATERIAL

A. Basis of Design Manufacturer: Curecrete Distribution, Inc.

1. Contact: 1203 Spring Creek Place, Springville, UT 84663-0551; Telephone: (800) 998-5664, (801) 489-5663; Fax: (801) 489-3307; Email: info@ashfordformula.com; Website: www.ashfordformula.com.

B. Cure-Densifier-Hardener: Basis of Design: Ashford Formula is a transparent, chemically reactive, water-based treatment that penetrates into the concrete surface, forming a chemical reaction of crystalline growth that fills in the natural pores and voids in the concrete surface.

1. Abrasion Resistance to Revolving Disks: At least a 32.5% improvement over untreated samples when tested in accordance with ASTM C779.
2. Surface Adhesion: At least a 22% increase in adhesion for epoxy when tested in accordance with ASTM D3359.

3. Hardening: As follows when tested (ASTM C39):

   a. After 7 Days: An increase of at least 40% over untreated samples.
   b. After 28 Days: An increase of at least 38% over untreated samples.

4. Rebound Number: An increase of at least 13.3% over untreated samples when tested in accordance with ASTM C805.
5. Electrical Resistance: To ASTM F150.
6. Light Exposure Degradation: No evidence of adverse effects on treated samples when tested in accordance with ASTM G23.
7. Test Method for Measuring Wet SCOF of Common Hard-Surface Floors in accordance with ANSI B101.1.
8. Test Method for Measuring Wet DCOF of Common Hard-Surface Floors in accordance with ANSI B101.3.
9. Certified as High Traction by the National Floor Safety Institute (NFSI), Phase 2 testing.
10. Certified Compliant according to California Department of Public Health CDPH/EHLB/Standard Method Version 1.2, 2017.

2.2 PRODUCT SUBSTITUTIONS

A. Substitutions: Substitutions in accordance with Section 012500 – SUBSTITUTION PROCEDURES.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

A. Compliance: Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions and product carton instructions for installation.

3.2 EXAMINATION

A. Do not begin installation until substrates have been properly prepared and are suitable for application of product.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.3 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.

C. Do not use frozen material. Thaw and agitate prior to use.

D. If construction equipment must be used for application, diaper all components that might drip oil, hydraulic fluid or other liquids that would stain concrete

3.4 INSTALLATION

A. New Concrete: Apply cure-densifier hardener to new concrete as soon as the concrete is firm enough to work on after troweling. With colored concrete, wait a minimum of 30 days before application.

1. Spray on at rate of 200 ft^2/gal (5 m^2/L).
2. Keep surface wet with cure-densifier-hardener for a minimum soak-in period of 30 minutes without allowing it to dry or become slippery. If slipperiness occurs before the 30 minute time period has elapsed, apply additional cure-densifier-hardener, as needed, to keep the entire surface in a non-slippery state for the first 15 minutes; for the remaining 15 minutes, mist the surface as needed with water to keep the material in a non-slippery state. In hot weather conditions, follow manufacturer's special application procedures.
3. When the treated surface becomes slippery after this period, lightly mist with water until slipperiness disappears.
4. Wait for surface to become slippery again, and then flush entire surface with water to remove all cure-densifier-hardener residue.
5. Squeegee surface completely dry, flushing any remaining slippery areas until no residue remains.
6. Wet vacuum or scrubbing machines can be used in accordance with manufacturer's instructions to remove residue.

3.5 PROTECTION

A. Protect installed floors for at least 3 months until chemical reaction process is complete.

1. Do not allow traffic on floors for 3 hours after application.
2. Do not allow parking of vehicles on concrete slab.
3. If vehicles must be temporarily parked on slab, place drop cloths under vehicles during entire time parked.
4. Do not allow pipe cutting using pipe cutting machinery on concrete slab.
5. Do not allow temporary placement and storage of steel members on concrete slabs.
6. Clean up spills immediately and spot-treat stains with degreaser or oil emulsifier.
7. Clean floor regularly in accordance with manufacturer's recommendations.

END OF SECTION 033500

SECTION 042000 - UNIT MASONRY

PART 1 - GENERAL

1.1 REQUIREMENTS:

A. Unit Masonry Standard: Masonry construction and materials shall conform to all requirements of "Specification for Masonry Structures (ACI 530.1/ASCE 6/TMS 602)," published by The Masonry Society (TMS), Boulder, Colorado; the American Concrete Institute (ACI), Farmington Hills, Michigan; and the American Society of Civil Engineers (ASCE), Reston, Virginia, except as modified by the requirements of these contract documents.

B. Fire Performance Characteristics: If indicated on the Drawings, provide materials and construction identical to those of assemblies whose fire resistance has been determined per ASTM E 119 by a testing and inspecting organization, by equivalent concrete masonry thickness, or by another means, as acceptable to Authorities Having Jurisdiction (AHJ).

C. Wall Sleeves: General Contractor shall furnish and masonry contractor shall install all sleeves in masonry wall construction for mechanical, electrical, and plumbing penetrations. Coordinate with applicable mechanical, electrical, and plumbing drawings and specification sections for specific requirements concerning sleeving.

D. Mortar: All mortar for exterior use shall have a water repellent admixture added to the mortar mix to provide water repellency, reduce moisture absorption, control efflorescence, and improve mortar durability. Refer to paragraph 2.1.C.8 of this section for additional information.

1.2 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM):

1. **ASTM A153** – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
2. **ASTM A307** – Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60000 PSI Tensile Strength.
3. **ASTM A563** – Standard Specification for Carbon and Alloy Steel Nuts.
4. **ASTM A615** – Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
5. **ASTM A1064** – Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
6. **ASTM C90** – Standard Specification for Loadbearing Concrete Masonry Units.
7. **ASTM C91** – Standard Specification for Masonry Cement.
8. **ASTM C144** – Standard Specification for Aggregate for Masonry Mortar.
9. **ASTM C150** – Standard Specification for Portland Cement.
10. **ASTM C207** – Standard Specification for Hydrated Lime for Masonry Purposes.
11. **ASTM C216** – Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale).
12. **ASTM C270** – Standard Specification for Mortar for Unit Masonry.
13. **ASTM C404** – Standard Specification for Aggregates for Masonry Grout.

14. **ASTM C476** – Standard Specification for Grout for Masonry.
15. **ASTM C1142** – Standard Specification for Extended Life Mortar for Unit Masonry.
16. **ASTM D226** – Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
27. **ASTM D882** – Standard Test Method for Tensile Properties of Thin Plastic Sheeting.
18. **ASTM D1056** – Standard Specification for Flexible Cellular Materials – Sponge or Expanded Rubber.
19. **ASTM D2000** – Standard Classification System for Rubber Products in Automotive Applications.
20. **ASTM D2287** – Standard Specification for Nonrigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds.
21. **ASTM D3273** - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
22. **ASTM E84** - Standard Test Method for Surface Burning Characteristics of Building Materials.
23. **ASTM E119** – Standard Test Methods for Fire Tests of Building Construction and Materials.
24. **ASTM E154** - Standard Test Method for Water Vapor Retarders Used in Contact with Earth, Under Concrete Slabs, on Walls, or as Ground Cover.

B. National Concrete Masonry Association (NCMA):

1. **NCMA TEK 45** – Removal of Stains from Concrete Masonry Walls

C. Brick Institute Association (BIA):

1. **BIA Technical Note No. 20 (Revised)** – Cleaning Brickwork.

D. Pressure Sensitive Tape Council (PSTC):

1. **PSTC-1** – Peel Adhesion of Pressure Sensitive Tape.

1.3 SUBMITTALS

A. Submittals: In addition to product data for each different masonry unit, accessory, and manufactured product indicated, submit the following:

1. Samples of each different exposed masonry unit, masonry mortar, and accessories.
2. Material certificates for each different masonry product required.
3. Material test reports from a qualified independent testing laboratory for mortar, grout mixes, and masonry units.

B. Field-Constructed Mock-Ups: Prior to installation of unit masonry, erect sample wall panel of typical exterior unit masonry wall as directed by Architect. Minimum panel size shall be 4’-0” X 4’-0”. Show proposed accent banding, joint treatment, texture, and color of masonry units. Do not proceed with masonry work until sample panel is approved.

PART 2 - PRODUCTS

2.1 PRODUCTS:

A. Concrete Masonry Units: Comply with requirements indicated below applicable to each form of concrete masonry unit required:

1. Provide special shapes where indicated and as follows:

a. For lintels, corners, jambs, sash, control joints, headers, bonding and other special conditions.
b. Square-edged units for outside corners, except where indicated as bullnose.

2. Size: Manufactured to specified dimension of 3/8 inch less than nominal widths by nominal heights by nominal lengths indicated on Drawings.
3. Provide Normal weight units for below grade and exterior use. Provide lightweight units for interior walls and partitions.
4. Exposed Faces: Manufacturer's standard color and texture, unless otherwise indicated.
5. Hollow Load-Bearing Concrete Masonry Units: ASTM C 90 and as follows:

a. Net Area Compressive Strength: 1900 psi minimum.
b. Weight Classification: Normal weight and lightweight.
c. Size and Style: 4 x 4 x 16, 8 x 8x 16, and 12 x 8 x 16 in locations as shown on the Drawings.

6. Mortar Joints: Provide 3/8" wide joints. At all exposed faces of regular concrete block, tool all joints concave. Vertical joints of center score concrete block, if used, shall be tooled concave. Joints on unexposed sides of all block shall be struck flush.

B. Clay Masonry Units: Comply with the following requirements:

1. Provide special molded shapes for applications requiring brick of form, color, texture, and size on exposed surfaces that cannot be produced by sawing standard brick sizes or where stretcher units cannot accommodate special conditions.
2. Provide units without cores or frogs and with all exposed surfaces finished for end of sills, caps, and similar exposed applications that expose brick surfaces that would otherwise be concealed from view.
3. Face Brick Standard: ASTM C216, size as indicated and as follows:

a. Grade: SW (Severe Weather).
b. Compressive Strength: 8,000 psi.
c. Type: FBS (Brick for General Use).

4. Face Brick: Modular face brick to be determined.

C. Mortar and Grout Materials: As follows:

1. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce required mortar color.
2. Masonry Cement: ASTM C 91, Type N or S as required for mortar type.
3. Hydrated Lime: ASTM C 207, Type S.
4. Aggregate for Mortar: ASTM C 144, except for joints less than 1/4 inch use aggregate graded with 100 percent passing the No. 16 sieve.

    a. White Mortar Aggregates: Natural white sand or ground white stone.

5. Aggregate for Grout: ASTM C 404.
6. Water: Clean and potable.
7. Grout: 3,000 psi minimum, ASTM C476.
8. Waterproofing Admixture for Mortar:

    a. Basis of Design: BLOCKTITE™ Mortar Admixture, an integral liquid water repellent admixture for mortar as manufactured by Euclid Chemical Company, 19215 Redwood Road, Cleveland, OH, (800) 321-7628, Fax: (216) 531-9399, www.euclidchemical.com , or approved equivalent.
    b. Admixture shall be specifically formulated for use in masonry mortar mix to provide moisture intrusion resistance and reduce efflorescence potential of masonry mortar joints exposed to the weather. Admixture shall improve mortar durability, not alter the color of colored mortar, and comply with requirements of ASTM C1384 – Standard Specification for Admixtures for Masonry Mortar.
    c. Follow manufacturer's written instruction for product use.
    d. Submit product data of water repellent admixture for review and approval.

D. Mortar and Grout Mixes

1. General

    a. For masonry below grade and in contact with the earth, reinforced unit masonry, and where indicated on the Drawings, use Type S.
    b. For exterior above-grade load bearing and non-load bearing masonry walls and parapet walls, interior load bearing and non-load bearing masonry walls, and other locations where a type is not indicated, use Type N.
    c. Mortar:

        1. For general use with concrete masonry units, conform to requirements of ASTM C270, Type N, minimum compressive Strength of 750 psi for job-mixed mortar, and ASTM C1142 for ready-mixed mortar.
        2. For use with masonry veneer, use only ready-mixed mortar conforming to ASTM C1142 to maintain consistency of mortar color. Do not use job-mixed mortar with masonry veneer due to

possibility of mortar color variations between separate batch mixes.

d. Grout: Grout, for concrete masonry, shall be proportioned by weight as follows, with water added to produce proper consistency for pouring without segregation of materials:

1) Fine Grout: 1 part Portland Cement, 2 to 2-1/2 parts fine aggregate.
2) Coarse Grout: 1 part Portland Cement, 2-1/2 parts fine aggregate and 1 to 2 parts coarse aggregate.

2. Mixing: Mix in strict accordance with manufacturer's latest printed instructions. Do not add admixtures unless otherwise indicated or approved. Do not use calcium chloride in mortar or grout. Measurement of materials shall be such that specified portions can be controlled and accurately and consistently maintained. Mix materials together in a batch mixer for a minimum period of two (2) minutes dry and three (3) minutes wet, using the quantity of water required to obtain the desired workability. Material that has partially set shall not be retempered or used. Mix only as much mortar as can be used in one hour after water has been first mixed into the batch.

2.2 ACCESSORIES

A. Reinforcing Steel: As follows:

1. Steel Reinforcing Bars: Billet steel complying with ASTM A 615.
2. Deformed Reinforcing Wire: ASTM A1064.
3. Plain Welded Wire Fabric: ASTM A1064.
4. Deformed Welded Wire Fabric: ASTM A1064.

B. Joint Reinforcement: Form joint reinforcing from the following:

1. Mill-galvanized carbon steel wire, coating class as required by referenced unit masonry standard for application indicated.
2. Description: Welded-wire units prefabricated with deformed continuous side rods and plain cross rods into straight lengths of not less than 10 feet, with prefabricated corner and tee units, and complying with requirements indicated below:

a. Wire Diameter for Side Rods: 0.1875 inch (3/16") for exterior walls, 0.1483 inch (9 gauge) for interior walls..
b. Wire Diameter for Cross Rods: 0.1483 inch (9 gauge).
c. For single-wythe masonry, provide type as follows with single pair of single side rods:

1) Ladder design. Hohmann & Barnard, Inc., #220 "Lox-All®" Ladder Mesh reinforcement or approved equivalent.

d. For masonry veneer with masonry backup wall, provide type as follows with adjustable wire ties:

1) No. 262 Double Eye Rod Anchor, 3/16-inch diameter hot-dip galvanized wire with No. 263 Double Pintle Tie, 3/16-inch diameter hot-dipped galvanized wire as manufactured by Heckman Building Products, Inc., Chicago, IL, or approved equivalent.
2) No. 270-2X SH Ladder Eye-Wire, ladder style adjustable joint reinforcing with eyes and "swaged" seismic hooks. Interior wythe reinforcing consisting of 3/16-inch diameter wire side rods and 9 gauge wire cross rods with 3/16-inch diameter veneer hooks and eyes as manufactured by Hohmann and Barnard, Inc., Hauppauge, NY, or approved equivalent. All wire components hot-dip galvanized.

C. Ties and Anchors, General: Comply with requirements for metal and size of referenced unit masonry standard and the following:

1. Galvanized Carbon Steel Wire: ASTM A1064, coating class as required by referenced unit masonry standard for application indicated, wire diameter as indicated.
2. All masonry ties shall be hot-dip galvanized, unless otherwise indicated.

D. Rigid Anchors: Provide straps of form, thickness, and length as required.

E. Miscellaneous Anchors: As follows:

1. Anchor Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153, Class C; of diameter, length, and configuration indicated.

F. Embedded Flashing Materials: As follows:

1. Self-Adhering Stainless Steel Flashing:

a. Prefabricated thru-wall flashing material consisting of a flexible 2 mil sheet of Type 304 stainless steel with 8 mils of butyl adhesive and a siliconized release liner: YORK 304® Self Adhering Stainless Steel Flashing as manufactured by York Manufacturing, Inc., Sanford, MA, (800)551-2828, Fax: (888)819-2592, www.yorkmfg.com, or approved equivalent.
b. Flashing shall be UV resistant, puncture resistant, fire and mold resistant, and have excellent bond capability with a wide range of construction materials.
c. Flashing shall have the following properties:

1) Tensile Strength: 100,000 PSI (ASTM D882).
2) Puncture Resistance: 2,500 PSI (ASTM E154).
3) Adhesion: 20 PSI (PSTC-1).
4) Fire Resistance: Pass, Class A (ASTM E84).
5) Mold Resistance: Pass (ASTM D3273).

d. Provide York stainless steel termination bar, sealant, inside and outside flashing corners, prefabricated end dam flashing, and stainless steel drip edge accessories as required for a complete installation.
e. Install flashing and accessories in accordance with manufacturer's instructions.

G. Miscellaneous Masonry Accessories: As follows:

1. Non-metallic Expansion Joint Strips:

a. Premoulded filler strips complying with ASTM D1056, Type 2, Class A, Grade1, compressible up to 35 percent, NSTA – Closed Cell Neoprene Sponge with tear strip and optional Pressure-Sensitive Adhesive on one side, ½" thickness, as manufactured by Hohmann & Barnard, Inc., Hauppauge, NY, (800) 645-0616, www.h-b.com or approved equivalent.

2. Preformed Control Joint Gaskets: Material as indicated below, designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as required.

a. Styrene-Butadiene Rubber Compound: ASTM D 2000, Designation 2AA-805.
b. Polyvinyl Chloride: ASTM D 2287, General Purpose Grade, Type PVC-65406.

3. Bond Breaker Strips: Asphalt-saturated organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).
4. Prefabricated Weep Hole/Cavity Vent:

a. Rectangular Plastic Cell Vents, standard/modular configuration (3/8" x 2-1/2" x 3-3/8") with perforated grid construction as manufactured by MASONPRO®, Inc., 43300 Seven Mile Road, Northville, MI 48167, (800) 659-4731, www.masonpro.com or approved equivalent.
b. Install as weep holes spaced 2'- 0" o.c. at all thru-wall flashing locations in exterior masonry veneer walls in locations as shown on the Drawings.
c. Submit actual color samples of cell vent colors available. Color to be selected by Architect to closely match mortar color.

5. Mortar Collection System:

a. High-density polyethylene (HDPE) strands woven into a 90% open mesh, Mortar Trap™ Mortar Collection System, 2" thick X 10" high X 4ft. long as manufactured by Hohmann & Barnard, Inc., Hauppauge, NY, (800) 645-0616, www.h-b.com or approved equivalent.
b. Configuration of woven mesh designed to break up mortar droppings and prohibit mortar from creating a moisture retaining barrier and to allow water in cavity to freely flow to weep holes.
c. Mesh shall not react with common building products, trap or absorb moisture, support mold or fungus growth, or be edible by insects.
d. Mesh shall not degrade from extreme temperature variations and will last life of the installation.

e. Furnish and install in all masonry cavity wall locations as shown on the Drawings.

H. Masonry Cleaners: As follows:

1. Job-Mixed Detergent Solution: Solution of trisodium phosphate (1/2-cup dry measure) and laundry detergent (1/2-cup dry measure) dissolved in one gallon of water.
2. Proprietary Acidic Cleaner: General-purpose cleaner designed for removing new construction stains from new masonry surfaces without discoloring or damaging masonry surfaces and color-pigmented mortar joints; approved for intended use by manufacturer of masonry units being cleaned.

I. Mortar and Grout Mixes: Do not add admixtures unless otherwise indicated. Do not use calcium chloride in mortar or grout.

1. Mortar for Unit Masonry: ASTM C 270, Specification for job-mixed mortar and ASTM C 1142 for ready-mixed mortar.
2. Limit cementitious materials in mortar to portland cement-lime.
3. For masonry below grade and in contact with earth, reinforced unit masonry, and where indicated, use Type S.
4. For exterior, above-grade loadbearing and nonloadbearing walls and parapet walls, for interior loadbearing walls, for interior nonloadbearing partitions, and for other applications where another type is not indicated, use Type N.

PART 3 - EXECUTION

3.1 INSTALLATION - OVERVIEW

A. Comply with referenced unit masonry standard and other requirements indicated applicable to each type of installation included in Project.

B. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint widths and for accurately locating openings, movement-type joints, returns, and offsets. Avoid the use of less-than-half-size units at corners, jambs, and where possible at other locations.

C. Lay up walls to comply with specified construction tolerances, with courses accurately spaced and coordinated with other construction. Tool all exposed joints concave. During the tooling of joints, enlarge any voids or holes, except weep holes, and completely fill with mortar.

D. Bond Pattern for Exposed Masonry: Lay exposed masonry in running bond pattern; do not use units with less than nominal 4-inch horizontal face dimension at corners or jambs. See exterior building elevations for locations of other coursing. Keep head joints of alternate courses in straight vertical alignment. Lay corners and reveals plumb and true.

E. Built-In Work: As construction progresses, build in items specified under this and other sections of the Specifications. Properly locate and provide for items required to be embedded in or pass-thru masonry in such a manner to avoid cutting or patching.

Coordinate with other trades in advance for requirements. Fill in solidly with masonry around built-in items.

1. Fill space between hollow metal frames and masonry solidly with mortar as masonry is laid unless otherwise indicated on the Drawings. Tool joint between masonry and frame same as for wall unless otherwise indicated.

F. Keep wall cavity air space clean of mortar droppings and other materials during construction. Strike joints facing cavities/air space flush. Install mortar deflection material at all locations of through-wall flashings.

G. Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to the downward flow of water in the wall cavity, and where indicated on the Drawings.

H. Do not use chipped or broken masonry units. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged in any way. If any such units are discovered in the finished wall, Architect may require their removal and replacement with new units at no additional cost to the Owner.

3.2 INSTALLATION – GENERAL

A. Wet concrete blocks 3 to 24 hours before laying if absorption of area immersed in 1/8-inch water for one minute exceeds 0.025 ounces per square inch. Do not place freshly wetted blocks having water or frost fill on surface in any walls.

B. All exposed concrete block surfaces shall receive 3/8-inch tooled joint. Verify joint treatment with sample panel approved by the Architect at the job site.

C. Provide bond beams where indicated on the Drawings. Bond beams shall be continuous course of bond-beam units filled with pea gravel concrete grout and reinforced with two (2) No. 5 bars, unless otherwise indicated on the Drawings. Bars shall be lapped a minimum of 24 bar diameters at splices, corners, and tee intersections.

D. Provide masonry lintels for openings in concrete masonry walls, except where steel lintels are indicated on the Drawings. Masonry lintels shall be lintel block units of load-bearing grade. Texture and joints shall match adjacent wall construction. Masonry lintels shall be long enough to provide at least eight (8) inches bearing on each side of the openings on solid grouted masonry. Unless otherwise shown on the Drawings, masonry lintels shall be reinforced with steel bars in accordance with the following schedule:

Max. Opening Width	Height - Inches	Reinforcement (top & bottom) for each 4" of thickness
4' – 0"	7-5/8"	2 – No. 4
6' – 0"	7-5/8"	2 – No. 4
8' – 0"	15-5/8"	2 – No. 5

E. If center-scored masonry units are indicated on the Drawings, provide mortar at each center score. Tool mortar to match other joints of masonry. Keep face of masonry units clean and free from excess mortar.

F. Maintain masonry work level so far as practicable. Where wall and corners must be built to higher levels than adjacent wall, rack back at rate of one-half unit per course. Toothing is not acceptable.

G. Refer to Structural Drawings for vertical masonry reinforcing.

3.3 INSTALLATION – SPECIFIC

A. Cut masonry units in exposed masonry with masonry saws. Saws shall be kept on the job site at all times during masonry work. Minimum length of any cut unit in exposed masonry work shall be one-half unit length.

B. Lay masonry in full bed of mortar, troweled flat. Form head joints by loading ends of unit with mortar and shoving into place, completely filling joint, without slushing.

C. Lay masonry units with full mortar coverage on outer and inner shell of bed and head joints. Load cross webs of masonry units with mortar in all courses of piers, columns, pilasters, starting courses on solid walls, and all areas to be reinforced and grouted full.

D. Work joints in concrete masonry walls to minimum 3/8" thickness. Work to modular masonry dimensions on interior block work. Cut joints flush. As mortar takes initial set, tool with 5/8" diameter round jointing tool, brush wall, and tool again unless concrete block is to receive plaster, then use flush joint. Compact mortar tightly on both sides of joint. Head joint shall be same size and shape as bed joints. For block, use 18-inch "sled runner" for tooling bed joints. Tool head joints after bed joints.

E. Keep masonry as clean as possible as work progresses. Remove mortar dropping on connecting and adjacent work surfaces before its final set occurs.

F. On completion, point up all exposed masonry, fill all holes and joints. Remove loose mortar, cut out defective joints and re-point where necessary. After all mortar has thoroughly set, clean all exposed surfaces as described in paragraph 3.6.

3.4 REINFORCEMENT

A. Provide vertical reinforcing as indicated on the Drawings. Provide horizontal wall reinforcing in all concrete block walls. Locate reinforcement at maximum vertical spacing of sixteen (16) inches on center and in first and second bed joints at openings. Embed reinforcement in horizontal mortar joints not closer than 5/8" from surface of masonry. Reinforcement shall be continuous and shall extend twenty-four (24) inches minimum beyond ends of lintel. Lap six (6) inches minimum at splices.

B. Concrete block walls and partitions shall be tied together at intersections with prefabricated corner and tee horizontal reinforcing at maximum vertical spacing of 16" o.c.

3.5 PROTECTION

A. Lay no unit masonry work when outside air temperature is below 40ºF unless suitable means are provided to heat the masonry materials and to protect the completed work from freezing for at least 48 hours. No admixture shall be used to lower freezing point of mortar or grout, unless approved by Architect.

B. Cover the top of unit masonry exposed to the weather at the end of each day or shut-down period with a non-staining, waterproof cover. Similarly, protect partially completed walls not being worked. Overhang cover at least two (2) feet on each side of walls and securely anchor.

C. Brace, shore, or otherwise protect walls during erection as required to protect work from damage due to high winds or other causes.

D. Protect newly erected in-place unit masonry construction when anticipated air temperature is as follows:

1. 32º – 25º Fahrenheit: Cover completely for 48 hours after erection.
2. 25º – 20º Fahrenheit: Cover completely with insulating blankets, providing wind breaks and heat sources each side of wall for 48 hours after erection.

E. Protect unit masonry construction from direct exposure to wind and sun when erected in an ambient air temperature of 99º Fahrenheit in the shade with relative humidity of less than 50%.

3.6 FINAL CLEANING

A. After mortar is thoroughly set and cured, clean exposed masonry by first removing large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels before proceeding as follows:

1. Test cleaning methods on sample wall panel; leave ½ panel uncleaned for comparison purposes.
2. Protect adjacent non-masonry surfaces from contact with cleaner.
3. Wet wall surfaces with water prior to application of cleaners; remove cleaners promptly by rinsing thoroughly with clear water.
4. Clean concrete masonry by means of cleaning methods indicated in NCMA TEK 45 applicable to type of stain present on exposed surfaces.
5. Clean brick by means of bucket and brush hand-cleaning method described in BIA “Technical Note No. 20 Revised” using masonry cleaner indicated under products.

END OF SECTION 042000

SECTION 047200 – ARCHITECTURAL CAST STONE

PART 1 - GENERAL

1.1. SCOPE

A. Furnish and install Architectural Cast Stone wall caps, water tables, parapet copings, and other architectural Cast Stone trim in locations as shown on the Drawings. Architectural Cast Stone shall be manufactured using an integral waterproofing admixture.

1.2. RELATED SECTIONS

A. Section 012500 – SUBSTITUTION PROCEDURES.

B. Section 013300 – SUBMITTAL PROCEDURES.

C. Section 042000 – UNIT MASONRY.

D. Section 079200 – JOINT SEALANTS.

1.3. REFERENCE STANDARDS

A. American Concrete Institute (ACI):

1. **ACI 318** – Building Code Requirements for Reinforced Concrete.

B. American Society for Testing and Materials (ASTM):

1 **ASTM A615/A615M** – Standard Specification for Deformed and Plain Billet-Steel Bars for Reinforced Concrete.
2. **ASTM A1064 / A1064M** – Standard Specification for Carbon Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
3. **ASTM C33** – Standard Specification for Concrete Aggregates.
4. **ASTM C150** – Standard Specification for Portland Cement.
5. **ASTM C595/C595M** – Specification for Blended Hydraulic Cements.
6. **ASTM C173** – Standard Test Method for Air Content of Freshly Mixed Concrete by the Volume Method.
7. **ASTM C231** – Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
8. **ASTM C260** – Standard Specification for Air-Entrained Admixtures for Concrete.
9. **ASTM C270** – Standard Specification for Mortar for Unit Masonry.
10. **ASTM C426** – Standard Test Method for Linear Shrinkage of Concrete Masonry Units.
11. **ASTM C494/C494M** – Standard Specification for Chemical Admixtures for Concrete.
12. **ASTM C618** – Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as aMineral Admixture in Concrete.
13. **ASTM C666/666M** – Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing.

14. **ASTM C979** – Standard Specification for Coloring Pigments for Integrally Colored Concrete.
15. **ASTM C989** – Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete.
16. **ASTM C1116** – Standard Specification for Fiber Reinforced Concrete and Shotcrete.
17. **ASTM C1194** – Standard Test Method for Compressive Strength of Architectural Cast Stone.
18. **ASTM C1195** – Standard Test Method for Absorption of Architectural Cast Stone.
19. **ASTM C1364** – Standard Specification for Architectural Cast Stone.
20. **ASTM D1729** – Practice for Visual Appraisal of Colors and Color Differences of Diffusely-Illuminated Opaque Materials.
21. **ASTM D2244** – Standard Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.
22. **ASTM D7957/D7957M** – Standard Specification for Solid Round Glass Fiber Reinforced Polymer Bars for Concrete Reinforcement

C. The Masonry Society (TMS):

1. **TMS 404-504-604** – Standards for Architectural Cast Stone Design – Fabrication - Installation

D. The Cast Stone Institute®.

1.4. DEFINITIONS

A. Cast Stone - a refined architectural concrete building unit manufactured to simulate natural cut stone, used in Division 4 masonry applications.

B. Dry Cast – manufactured from zero slump concrete.

1. Vibrant Dry Tamp (VDT) casting method: Vibratory ramming of earth moist, zero-slump concrete against a rigid mold until it is densely compacted.
2. Machine casting method: Manufactured from earth moist, zero-slump concrete compacted by machinery using vibration and pressure against a mold until it becomes densely consolidated.

C. Wet Cast – Manufactured from measurable slump concrete.

1. Wet casting method: Manufactured from measurable slump concrete and vibrated into a mold until it becomes densely consolidated.

1.5. SUBMITTAL PROCEDURES

A. Samples: Submit pieces of the Cast Stone that are representative of the general range of finish and color proposed to be furnished for the project.

B. Test results: Submit manufacturers test results of Cast Stone previously made by the manufacturer.

C. Shop Drawings: Submit manufacturers shop drawings including profiles, cross-sections, reinforcement, exposed faces, arrangement of joints (optional for standard or semi-custom installations), anchoring methods, anchors (if required), annotation of stone types and their location.

D. Product Data: Submit Cast Stone mix design, all admixture product data, and integral waterproofing admixture product data to show compliance with ASTM standards referenced in this section.

E. Warranty: Submit Cast Stone Institute® Member Limited Warranty. Certification: Submit valid Cast Stone Institute® Plant Certification.

1. Warranty Period: 10 years.

F. Quality Assurance

1. Manufacturer Qualifications:

a. Cast Stone shall be produced in a plant certified by the Cast Stone Institute®.
b. Manufacturer shall have sufficient plant facilities to produce the shapes, quantities and size of Cast Stone required in accordance with the project schedule.
c. Manufacturer shall submit a written list of projects similar in scope and at least three (3) years of age, along with owner, architect and contractor references.

G. Standards: Comply with the requirements of the Cast Stone Institute® Technical Manual and the project specifications. Where a conflict may occur, the contract documents shall prevail.

H Mock-up: Provide full size unit(s) for use in construction of sample wall. The approved mock-up shall become the standard for appearance and workmanship for the project. Coordinate with field constructed mock-up wall panel specified in Section 042000 – UNIT MASONRY.

PART 2 - PRODUCTS

2.1. ARCHITECTURAL CAST STONE

A. Comply with current version ASTM C1364 Physical properties: Provide the following:

1. Compressive Strength - ASTM C1194: 6,500 psi minimum at 28 days.
2. Absorption – ASTM C1195: 6.0% maximum at 28 days.
3. Air Content – Provide sufficient air content to meet the freeze-thaw requirements for wet cast products, when the air content is tested in accordance with ASTM C173/C173M or ASTM C231/C231M. Air entrainment is not required for Vibrant Dry Tamp (VDT) products.
4. Freeze-thaw – ASTM C666/C666M in accordance with ASTM C1364. The CPWL shall be less than 5.0% after 300 cycles of freezing and thawing.

5. Linear Drying Shrinkage – ASTM C426: Test and report in accordance with ASTM C1364.
6. Job site testing – One sample from production units may be selected at random from the field for each 500 cubic feet (14 m 3) delivered to the job site.
7. Three field cut cube specimens from each of these samples shall have an average minimum compressive strength of not less than 85% with no single specimen testing less than 75% of design strength as allowed by ACI 318.
8. Three field cut cube specimens from each of these samples shall have an average maximum cold- water absorption of 6.0%.
9. Field specimens shall be tested in accordance with ASTM C1194 and ASTM C1195.

2.2. RAW MATERIALS

A. Portland cement – Type I or Type III, white and/or grey, ASTM C150 or ASTM C595 Blended Hydraulic Cement (Type 1L).

B. Coarse aggregates - Granite, quartz or limestone, ASTM C33, except for gradation, and are optional for the Vibrant Dry Tamp (VDT) casting method.

C. Fine aggregates - Manufactured or natural sands, ASTM C33, except for gradation.

D. Colors - Inorganic iron oxide pigments, ASTM C979 except that carbon black pigments shall not be used. Provide colors as required to produce a color of Cast Stone resembling "Limestone".

E. Admixtures - Comply with the following:

1. ASTM C260 for air-entraining admixtures.
2. ASTM C494/C495M Types A - G for water reducing, retarding, accelerating, and high range admixtures.
3. ASTM C618 mineral admixtures of dark and variable colors shall not be used in surfaces intended to be exposed to view.
4. ASTM C989 granulated blast furnace slag may be used to improve physical properties. Tests are required to verify these features.
5. Integral Waterproofing: All architectural Cast Stone shall be integrally waterproofed with a water-based hydrophobic concrete admixture as recommended by the Cast Stone manufacturer. Submit complete admixture product data for review and approval.

F. Water: Potable.

G. Reinforcing Bars:

1. Steel: ASTM A615/A615M: Grade 40 or 60.
2. Non-Ferrous: ASTM D7957/ASTM D7957M.

H. Welded Wire Fabric: ASTM A1064/A1064M where applicable for wet cast units.

I. Fiber Reinforcement: ASTM C1116.

J. All anchors, dowels and other anchoring devices and shims shall be standard building stone anchors commercially available in a non-corrosive material such as zinc plated, galvanized steel, brass, or stainless steel Type 302, 304 or 316.

2.3. COLOR AND FINISH

A. Match approved Cast Stone sample on file in Architect's office.

B. All surfaces intended to be exposed to view shall have a fine-grained texture similar to natural limestone, with no air voids in excess of 1/32 in. and the density of such voids shall be le ss than 3 occurrences per any 1 in.2 and not obvious under direct daylight illumination at a 5 ft distance.

C. Units shall exhibit a texture approximately equal to the approved sample when viewed under direct daylight illumination at a 10 ft distance.

1. ASTM D2244 permissible variation in color between units of comparable age subjected to similar weathering exposure.

a. Total color difference – not greater than 6 units.
b. Total hue difference – not greater than 2 units.

D. Minor chipping resulting from shipment and delivery shall not be grounds for rejection. Minor chips shall not be obvious under direct daylight illumination from a 20 -ft distance.

E. The occurrence of crazing or efflorescence shall not constitute a cause for rejection. Remove cement film, if required, from exposed surfaces prior to packaging for shipment.

F. Exposed Cast Stone faces shall be free of joint marks, grain, and other obvious defects. Corners, including false joints shall be uniform and straight. Finish exposed-face surfaces of architectural Cast Stone units to match approved Cast Stone sample and mockup and as follows:

1. Acid-Etched Finish: Use acid and hot-water solution, equipment, application techniques, and cleaning procedures to expose aggregate and surrounding matrix surfaces to match approved Cast Stone sample.
2. Finish all exposed surfaces of architectural Cast Stone units to match face-surface finish.
3. Finish unexposed surfaces of architectural Cast Stone units with as-cast finish.

2.4. REINFORCING

A. Reinforce the units as required for safe handling and structural stress. Minimum reinforcing shall be 0.25 percent of the cross section area.

B. Reinforcement shall be noncorrosive where faces exposed to weather are covered with less than 1.5 inch. of concrete material. All reinforcement shall have minimum coverage of twice the diameter of the bars.

C. Architectural Cast Stone units greater than 24 inches (600 mm) in one direction shall be reinforced in that direction. Units less than 24 inches (600 mm) in both their length and width dimension shall be non-reinforced unless otherwise specified.

D. Welded wire fabric reinforcing shall not be used in dry cast products.

2.5. CURING

A. Cure units in a warm curing chamber approximately 100ºF (37.8ºC) at 95 percent relative humidity for approximately 12 hours, or cure in a 95 percent moist environment at a minimum 70ºF (21.1ºC) for 16 hours after casting. Additional yard curing at 95 percent relative humidity shall be 350 degree- days (i.e. 7 days @ 50°F (10°C) or 5 days @ 70°F (21°C)) prior to shipping. Form cured units shall be protected from moisture evaporation with curing blankets or curing compounds after casting.

2.6. MANUFACTURING TOLERANCES

A. Minimum Thickness shall be 2.5" to facilitate testing for compressive strength and absorption as specified in ASTM C-1364 Standard Specification for Architectural Cast Stone.

B. Cross section dimensions shall not deviate by more than ±1/8 inch from approved dimensions.

C. Length of units shall not deviate by more than length/ 360 or ±1/8 inch, whichever is greater, not to exceed ±1/4 inch

D Maximum length of any unit shall not exceed 15 times the average thickness of such unit unless otherwise agreed by the manufacturer.

E. Warp, bow or twist of units shall not exceed length/ 360 or ±1/8 inch, whichever is greater.

F. Location of dowel holes, anchor slots, flashing grooves, false joints and similar features – On formed sides of unit, 1/8 inch, on unformed sides of unit, 3/8 inch maximum deviation.

2.7. PRODUCTION QUALITY CONTROL

A. Testing:

1. Test compressive strength and absorption from specimens taken from every 500 cubic feet of product produced.
2. Perform tests in accordance ASTM C1194 and ASTM C1195.
3. Have tests performed by an independent testing laboratory every six months.
4. New and existing mix designs shall be tested for strength and absorption compliance prior to producing units.
5. Retain copies of all test reports for a minimum of two years.

2.8. DELIVERY, STORAGE AND HANDLING

A. Mark production units with the identification marks as shown on approved shop drawings. Package units and protect them from staining or damage during shipping and storage. Provide an itemized list of product to support the bill of lading.

PART 3 - EXECUTION

3.1. EXAMINATION

A. Installing contractor shall check Cast Stone materials for fit and finish prior to installation. Unacceptable units shall not be set.

3.2. SETTING TOLERANCES

A. Comply with Cast Stone Institute® Technical Manual.

B. Set stones 1/8 in. or less, within the plane of adjacent units. Joints, plus - 1/16 inch, minus - 1/8 inch

3.3. JOINTING

A. Joint size:

1. At stone/brick joints 3/8 inch
2. At stone/stone joints in vertical position 1/4 inch (3/8 inch optional).
3. Stone/stone joints exposed on top 3/8 inch.

B. Joint materials:

1. Mortar, Type N, ASTM C270.
2. Use a full bed of mortar at all bed joints.
3. Flush vertical joints full with mortar.
4. Leave all joints with exposed tops or under relieving angles open for sealant.
5. Leave head joints in copings and projecting components open for sealant.

C. Location of joints:

1. As shown on approved shop drawings.
2. At control and expansion joints unless otherwise shown.

3.4. SETTING

A. Drench units with clean water prior to setting.

B. Fill dowel holes and anchor slots completely with mortar or non-shrink grout. Set units in full bed of mortar, unless otherwise detailed.

C. Rake mortar joints 3/4 inch deep in for pointing.

D. Remove excess mortar from unit faces immediately after setting. Tuck point unit joints to a slight concave profile.

3.5. JOINT PROTECTION

A. Comply with requirements of Section 079200 – JOINT SEALANTS.

B. Prime ends of units, insert properly sized backing rod and install required sealant.

3.6. REPAIR AND CLEANING

A. Repair chips with touchup materials furnished by manufacturer.

B. Saturate units to be cleaned prior to applying an approved masonry cleaner. Consult with the manufacture for appropriate cleaners.

3.7. INSPECTION AND ACCEPTANCE

A. Inspect finished installation according to Cast Stone Institute® Technical Bulletin #36.

END OF SECTION 047200

SECTION 051200 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes structural steel and grout.

B. Reference Standards:

1. American Society for Testing and Materials (ASTM):

a. ASTM A36 – Standard Specification for Carbon Structural Steel.
b. ASTM A53 – Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
c. ASTM A325 – Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength [*Withdrawn 2016. Replaced by ASTM F3125*.]
d. ASTM A490 – Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength [*Withdrawn 2016. Replaced by ASTM F3125*.]
e. ASTM A500 – Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
f. ASTM A992 – Standard Specification for Structural Steel Shapes.
g. ASTM C1107 – Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
h. ASTM F3125 – Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions.
i. ASTM F436 – Standard Specification for Hardened Steel Washers Inch and Metric Dimensions.
j. ASTM F1852 – Standard Specification for "Twist Off" Type Tension Control Structural Bolt/Nut/Washer Assemblies, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength [*Withdrawn 2016. Replaced by ASTM F3125.*]

2. American Welding Society (AWS):

a. AWS D1.1 – Structural Welding Code, Steel.

3. Master Painter Institute (MPI):

a. MPI #79 – Primer, Alkyd, Anti-Corrosive for Metal.

4. Research Council on Structural Connections (RCSC).
5. The Society for Protective Coatings (SSPC):

a. SSPC SP-2 – Hand Tool Cleaning.

6. American Institute of Steel Construction (AISC):

a. AISC 303 – Code of Standard Practice for Steel Buildings and Bridges.
b. ASIC 360 – Specification for Structural Steel Buildings.

C. Related Sections:

1. Section 052100 – STEEL JOIST FRAMING.
2. Section 099110 – PAINTING.

1.2 DEFINITIONS

A. Structural Steel: Elements of structural-steel frame, as classified by AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

1.3 SUBMITTALS

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

B. Shop Drawings: Show fabrication of structural-steel components, including connections, splices, holes, welds, and bolts.

C. Welding certificates.

D. Mill test reports for structural steel, including chemical and physical properties.

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD.

B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category CSE.

C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

D. Comply with applicable provisions of the following specifications and documents:

1. AISC 303 – “Code of Standard Practice or Steel Buildings and Bridges.”
2. AISC 360 – “Specification for Structural Steel Building”.
3. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

A. W-Shapes: ASTM A 992/A 992M, Grade 50 .

B. Channels, Angles, M or S-Shapes: ASTM A 36/A 36M.

C Plate and Bar: ASTM A 36/A 36M.

D. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B, structural tubing.

E. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.

F. Welding Electrodes: Comply with AWS requirements.

2.2 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts Twist off type or with direct tension indicators; and ASTM F 436, Type 1, hardened carbon-steel washers; all with plain finish.

B. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, heavy-hex head assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.

1. Finish: Plain.

C. Threaded Rods: ASTM A 36/A 36M .

1. Finish: Plain.

2.3 PRIMER

A. Primer: Comply with Section 099110 – PAINTING. Primer requires SSPC-SP 2 surface preparation or better and 24 hours' drying before recoating.

B. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

2.4 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.5 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC 360.

2.6 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug Tightened.

B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

2.7 SHOP PRIMING

A. Shop prime steel surfaces except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches (50 mm).
2. Surfaces to be field welded.
3. Surfaces to be high-strength bolted with slip-critical connections.
4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:

1. SSPC-SP 2, "Hand Tool Cleaning."
2. SSPC-SP 3, "Power Tool Cleaning."

C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 2.0 mils.. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

2.8 SOURCE QUALITY CONTROL

A. Testing Agency: Owner will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports.

1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.

B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

C. Bolted Connections: Shop bolted connections will be inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1. Fillet Welded Connections: Visual inspection.
2. Full Penetration Welded Connections: Ultrasonic inspection.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify, with steel Erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.

B. Base Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.

1. Set plates for structural members on wedges, shims, or setting nuts as required.
2. Weld plate washers to top of baseplate.
3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

3.3 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug Tightened.

B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.

B. Bolted Connections: Bolted connections will be inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

C. Welded Connections: Field welds will be visually inspected according to AWS D1.1/D1.1M.

D. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

END OF SECTION 051200

SECTION 052100 - STEEL JOIST FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. K-series steel joists.
2. Joist accessories.

B. Reference Standards:

1. American Society for Testing and Materials (ASTM):

a. ASTM A36 – Standard Specification for Carbon Structural Steel.
b. ASTM A307 – Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 PSI Tensile Strength.
c. ASTM A325 – Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength [*Withdrawn 2016. Replaced by ASTM F3125.]*
d. ASTM A490 – Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength [Withdrawn 2016. Replaced by ASTM F3125.]
e. ASTM F436 – Standard Specification for Hardened Steel Washers Inch and Metric Dimensions.
f. ASTM F3125 – Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions.

2. American Welding Society (AWS).
3. The Society for Protective Coatings (SSPC):

a. SSPC Paint 15 – Steel Joist Shop Primer/Metal Building Primer.

4. Steel Joist Institute (SJI).

1.2 SUBMITTALS

A. Product Data: For each type of joist, accessory, and product indicated.

B. Shop Drawings: Show layout, designation, number, type, location, and spacings of joists. Include joining and anchorage details, bracing, bridging, joist accessories; splice and connection locations and details; and attachments to other construction.

1. Require a comprehensive engineering analysis certified by the qualified Professional Engineer who is responsible for its preparation and who is legally authorized to practice in the jurisdiction where the project is located.

C. Welding certificates.

D. Manufacturer certificates.

E. Mill Certificates: For bolts.

F. Field quality-control test and inspection reports.

G. Research/Evaluation reports.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer certified by the Steel Joist Institute (SJI) to manufacture joists complying with SJI standard specifications and load tables.

B. SJI Specifications: Comply with SJI's "Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders" (hereafter, SJI's "Specifications") that are applicable to types of joists indicated.

C. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle joists as recommended in SJI's "Specifications."

B. Project joists from corrosion, deformation, and other damage during delivery, storage and handling.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Steel: Comply with SJI's "Specifications" for web and steel-angle chord members.

B. Steel Bearing Plates: ASTM A 36/A 36M.

C. Carbon-Steel Bolts and Threaded Fasteners: ASTM A 307, Grade A, carbon-steel, hex-head bolts and threaded fasteners; carbon-steel nuts; and flat, unhardened steel washers.

1. Finish: Plain, uncoated.

D. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy hex steel structural bolts; ASTM A490 ; and ASTM F 436 (ASTM F 436M) hardened carbon-steel washers.

1. Finish: Plain.

E. Welding Electrodes: Comply with AWS Requirements.

F. Primer: SSPC-Paint 15, or manufacturer's standard shop primer complying with performance requirements in SSPC-Paint 15.

2.2 K-SERIES STEEL JOISTS

A. Manufacture steel joists of type indicated according to "Standard Specifications for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steel-angle top- and bottom-chord members, under slung ends, and parallel top chord.

1. Joist Type: K-series steel joists .

B. Steel Joist Substitutes: Manufacture according to "Standard Specifications for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steel-angle or -channel members.

2.3 JOIST ACCESSORIES

A. Bridging: Provide bridging anchors and number of rows of bridging of material, size, and type required by SJI's "Specifications" for type of joist, chord size, spacing, and span. Furnish additional erection bridging if required for stability.

B. Bridging: Bridging is not indicated on structural drawings. Detail and fabricate according to SJI's "Specifications." Furnish additional erection bridging if required for stability.

C. Supply ceiling extensions if required by Architect, either extended bottom-chord elements or a separate extension unit of enough strength to support ceiling construction. Extend ends to within 1/2 inch of finished wall surface, unless otherwise indicated.

D. Supply miscellaneous accessories, including splice plates and bolts required by joist manufacturer to complete joist installation.

2.4 CLEANING AND SHOP PAINTING

A. Clean and remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories. Apply 1 coat of shop primer with a minimum continuous dry paint film thickness of 1 mil.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Do not install joists until supporting construction is in place and secured. Proceed with installation only after unsatisfactory conditions have been corrected.

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 recommendations, 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.

C. Field weld joists to supporting steel. 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 high-strength structural bolts. Comply with Research Council on Structural Connections' "Specification for Structural Joints" using ASTM A 325 or ASTM A 490 Bolts" for high-strength structural bolt installation and tightening requirements.

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.

F. After installation, promptly clean, prepare and prime or re-prime field connections, rust spots, and abraded surfaces of prime-painted joists and accessories, bearing plates, and abutting structural steel.

3.2 FIELD QUALITY CONTROL

A. Testing Agency: The Owner will engage a qualified independent testing and inspecting agency to inspect field welds and bolted connections and to perform field tests and inspections and prepare test and inspection reports.

B. Correct deficiencies in work that inspections and test reports have indicated are not in compliance with specified requirements.

C. Provide final protection and maintain conditions in a manner acceptable to manufacturer and installer.

END OF SECTION 052100

SECTION 053100 - STEEL DECK

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.

B. Reference Standards

1. American Society for Testing and Materials (ASTM):

a. **ASTM A108** - Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished.
b. **ASTM A653** – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
c. **ASTM A780** – Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
d. **ASTM E329** - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection.
e. **ASTM E548** – Standard Guide for General Criteria Used for Evaluating Laboratory Competence [*Withdrawn standard. No replacement*.]

2. American Iron and Steel Institute (AISI).
3. American Welding Society (AWS):

a. **AWS D1.1** – Structural Welding Code, Steel.
b. **AWS D1.3** – Structural Welding Code, Steel Sheet.

4. Federal Specifications (FS):

a. **TT-P-664** – Primer Coating, Alkyd, Corrosion-Inhibiting, Lead and Chromate Free, Voc-Compliant.

5. Steel Deck Institute (SDI).

1.2 SUMMARY

A. This Section includes the following:

1. Roof deck.

B. Related Sections include the following:

1. Section 051200 - STRUCTURAL STEEL FRAMING for shop-welded shear connectors.
2. Section 055000 - METAL FABRICATIONS for framing deck openings with miscellaneous steel shapes.
3. Section 075423 - SINGLE PLY ROOFING SYSTEM (TPO).

4. Section 099110 – PAINTING for repair of deck special coatings.

1.3 SUBMITTALS

A. Product Data: For each type of deck, accessory, and product indicated.

B. Shop Drawings: Show layout and types of deck panels, anchorage details, reinforcing channels, pans, deck openings, special jointing, accessories, and attachments to other construction.

C. Product Certificates: Signed by steel deck manufacturers certifying that products furnished comply with requirements.

D. Welding Certificates: Copies of certificates for welding procedures and personnel.

E. Product Test Reports: From a qualified testing agency indicating that each of the following complies with requirements, based on comprehensive testing of current products:

1. Mechanical fasteners.

F. Research/Evaluation Reports: Evidence of steel deck's compliance with building code in effect for Project, from a model code organization acceptable to Authorities Having Jurisdiction (AHJ).

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed steel deck similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Testing Agency Qualifications: An independent testing agency, acceptable to Authorities Having Jurisdiction (AHJ), qualified according to ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.

C. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."

D. AISI Specifications: Calculate structural characteristics of steel deck according to AISI's "Specification for the Design of Cold-Formed Steel Structural Members."

1.5 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.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Steel Deck:

a. BHP Steel Building Products USA Inc.
b. Consolidated Systems, Inc.
c. Epic Metals Corp.
d. Marlyn Steel Products, Inc.
e. Nucor Corp.; Vulcraft Div.
f. Roof Deck, Inc.
g. United Steel Deck, Inc.
h. Verco Manufacturing Co.
i. Wheeling Corrugating Co.; Div. of Wheeling-Pittsburgh Steel Corp.
J. Or Approved Equivalent.

2.2 ROOF DECK

A. Steel Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 29, and the following:

1. Galvanized Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33 (230), G60 (Z180) zinc coating.
2. Deck Profile Type WR and N.
3. Profile Depth: 1-1/2 and 3 inches.
4. Steel Thickness: WR = 20 gage and N = 20 gage.
5. Span Condition: 2 span min.
6. Side Laps: Overlapped.
7. Refer to Structural Drawings, Sheet S402, Typical Framing Details, 5/S402 – Metal Deck Schedule for additional information.

2.3 ACCESSORIES

A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.

B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.

C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 (4.8 mm) minimum diameter.

D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.

E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi (230 MPa), not less than 0.0359-inch (0.91-mm) design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.

F. Steel Sheet Accessories: Steel sheet, of same material, finish, and thickness as deck, unless otherwise indicated.

G. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi (230 MPa), of same material and finish as deck, and of thickness and recommended by SDI Publication No. 29 for overhang and slab depth. Provide as necessary.

H. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck, unless otherwise indicated. Provide as necessary.

I. Weld Washers: Uncoated steel sheet, shaped to fit deck rib, 0.0747 inch (1.90 mm) thick, with factory-punched hole of 3/8-inch (9.5-mm) minimum diameter.

J. Shear Connectors: ASTM A 108, Grades 1010 through 1020 headed stud type, cold-finished carbon steel, AWS D1.1, Type B, with arc shields.

K. Galvanizing Repair Paint: ASTM A 780.

L. Repair Paint: Lead- and chromate-free rust-inhibitive primer complying with performance requirements of FS TT-P-664.

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.

3.2 INSTALLATION, GENERAL

A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 29, 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 decking 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.

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 decking.

G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of decking, 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 ROOF DECK INSTALLATION

A. Fasten roof deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter, but not less than 1-1/2 inches (38 mm) long, and as follows:

1. Per structural drawings.

B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of 1/2 of the span or 18 inches (450 mm), and as follows:

1. Per structural drawings.

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm), with end joints as follows:

1. End Joints: Lapped 2 inches (51 mm) minimum.

D. Roof Sump Pans and Sump Plates: Install over openings provided in roof decking and weld flanges to top of deck. Space welds not more than 12 inches (305 mm) apart with at least 1 weld at each corner.

E. Miscellaneous Roof Deck Accessories: Install ridge and valley plates, finish strips, cover plates, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld to substrate to provide a complete deck installation.

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.

3.4 FIELD QUALITY CONTROL

A. Testing: Owner will engage a qualified independent testing agency to perform field quality-control testing.

B. Field welds will be subject to inspection.

C. Shear connector stud welds will be inspected and tested according to AWS D1.1 for stud welding and as follows:

1. Shear connector stud welds will be visually inspected.
2. Bend tests will be performed if visual inspections reveal less than a full 360-degree flash or welding repairs to any shear connector stud.
3. Tests will be conducted on additional shear connector studs if weld fracture occurs on shear connector studs already tested according to AWS D1.1.

D. Testing agency will report test results promptly and in writing to Contractor and Architect.

E. Remove and replace work that does not comply with specified requirements.

F. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

3.6 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on top surface of prime-painted deck immediately after installation and apply repair paint.

C. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION 053100

SECTION 054000 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Exterior non-load-bearing wall framing.

B. Related Sections:

1. Section 061643 – GYPSUM SHEATHING: Exterior wall sheathing.
2. Section 072100 – BUILDING INSULATION: Batt insulation between studs.
3. Section 072726 – FLUID-APPLIED MEMBRANE AIR BARRIERS: Flashing attachment to solid (un-punched) jamb studs at wall openings.
4. Section 133419 – METAL BUILDING SYSTEMS: Coordination with pre-engineered metal building framing.

B. Reference Standards:

1. American Iron and Steel Institute (AISI).
2. American Society for Testing and Materials (ASTM):

a. **ASTM A36** - Standard Specification for Carbon Structural Steel.
b. **ASTM A123** - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
c. **ASTM A446** – Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structure (Physical) Quality [*Withdrawn 1994. Replaced by ASTM A653*].
d. **ASTM A525** – Specification for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process [*Withdrawn 1994. Replaced by ASTM A653*].
e. **ASTM A570** – Standard Specification for Steel, Sheet and Strip, Carbon, Hot-Rolled [*Withdrawn 2000. Replaced by ASTM A1011*].
f. **ASTM A611** - Standard Specification for Structural Steel (SS), Sheet, Carbon, Cold-Rolled [*Withdrawn 2000. Replaced by ASTM A1008*].
g. **ASTM A653** - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
h. **ASTM A780** – Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
i. **ASTM A1003** – Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold Formed Framing Members.
j. **ASTM A1008** - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.
k. **ASTM A1011** - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength-Low Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.

l. **ASTM C1513** – Standard Specification for Steel Taping Screws for Cold-Formed Steel Framing Connections.
m. **ASTM E119** – Standard Test Methods for Fire Tests of Building Construction and Materials.
n. **ASTM E488** – Standard Test Methods for Strength of Anchors in Concrete Elements.
o. **ASTM E1190** – Standard Test Methods for Strength of Power-Actuated Fasteners Installed in Structural Members.

3. American Welding Society (AWS).
4. Steel Stud Manufacturer's Association (SSMA).

1.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design cold-formed metal framing, including comprehensive engineering analysis by a qualified professional engineer currently licensed in the State where the Project is located, using design loads as indicated on the Drawings.

1.3 SUBMITTALS

A. Product Data: For each type of product and accessory indicated.

B. Qualification data.

C. 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.

1.4 QUALITY ASSURANCE

A. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements.

B. Welding: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code--Sheet Steel."

C. Fire-Test-Response Characteristics: Where indicated, provide cold-formed metal framing identical to that of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to Authorities Having Jurisdiction (AHJ).

D. AISI Specifications and Standards: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" and its "Standard for Cold-Formed Steel Framing - General Provisions."

1. Comply with AISI's "Standard for Cold-Formed Steel Framing - Header Design."

E. Comply with AISI's "Standard for Cold-Formed Steel Framing - Prescriptive Method for One and Two Family Dwellings."

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

A. Manufacturers: Subject to compliance with requirements, provide cold-formed metal framing by one of the following (List below includes members of Steel Stud Manufacturers Association (SSMA)).

1. Clark Steel Framing.
2. Consolidated Fabricators Corp.; Building Products Division.
3. Craco Metals Manufacturing, LLC.
4. Dale/Incor.
5. Dietrich Metal Framing; a Worthington Industries Company.
6. MarinoWare; a division of Ware Industries.
7. SCAFCO Corporation.
8. Southeastern Stud & Components, Inc.
9. Steel Construction Systems.
10. United Metal Products, Inc.
11. Approved Manufacturer.

2.2 MATERIALS

A. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:

1. For 16 gage and heavier units, fabricate metal framing components of structural quality steel sheet with a minimum yield point of 40,000 psi; ASTM A 446, ASTM A570, or ASTM A611. Minimum thickness shall be 0.0538 inch, 54 mils, 1.367 mm for 16 gauge units.
2. For 18 gage and lighter units, fabricate metal framing components of commercial quality steel sheet with a minimum yield point of 33,000 psi; ASTM A 446, ASTM A 570, or ASTM A 611. Minimum thickness shall be 0.0428 inch, 43 mils, 1.087 mm for 18 gauge units.
3. Provide galvanized finish to metal framing components complying with ASTM A 525 for minimum G 60 coating.

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. NOTE: Provide solid, unpunched studs for framing perimeter of all exterior window, door and louver openings to permit continuous attachment and sealing of membrane air barrier system components around these openings.

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and same minimum base-metal thickness as steel studs.

C. Vertical Deflection Clips: Manufacturer's standard clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.

D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal and lateral loads.

E. Double Deflection Tracks: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.

2.4 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members, unless otherwise indicated.

B. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.

C. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency.

E. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.

1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

F. Galvanizing Repair Paint: ASTM A780.

2.5 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: ASTM A 780.

B. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

PART 3 - EXECUTION

3.1 PREPARATION

A. Install load bearing shims or grout between the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations to ensure a uniform bearing surface on supporting concrete or masonry construction.

B. Install sealer gaskets to isolate the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations.

3.2 INSTALLATION, GENERAL

A. Install cold-formed metal framing according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions" and to manufacturer's written instructions unless more stringent requirements are indicated.

B. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened.

C. Install framing members in one-piece lengths.

D. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

E. Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both sides of joints.

F. Install insulation, specified in Section 072100 - BUILDING INSULATION, in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.

G. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.

H. Erection Tolerances: Install cold-formed metal framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet 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.

3.3 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION

A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.

B. Fasten both flanges of studs to top and bottom track, unless otherwise indicated. Space studs as indicated.

C. Set studs plumb, except as needed for diagonal bracing or required for non-plumb walls or warped surfaces and similar requirements.

D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.

1. Install single deflection tracks and anchor to building structure.
2. Install double deflection tracks and anchor outer track to building structure.
3. Connect vertical deflection clips to bypassing or infill studs and anchor to primary building structure.

E. Install horizontal bridging in wall studs, spaced in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.

1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches 18 inches of single deflection track. Install a combination of flat, taut, steel sheet straps of width and thickness indicated and stud or stud-track solid blocking of width and thickness matching studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
2. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
3. 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.
4. Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, fasteners, and stud girts, to provide a complete and stable storefront or curtain-wall-framing system.

3.4 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 Structural Engineer.

D. Remove and replace work where test results indicate that it does not comply with specified requirements.

E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.5 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed metal framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 054000

SECTION 055000 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Miscellaneous steel framing and supports.
2. Miscellaneous steel trim.
3. Steel pipe bollards.

1.2 REFERENCE STANDARDS

A. American National Standards Institute (ANSI):

1. **ANSI A14.3** – Ladders – Fixed – Safety Requirements.

B. American Society for Testing and Materials (ASTM):

1. **ASTM A27** – Standard Specification for Steel Castings, Carbon, for General Application.
2. **ASTM A36** - Standard Specification for Carbon Structural Steel.
3. **ASTM A47** – Standard Specification for Ferritic Malleable Iron Castings.
4. **ASTM A53** - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
5. **ASTM A276** – Standard Specification for Stainless Steel Bars and Shapes.
6. **ASTM A500** - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
7. **ASTM A780** – Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
8. **ASTM B633** - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel.
9. **ASTM C1107** - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink.)
10. **ASTM D1187** - Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal.
11. **ASTM F1941** – Standard Specification for Electrodeposited Coatings on Mechanical Fasteners, Inch and Metric.
12. **ASTM F2329** - Standard Specification for Zinc Coating, Hot-Dip, Requirements for Application to Carbon and Alloy Steel Bolts, Screws, Washers, Nuts, and Special Threaded Fasteners.

C. Master Painter Institute (MPI):

1. **MPI #79** – Primer, Alkyd, Anti-Corrosive for Metal.

D. The Society for Protective Coatings (SSPC):

1. **SSPC-PA1** – Shop, Field, and Maintenance Coating of Metals.
2. **SSPC-Paint 20** – Zinc-Rich Primers (Type I, Inorganic, and Type II, Organic).

E. National Association of Architectural Metal Manufacturers (NAAMM).

1.3 SUBMITTALS

A. Shop Drawings: Show fabrication and installation details for metal fabrications.

1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces without blemishes.

2.2 FERROUS METALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.

C. Steel Tubing: ASTM A 500, cold-formed steel tubing.

D. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40) unless otherwise indicated.

2.3 FASTENERS

A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, at exterior walls.

1. Provide stainless-steel fasteners for fastening aluminum.
2. Provide stainless-steel fasteners for fastening stainless steel.
3. Provide stainless-steel fasteners for fastening nickel silver.
4. Provide bronze fasteners for fastening bronze.

B. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.

C. Post-Installed Anchors: chemical anchors.

2.4 MISCELLANEOUS MATERIALS

A. Shop Primers: Provide primers that comply with Section 099110 - PAINTING.

B. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

E. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

F. Concrete: Comply with requirements in Section 033000 - CAST-IN-PLACE CONCRETE for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 3000 psi (20 MPa).

2.5 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Use connections that maintain structural value of joined pieces.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges. Remove sharp or rough areas on exposed surfaces.

C. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended.

D. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Locate joints where least conspicuous.

E. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

F. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors not less than 24 inches (600 mm) o.c.

2.6 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.

2.7 MISCELLANEOUS STEEL TRIM

A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.

B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.

C. Galvanize all exterior miscellaneous steel trim.

2.8 STEEL PIPE BOLLARDS

A. Fabricate steel pipe bollards from Schedule 40 steel pipe, 6-inch minimum diameter, or size as indicated on the Drawings.

B. Exterior bollards shall be hot-dipped galvanized.

C. Fabricate bollards with 3/8-inch (9.5-mm) thick steel base plates for bolting to concrete slab or concrete pads if shown on the Drawings. Drill base plates at all four corners for ¾-inch (19-mm) diameter anchor bolts.

D. Fabricate bollards for installation into concrete footings if shown on the Drawings.

E. Fill bollards with 3,000 psi minimum concrete. Form concrete at top of bollard into a curved dome shape to shed water.

F. Prime bollards with zinc-rich primer and paint as specified in Section 099110 – PAINTING. Color of bollards as directed by Architect."

2.9 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish metal fabrications after assembly.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

3.2 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 055000

SECTION 055000 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Miscellaneous steel framing and supports.
2. Miscellaneous steel trim.

1.2 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM):

1. **ASTM A27** – Standard Specification for Steel Castings, Carbon, for General Application.
2. **ASTM A36** - Standard Specification for Carbon Structural Steel.
3. **ASTM A47** – Standard Specification for Ferritic Malleable Iron Castings.
4. **ASTM A53** - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
5. **ASTM A276** – Standard Specification for Stainless Steel Bars and Shapes.
6. **ASTM A500** - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
7. **ASTM A780** – Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
8. **ASTM B633** - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel.
9. **ASTM C1107** - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink.)
10. **ASTM D1187** - Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal.
11. **ASTM F1941** – Standard Specification for Electrodeposited Coatings on Mechanical Fasteners, Inch and Metric.
12. **ASTM F2329** - Standard Specification for Zinc Coating, Hot-Dip, Requirements for Application to Carbon and Alloy Steel Bolts, Screws, Washers, Nuts, and Special Threaded Fasteners.

B. Master Painter Institute (MPI):

1. **MPI #79** – Primer, Alkyd, Anti-Corrosive for Metal.

C. The Society for Protective Coatings (SSPC):

1. **SSPC-PA1** – Shop, Field, and Maintenance Coating of Metals.
2. **SSPC-Paint 20** – Zinc-Rich Primers (Type I, Inorganic, and Type II, Organic).

D. National Association of Architectural Metal Manufacturers (NAAMM).

1.3 SUBMITTALS

A. Shop Drawings: Show fabrication and installation details for metal fabrications.

1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces without blemishes.

2.2 FERROUS METALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.

C. Steel Tubing: ASTM A 500, cold-formed steel tubing.

D. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40) unless otherwise indicated.

2.3 FASTENERS

A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, at exterior walls.

1. Provide stainless-steel fasteners for fastening aluminum.
2. Provide stainless-steel fasteners for fastening stainless steel.
3. Provide stainless-steel fasteners for fastening nickel silver.
4. Provide bronze fasteners for fastening bronze.

B. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.

C. Post-Installed Anchors: chemical anchors.

2.4 MISCELLANEOUS MATERIALS

A. Shop Primers: Provide primers that comply with Section 099110 - PAINTING.

B. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

E. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

F. Concrete: Comply with requirements in Section 033000 - CAST-IN-PLACE CONCRETE for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 3000 psi (20 MPa).

2.5 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Use connections that maintain structural value of joined pieces.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges. Remove sharp or rough areas on exposed surfaces.

C. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended.

D. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Locate joints where least conspicuous.

E. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

F. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors not less than 24 inches (600 mm) o.c.

2.6 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.

2.7 MISCELLANEOUS STEEL TRIM

A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.

B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.

C. Galvanize all exterior miscellaneous steel trim.

2.8 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish metal fabrications after assembly.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

3.2 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 055000

SECTION 055100 - METAL STAIRS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Preassembled steel stairs with concrete-filled treads.
2. Steel tube handrails and guardrails attached to metal stairs.
3. Steel tube handrails attached to walls adjacent to metal stairs.
4. Steel tube handrails and guardrails attached to stair landings.

B. Related Sections:

1. Section 033000 – CAST-IN-PLACE CONCRETE
2. Section 055000 – METAL FABRICATIONS.
3. Section 055213 – PIPE AND TUBE RAILINGS.

1.2 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM):

1. **ASTM A36** – Standard Specification for Carbon Structural Steel.
2. **ASTM A123** – Standard Specification for Zinc (Hot-Dipped Galvanized) Coatings on Iron and Steel Products.
3. **ASTM A153** – Standard Specification for Zinc Coating (Hot-Dip_ on Iron and Steel Hardware.
4. **ASTM A185** – Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
5. **ASTM A283** – Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.
6. **ASTM A500** – Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
7. **ASTM A780** – Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
8. **ASTM A786** – Standard Specification for Hot-Rolled Carbon, Low-Alloy, High-Strength Low-Alloy, and Alloy Steel Floor Plates.
9. **ASTM A1011** – Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
10. **ASTM A1018** – Standard Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Hot-Rolled, Carbon, Commercial, Drawings, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
11. **ASTM B633** – Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel.
12. **ASTM D1187** – Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal.
13. **ASTM F1941** – Standard Specification for Electrodeposited Coatings on Mechanical Fasteners, Inch and Metric.

B. Master Painters Institute® (MPI):

1. **MPI #79** – Primer, Alkyd, Anti-Corrosive for Metal.

C. National Association of Architectural Metal Manufacturers (NAAMM).

D. National Ornamental and Miscellaneous Metals Association (NOMMA).

E. The Society for Protective Coatings (SSPC):

1. **SSPC-PA1** – Shop, Field, and Maintenance Painting of Steel.
2. **SPPC-SP6/NACE No. 3** – Commercial Blast Cleaning.

1.3 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design metal stairs, including comprehensive engineering analysis by a qualified professional engineer, licensed in the State of Arkansas, using performance requirements and design criteria indicated.

B. Structural Performance of Stairs: Metal stairs shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.

1. Uniform Load: 100 lbf/sq.ft.
2. Concentrated Load: 300 lbf applied on an area of 4 sq. in.
3. Uniform and concentrated loads need not be assumed to act concurrently.
4. Stair Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.
5. Limit deflection of treads, platforms, and framing members to L/360 or ¼ inch, whichever is less.

C. Structural Performance of Railings: Railings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.

1. Handrails and Top Rails of Guards:

a. Uniform load of 50 lbf/ft. applied in any direction.
b. Concentrated load of 200 lbf applied in any direction.
c. Uniform and concentrated loads need not be assumed to act concurrently.

2. Infill of Guards:

a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft.
b. Infill load and other loads need not be assumed to act concurrently.

1.4 SUBMITTALS

A. Shop Drawings: Shop Drawings: Include plans, elevations, sections, details, and attachments to other work. Provide stair calculations stamped by a registered engineer currently licensed in the State of Arkansas.

B. Delegated Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including design analysis data signed and sealed by the qualified engineer, currently licensed in the state of Arkansas, responsible for their preparation.

PART 2 - PRODUCTS

2.1 METALS

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For components exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

C. Steel Tubing: ASTM A 500 cold formed.

D. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.

E. Steel Bars for Grating Treads: ASTM A 36/A 36M or steel strip, ASTM A 1011 / A 1011M or ASTM A 1018/A 1018M.

2.2 MISCELLANEOUS MATERIALS

A. Provide anchors for embedding units in concrete, either integral or applied to units, as standard with manufacturer.

B. Apply bituminous paint to concealed surfaces of cast-metal units set into concrete.

C. Apply clear lacquer to concealed surfaces of extruded units set into concrete.

D. Fasteners: Provide zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 12 for exterior use, and Class Fe/Zn 5 where built into exterior walls. Select fasteners for type, grade, and class required.

E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

F. Universal Shop Primer: Fast-curing, lead and chromate-free, universal modified-alkyd primer complying with MPI #79 and compatible with topcoat.

G. Concrete Materials and Properties: Comply with requirements in Section 033000 - CAST-IN-PLACE CONCRETE for normal-weight, air-entrained, ready-mix pea gravel concrete with a minimum 28 day compressive strength of 3000 psi for stair pan infill unless otherwise indicated.

H. Welded Wire Fabric: ASTM A185/A 185M, 6 by 6 inches, W1.4 X W1.4 unless otherwise indicated.

2.3 FABRICATION, GENERAL

A. Provide complete stair assemblies, including metal framing, hangers, struts, railings, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.

1. Join components by welding unless otherwise indicated.
2. Use connections that maintain structural value of joined pieces.

B. Preassembled Stairs: Assemble stairs in shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations.

C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges. Remove sharp or rough areas on exposed surfaces.

D. Form bent-metal corners to smallest radius possible without impairing work.

E. Welded connections to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Weld exposed corners and seams continuously unless otherwise indicated.
5. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 3 welds: welds used in areas where it is not subject to view – as in service stairs.

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Locate joints where least conspicuous.

2.4 STEEL-FRAMED STAIRS

A. Stair Framing:

1. Fabricate stringers of 12” steel channels.
2. If using bolts, fabricate and join so bolts are not exposed on finished surfaces.

B. Metal-Pan Stairs: Form risers, subtread pans, and subplatforms to configurations shown from steel sheet of thickness not less than 0.067 inch (14-gauge).

2.5 STAIR RAILINGS

A. Steel Tube Railings: Fabricate railings to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of tube, post spacings, and anchorage.

1. Horizontal and Sloping Rails and Vertical Posts: 1-1/2-inch- diameter top, bottom and horizontal and sloping intermediate rails and 1-1/2-inch-diameter vertical posts.
2. Picket Infill: 1 inch diameter pickets spaced less than 4 inches clear.

B. Welded Connections: Fabricate railings with welded connections. Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

1. Finish welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 3 welds: welds used in areas where it is not subject to view – as in service stairs.

C. Form changes in direction of railings by bending.

D. Form curves by bending members in jigs to produce uniform curvature without buckling.

E. Close exposed ends of railing members with prefabricated end fittings.

F. Provide wall returns at ends of wall-mounted handrails.

G. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnecting components and for attaching to other work.

1. Connect posts to stair framing by direct welding.

H. Fillers: Provide fillers made from steel plate, or other suitably crush-resistant material, to transfer wall bracket loads through wall finishes. Size fillers to suit wall finish thicknesses.

2.6 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish metal stairs after assembly.

C. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.

D. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

E. Apply shop primer to uncoated surfaces of metal stair components. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.

B. Install metal stairs by welding stair framing to steel structure.

C. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication.

D. Field Welding: Comply with requirements for welding in "Fabrication, General" Article 2.3 of this Section.

E Place and finish concrete fill for treads and platforms to comply with Section 033000 - CAST-IN-PLACE CONCRETE.

F. Attach handrails to wall with wall brackets. Use type of bracket with predrilled hole for exposed bolt anchorage.

3.2 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 055100

SECTION 055213 - PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. This section includes the following:

1. Steel pipe and tube handrails and railing systems for interior stairs and exterior steps and ramps in locations as shown on the Drawings.
2. All exterior handrails and railing systems shall be hot-dipped galvanized with a painted finish.

1.2 DEFINITIONS

A. Definitions in ASTM E 985 “Standard Specification for Permanent Metal Railing Systems and Rails for Buildings”, for railing-related terms apply to this Section.

1.3 RELATED SECTIONS

A. Section 033000 – CAST-IN-PLACE CONCRETE.

B. Section 055000 – METAL FABRICATIONS.

C. Section 055100 – METAL STAIRS.

D. Section 099110 – PAINTING.

1.4 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM):

1. **ASTM A36** – Standard Specification for Carbon Structural Steel.
2. **ASTM A47** – Standard Specification for Ferritic Malleable Iron Castings.
3. **ASTM A48** – Standard Specification for Gray Iron Castings.
4. **ASTM A53** – Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
5. **ASTM A500** – Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
6. **ASTM A501** – Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
7. **ASTM B633** - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel.
8. **ASTM B696** - Standard Specification for Coatings of Cadmium Mechanically Deposited.
9. **ASTM C1107** - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).

B. Military Specifications - Department of Defense (DOD) Standards:

1. **DOD-P-21035** – Specification Galvanizing Repair Coating.

C. Federal Specifications (FS):

1. **FS-TT-P-664** – Primer Coating, Alkyd, Corrosion-Inhibiting, Lead And Chromate Free, Voc-Compliant.

D. The Society for Protective Coatings (SSPC):

1. **SSPC-Paint 5** – Zinc Dust, Zinc Oxide and Phenolic Varnish Paint [*Discontinued 2005*].
2. **SSPC-Paint 12** – Cold Applied Asphalt Mastic Paint (Extra Thick Film) [*Discontinued 2005*].
3. **SSPC-Paint 20** – Zinc-Rich Primers (Type I, Inorganic, and Type II, Organic).

E. National Association of Architectural Metal Manufacturers (NAAMM).

F. American Iron and Steel Institute (AISI).

G. National Ornamental and Miscellaneous Metal Association (NOMMA) – Voluntary Joint Finish Standards.

1.5 PERFORMANCE REQUIREMENTS

A. General: In engineering handrail and railing systems to withstand structural loads indicated, determine allowable design working stresses of materials based on the following:

1. Cold-Formed Structural Steel: AISI "Specification for the Design of Cold-Formed Steel Structural Members."

B. Structural Performance of Handrails and Railing Systems: Engineer, fabricate, and install handrails and railing systems to withstand the following structural loads without exceeding the allowable design working stress of the materials for handrails, railing systems, anchors, and connections. Apply each load to produce the maximum stress in each of the respective components comprising handrails and railing systems.

1. Top Rail of Guardrail Systems: Capable of withstanding the following loads applied as indicated:

a. Concentrated load of 250 lbf (890 N) applied at any point and in any direction.
b. Uniform load of 50 lbf per linear foot (730 N/m) applied horizontally and concurrently with uniform load of 100 lbf per linear foot (1460 N/m) applied vertically downward.
c. Concentrated and uniform loads above need not be assumed to act concurrently.

2. Handrails Not Serving as Top Rails: Capable of withstanding the following loads applied as indicated:

    a. Concentrated load of 200 lbf (890 N) applied at any point and in any direction.
    b. Uniform load of 50 lbf per linear foot (730 N/m) applied in any direction.
    c. Concentrated and uniform loads above need not be assumed to act concurrently.

3. Infill Area of Guardrail Systems: Capable of withstanding a horizontal concentrated load of 200 lbf (890 N) applied to 1 sq. ft. (0.09 sq. m) at any point in the system including panels, intermediate rails, balusters, or other elements composing the infill area.

    a. Above load need not be assumed to act concurrently with loads on top rails of railing systems in determining stress on guard.

C. Thermal Movements: Allow for thermal movement resulting from the following maximum change (range) in ambient temperature in engineering, fabricating, and installing handrails and railing systems to prevent buckling, opening of joints, overstressing of components and connections, and other detrimental effects. Base engineering calculation on actual surface temperatures of materials due to both solar heat gain and nighttime sky heat loss.

1. Temperature Change (Range): 120 deg F (67 deg C) ambient 180 deg F (100 deg C) material surfaces.

D. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.6 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Shop drawings showing fabrication and installation of handrails and railing systems including plans, elevations, sections, details of components, and attachments to other units of Work.

1.7 QUALITY ASSURANCE

A. Single-Source Responsibility: Obtain handrails and railing systems of each type and material from a single manufacturer.

B. Engineer Qualifications: Professional engineer currently licensed to practice in Arkansas and experienced in providing engineering services of the kind indicated for handrails and railing systems similar to this Project in material, design, and extent, and that have a record of successful in-service performance.

1.8 STORAGE

A. Store handrails and railing systems inside a well-ventilated area, away from uncured concrete and masonry and protected from weather, moisture, soiling, abrasion, extreme temperatures, and humidity.

1.9 PROJECT CONDITIONS

A. Field Measurements: Where handrails and railing systems are indicated to fit to other construction, check actual dimensions of other construction by accurate field measurements before fabrication; show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.10 SEQUENCING AND SCHEDULING

A. Sequence and coordinate installation of wall handrails as follows:

1. Mount handrails only on completed walls. Do not support handrails temporarily by any means not satisfying structural performance requirements.
2. Mount exterior handrails on concrete or masonry assemblies utilizing appropriate fasteners for the substrate.

PART 2 - PRODUCTS

2.1 METALS

A. General: Provide metals free from surface blemishes where exposed to view in the finished unit. Exposed-to-view surfaces exhibiting pitting, seam marks, roller marks, stains, discolorations, or other imperfections on finished units are not acceptable.

B. Steel and Iron: Provide steel and iron in the form indicated, complying with the following requirements:

1. Steel Pipe: ASTM A 53; finish, type, and weight class as follows:

a. Hot-dip galvanized finish for exterior conditions, unless otherwise indicated.
b. Type F, standard weight (schedule 40), unless otherwise indicated, or another weight, type, and grade required by structural loads.

2. Steel Tubing: Product type (manufacturing method) and other requirements as follows:

a. Cold-Formed Steel Tubing: ASTM A 500, grade as indicated below:

1) Grade A, unless otherwise indicated or required by structural loads.

b. Hot-Formed Steel Tubing: ASTM A 501.

3. Steel Plates, Shapes, and Bars: ASTM A 36.

4. Gray Iron Castings: ASTM A 48, Class 30.
5. Malleable Iron Castings: ASTM A 47, Grade 32510.

C. Brackets, Flanges, and Anchors: Cast or formed metal of the same material and finish as supported rails, unless otherwise indicated.

2.2 WELDING MATERIALS, FASTENERS, AND ANCHORS

A. Welding Electrodes and Filler Metal: Provide type and alloy of filler metal and electrodes as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.

B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of the type, grade, and class required to produce connections that are suitable for anchoring railings to other types of construction indicated and capable of withstanding design loadings.

1. For steel railings and fittings, use plated fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating, or ASTM B 696, Class 12 for cadmium plating.

C. Fasteners for Interconnecting Railing Components: Use fasteners of same basic metal as the fastened metal, unless otherwise indicated. Do not use metals that are corrosive or incompatible with materials joined.

1. Provide concealed fasteners for interconnecting railing components and their attachment to other work, except where otherwise indicated.

2.3 PAINT

A. Shop Primers: Provide primers to comply with applicable requirements of Section 099110 - PAINTING.

B. Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer, selected for good resistance to normal atmospheric corrosion, compatibility with finish paint systems indicated, and capability to provide a sound foundation for field-applied topcoats despite prolonged exposure, complying with performance requirements of FS TT-P-664.

C. Shop Primer for Galvanized Steel: Zinc-dust, zinc-oxide primer formulated for priming zinc-coated steel and compatibility with finish paint systems indicated, complying with SSPC-Paint 5.

D. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in galvanized steel, with dry film containing not less than 94 percent zinc dust by weight, complying with DOD-P-21035 or SSPC-Paint 20.

E. Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint 12, except containing no asbestos fibers.

2.4 GROUT AND ANCHORING CEMENT

A. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

B. Erosion-Resistant Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to erosion from water exposure without need for protection by a sealer or waterproof coating and is recommended for exterior use by manufacturer.

C. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:

1. Nonshrink, Nonmetallic Grouts:

a. B-6 Construction Grout; W.R. Bonsal Co.
b. Sure-grip High Performance Grout; Dayton Superior Corp.
c. Sealtight 588 Grout; W.R. Meadows, Inc.
d. Sonogrout 14; Sonneborn Building Products--ChemRex, Inc.
e. Kemset; The Spray-Cure Company.
f. Or approved equivalent product.

2.5 FABRICATION

A. General: Fabricate handrails and railing systems to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of hollow members, post spacings, and anchorage, but not less than those required to support structural loads.

B. Assemble handrails and railing systems in the shop to the greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

C. Form changes in direction of members as follows:

1. By radius bends of radius indicated.
2. By mitering at elbow bends.
3. By insertion of prefabricated flush elbow fittings.
4. By any method indicated above, applicable to change of direction involved.

D. Form simple and compound curves by bending pipe in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross section of pipe throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of pipe.

E. Welded Connections: Fabricate handrails and railing systems for connection of members by welding. For connections made during fabrication, weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At tee and cross intersections, cope ends of intersecting members to fit contour of pipe or tube to which end is joined, and weld all around.
5. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and welded surface matches contours of adjoining surfaces.
6. See Attachment 1 at the end of this section for NOMMA standards of visual appearance for welded joint connections for pipe and tube members used in stair and ramp handrail and guardrail construction. Visual appearance of weld for this project shall be Type 3 (Finish #3): “Welds used in areas of traffic where it is not subject to view -as in service stairs.”

F. Brackets, Flanges, Fittings, and Anchors: Provide manufacturer's standard wall brackets, flanges, miscellaneous fittings, and anchors to interconnect handrail and railing system members to other construction.

G. Shear and punch metals cleanly and accurately. Remove burrs from exposed cut edges.

H. Ease exposed edges to a radius of approximately 1/32 inch (1 mm), unless otherwise indicated. Form bent-metal corners to the smallest radius possible without causing grain separation or otherwise impairing work.

I. Cut, reinforce, drill, and tap components, as indicated, to receive finish hardware, screws, and similar items.

J. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated.

K. Fillers: Provide steel sheet or plate fillers, of thickness and size indicated or required to support structural loads of handrails, where needed to transfer wall bracket loads through wall finishes to structural supports. Size fillers to suit wall finish thicknesses to produce adequate bearing to prevent bracket rotation and overstressing substrate.

2.6 FINISHES, GENERAL

A. Comply with NAAMM "Metal Finishes Manual" for recommendations relative to applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering prior to shipment.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one half of the range of approved samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved samples and they are assembled or installed to minimize contrast.

2.7 STEEL FINISHES

A. Preparation for Shop Priming: Prepare uncoated ferrous metal surfaces to comply with minimum requirements indicated below for SSPC surface-preparation specifications and environmental exposure conditions of installed railings:

1. Interiors (SSPC Zone 1A): SSPC-SP 7 "Brush-Off Blast Cleaning."

B. Apply shop primer to prepared surfaces of handrails and railing components, unless otherwise indicated. Comply with requirements of SSPC-PA 1 "Paint Application Specification No. 1" for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.

1. Do not apply primer to galvanized surfaces.
2. Stripe paint all edges, corners, crevices, bolts, welds, and sharp edges.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installing anchorages, such as sleeves, concrete inserts, anchor bolts, and miscellaneous items having integral anchors, that are to be embedded in concrete and masonry construction. Coordinate delivery of such items to Project site.

3.2 INSTALLATION, GENERAL

A. Fit exposed connections accurately together to form tight, hairline joints.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing handrails and railing systems. Set handrails and railing systems accurately in location, alignment, and elevation, measured from established lines and levels and free from rack.

1. Do not weld, cut, or abrade surfaces of handrails and railing components that have been coated or finished after fabrication and are intended for field connection by mechanical or other means without further cutting or fitting.
2. Set posts plumb within a tolerance of 1/4 inch in 12 feet (2 mm in 1 m).
3. Align rails so that variations from level for horizontal members and from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet (2 mm in 1 m).

C. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing, and welded surface matches contours of adjoining surfaces.

D. Adjust handrails and railing systems prior to anchoring to ensure matching alignment at abutting joints. Space posts at interval indicated but not less than that required by design loadings.

E. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing handrails and railing systems and for properly transferring loads to in-place construction.

3.3 RAILING CONNECTIONS

A. Welded Connections: Use fully welded joints for permanently connecting railing components by welding. Cope or butt components to provide 100 percent contact, or use fittings designed for this purpose. Refer to paragraph 2.5.E.6 of this section for welded joint finish type information.

3.4 ATTACHING HANDRAILS TO WALLS

A. Attach handrails to wall with wall brackets and end fittings. Provide bracket with 1-1/2-inch (38-mm) clearance from inside face of handrail to finished wall surface.

B. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.

C. Secure wall brackets and wall return fittings to building construction as follows:

1. Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt.

3.5 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material.

3.6 PROTECTION

A. Protect finishes of handrails and railing systems from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

B. Restore finishes damaged during installation and construction period so that no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

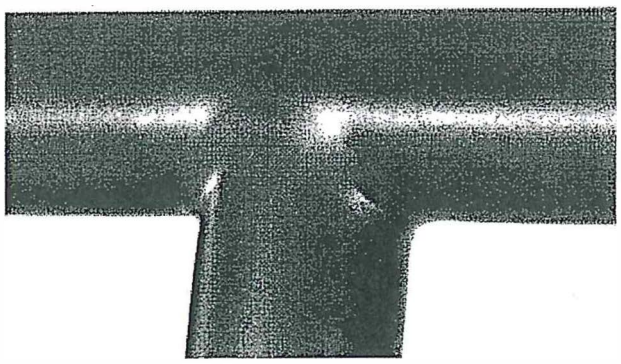
END OF SECTION 055213

CONSTRUCTION DETAILS

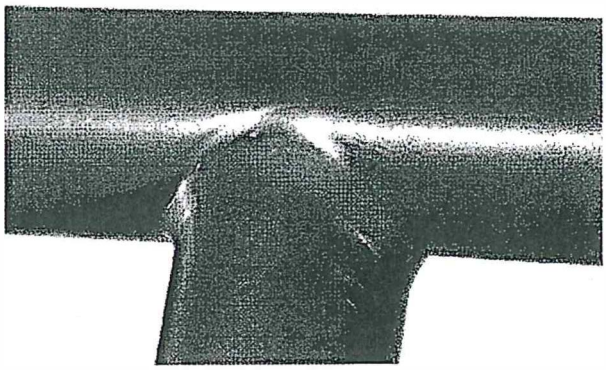
Railing System Joint Construction

Welded Steel Pipe or Tubing with Prime Coat of Paint Applied

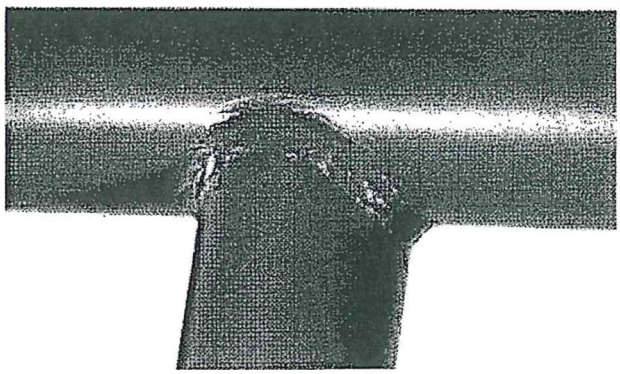
Type 1 — Ornamental quality — used where appearance is a critical factor
Type 2 — Weld of good appearance used in areas of traffic — where highly ornamental quality is not required
Type 3 — Used in areas where it is not subject to view — as in service stairs
Type 4 — Acceptable when appearance is not a factor — used in industrial and non-public areas



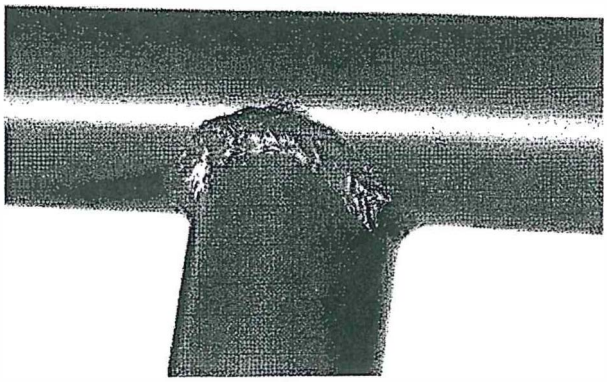
Type 1



Type 2



Type 3



Type 4

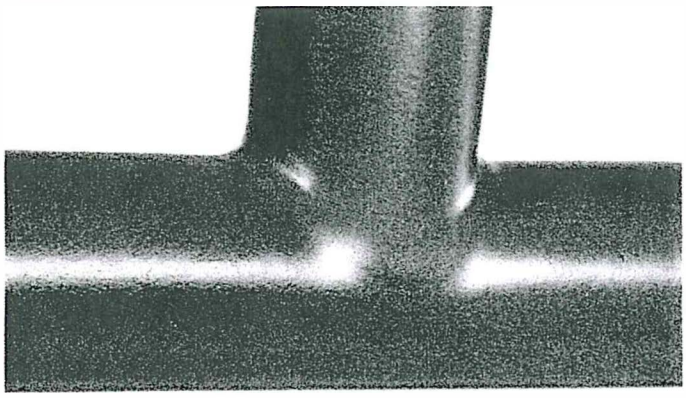
The above descriptions for Railing System Joint Construction are based on "Voluntary Joint Finish Standards" developed by the National Ornamental & Miscellaneous Metals Association (NOMMA). Photographs were provided through the courtesy of NOMMA.

Guideline 1: Joint Finishes

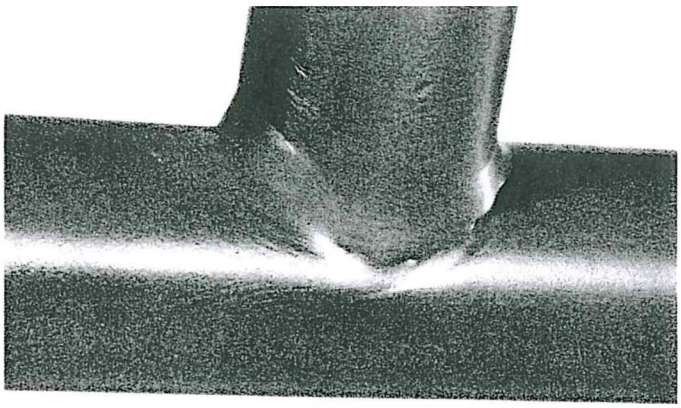
These voluntary guidelines were developed by the NOMMA Standards Committee, with strong input from the membership.

All samples shown are primed steel.

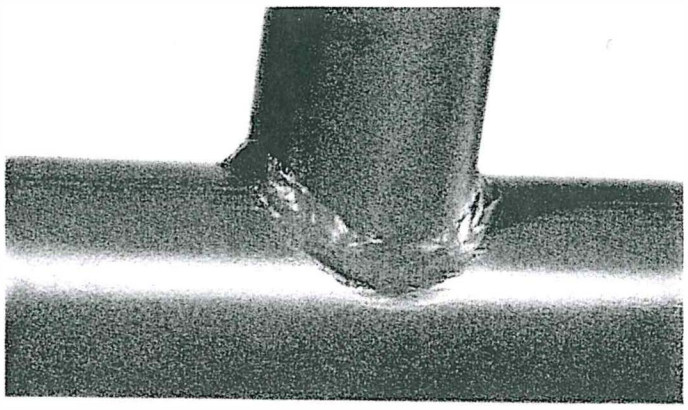
Example C: 1½" to 1½" pipe "T"



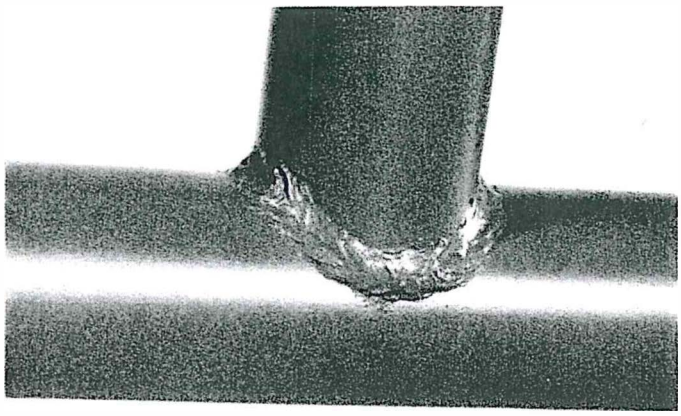
Finish #1 - No evidence of a welded joint.



Finish #2 - Completely sanded joint, some undercutting and pinholes OK.



Finish #3 - Partially dressed weld with spatter removed.



Finish #4 - Good quality, uniform undressed weld with minimal spatter.

These guidelines are voluntary recommendations for informational purposes only. It is the responsibility of the individual to ensure proper construction design, method, and materials and code compliance.

The use of fillers is not included in the scope of this work. The guidelines do not endorse or discourage use of fillers. They deal with finished appearance only.

SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included: Furnish and install all blocking, framing and other rough carpentry, as shown on the Drawings and as specified herein. Wood framing and blocking installed on or above the roof deck shall be pressure treated to prevent rot.

1.2 QUALITY ASSURANCE

A. Reference Standards. Comply with the following:

1. The Engineered Wood Association (APA):

a. **APA PRP-108** – Performance Standards and Qualification Policy for Wood Structural Panels.

2. American Wood Preservers Association (AWPA):

a. **AWPA Standard C9** – Plywood – Preservative Treatment by Pressure Process.

3. International Building Code (IBC): Local adopted edition.
4. Military Specifications (MIL):

a. **MIL-A-397B** – Adhesive, Room-Temperature and Intermediate-Temperature Setting Resin (Phenol, Resorcinol, and Melamine Based) [Superseded. Use MIL-A-22397 or MIL-A-46051].
b. **MIL-A-5534A** – Adhesive, High-Temperature-Setting Resin, (Phenol, Melamine, and Resorcinol Base).
c. **MIL-A-22397** – Adhesive, Phenol and Resorcinol Resin Base (for Marine Service Use).
d. **MIL-A-46051** – Adhesive, Room-Temperature and Intermediate-Temperature Setting Resin (Phenol, Resorcinol and Melamine Base) [Superseded. Use MIL-A-48611].
e. **MIL-A-48611** – Adhesive System, Epoxy-Elastomeric, for Glass to Metal.

5. Southern Pine Association (SPA) – Standard Grading Rules.
6. Southern Pine Inspection Bureau (SPIB).
7. U.S. Department of Commerce Product Standard (PS):

a. **PS1-95** – Construction and Industrial Plywood with typical APA Grade Trademarks.
b. **PS20-15** – American Softwood Lumber Standards.

8. West Coast Lumber Inspection Bureau (WCLIB).

9. Western Wood Products Association (WWPA) – Standard Grading Rules for Western Lumber

B. Lumber Standard and Grade-Marking: Each piece of lumber and each board shall comply with the American Standards PS20-15 and with specific grading requirements of the Association recognized as covering the species used and under whose grading rules it is identified by the grade-mark of a recognized association or independent inspection agency.

C. Plywood: Plywood shall conform to U.S. Product Standard PS-1-95 issued by the National Bureau of Standards. Each standard size panel shall be stamped or branded to show the type and grade of the panel. When used structurally, plywood shall meet performance standards for its type as described in Product Standard PS 1-95 for Douglas Fir plywood. It shall be identified as to species, grade and glue type by an approved agency or independent testing laboratory by means of appropriate grademarks on each panel. Exterior grade plywood shall be used at all exterior locations.

D. Laminating Adhesive shall meet requirements of MIL-A-397B or MIL-A-5534A.

E. Moisture Content of various materials shall meet the following requirements at time of installation:

1. Framing lumber 2 inches and less in thickness. Not more than 19 percent.
2. Boards:

a. 8 inches or less in width, not more than 19 percent.
b. Wider than 8 inches, Not more than 15 percent.

F. Qualifications of Workmen: Provide sufficient workmen and supervisors who shall be present at all times during execution of this portion of the Work, and who shall be thoroughly familiar with the type of construction involved and the materials and techniques specified.

G. Product Handling:

1. Delivery and Storage: Store all materials in such a manner as to ensure proper ventilation and drainage and to protect against damage and the weather.
2. Protection: Use extreme care in the off-loading of lumber to prevent damage, splitting, and breaking of materials.

PART 2 - PRODUCTS

2.1 LUMBER

A. Lumber for structural capacity may be any of the following species provided the grade for each is not lower than the minimum shown:

1. Cedar, Western Red, and Incense - WCLIB Rules Standard.
2. Fir, Douglas - WCLIB Rules, Standard.
3. Fir, White - WCLIB Rules, Standard.
4. Pine, Western White* - WWPA Rules, Standard.

5. Pine, Southern Yellow – SPA and SPIB Rules (KD), No. 2 Common.
   * Includes Idaho, Lodgepole, Ponderosa, and Sugar Pine.

B. Lumber, except where otherwise noted, shall be surfaced 4 sides unless, in addition to being dressed, it has been notched, shiplapped, or patterned.

C. Dimensions of lumber specified or called for by the Drawings are nominal.

2.2 WOOD PRESERVATION TREATMENT

A. Wood framing and installed on or above the roof deck shall be pressure treated as called for by the published Standards of the American Wood Preserver's Association (AWPA), and the following:

1. Moisture content of lumber at time of treatment shall not be more than 30 percent, except that Douglas Fir may be treated green if it does not have a high percentage of sapwood.
2. Preservative used for treating lumber to be painted or which will come in contact with finish materials shall be paintable type.
3. All treated lumber shall be suitably identified as to name of treater, preservative used, and retention of preservative in lbs. per cubic foot of lumber.
4. All lumber shall be seasoned after treatment to the moisture content required for non-treated lumber.

2.3 PLYWOOD

A. Identification Requirements

1. Each panel shall be identified with the appropriate trademark of the APA – The Engineered Wood Association and shall meet the requirements of the latest edition of U.S. Product Standard PS-1 or APA PRP-108 Performance Standards.
2. All panels which have an edge or surface permanently exposed to the weather shall be classified Exterior.
3. Panel thickness, grade, and Group number or Span Rating shall be as shown on the Drawings.
4. Application shall be in accordance with recommendations of the APA – The Engineered Wood Association.

B. Preservative-Treated Plywood

1. Treated plywood for use in roof construction or other exterior use shall be pressure-treated in accordance with AWPA Standard C9 with water-borne preservatives, as required for above ground exposure.
2. Plywood treated with water-borne preservatives shall be dried after treatment to a moisture content of 18 per cent or less.

2.4 ROUGH HARDWARE

A. Rough hardware needed for the proper installation of all carpentry work shall be provided. Nails, spikes, screws, bolts, and similar items shall be of proper types and ample sizes to fasten and hold the various members securely in place.

2.5 OTHER MATERIALS

A. All other materials, not specifically described but required for a complete and proper installation as indicated on the Drawings, shall be new, suitable for the intended use, and subject to the approval of the Architect.

PART 3 - EXECUTION

3.1. WORKMANSHIP

A. All rough carpentry shall produce joints true, tight, and well nailed. Wood framing, furring, stripping, and blocking shall be laid out, installed and fitted as required by the conditions encountered. All work shall be plumbed, leveled and braced with sufficient nails, spikes, bolts, or other appropriate fasteners, to ensure secure attachment and rigidity. Any piece of work or carpentry material with a defect or defects that prevent it from serving its intended purpose satisfactorily, including crooked, warped, bowed, or otherwise defective material, even if within the limits of grade specified, will be rejected and shall be replaced with an acceptable piece.

END OF SECTION 061000

SECTION 061643 - GYPSUM SHEATHING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Fiberglass-mat faced, moisture and mold resistant gypsum sheathing for exterior walls in locations as shown on the Drawings.

B. Related Sections:

1. Section 054000 – COLD-FORMED METAL FRAMING.
2. Section 072726 – FLUID-APPLIED MEMBRANE AIR BARRIERS.

1.2 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM):

1. **ASTM C518** - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
2. **ASTM C1002** - Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
3. **ASTM C1177** - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
4. **ASTM C1280** - Standard Specification for Application of Gypsum Sheathing.
5. **ASTM D3273** - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
6. **ASTM D6329** - Standard Guide for Developing Methodology for Evaluating the Ability of Indoor Materials to Support Microbial Growth Using Static Environmental Chambers.
7. **ASTM E72** - Standard Test Methods of Conducting Strength Tests of Panels for Building Construction.
8. **ASTM E 84** - Standard Test Method for Surface Burning Characteristics of Building Materials
9. **ASTM E96** - Standard Test Methods for Water Vapor Transmission of Materials.
10. **ASTM E 136** Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C

B. Gypsum Association (GA):

1. **GA-253** - Application of Gypsum Sheathing.

C. Underwriter's Laboratories (UL):

1.3 SUBMITTALS

A. Product Data: Manufacturer's specifications and installation instructions for each product specified.

1.4 WARRANTY

A. Provide products that offer twelve months of coverage against in-place exposure damage (delamination, deterioration and decay) commencing with the date of installation of the product in such structure.

B. Manufacturer's Warranty:

1. Five years against manufacturing defects from the date of purchase of the product for installation

PART 2 PRODUCTS

2.1 MANUFACTURER

A. Basis of Design: Georgia-Pacific Gypsum LLC.

2.2 MATERIALS

A. Basis of Design: 5/8 inch Dens Glass® Fireguard ® sheathing, Fire-Rated Fiberglass-Mat Faced Gypsum Sheathing: ASTM C1177, Type X:

1. Thickness: 5/8 inch.
2. Width: 4 feet.
3. Length: 8 feet.
4. Weight: 2.5 lb/sq. ft.
5. Edges: Square.
6. Surfacing: Fiberglass mat on face, back, and long edges.
7. Racking Strength (Ultimate, not design value) (ASTM E72): Not less than 654 pounds per square foot, dry.
8. Flexural Strength, Parallel (ASTM C1177): 100 lbf, parallel.
9. Humidified Deflection (ASTM C1177): Not more than 1/8 inch.
10. Permeance (ASTM E96): Not less than 17 perms.
11. R-Value (ASTM C518): 0.67.
12. Mold Resistance (ASTM D3273): 10, in a test as manufactured.
13. Microbial Resistance (ASTM D6329), UL Environmental GREENGUARD 3-week protocol): Will not support microbial growth.
14. Combustibility (ASTM E136): Noncombustible.
15. Surface Burning Characteristics (ASTM E84), Flame Spread/Smoke Developed: 0/0.

2.3 ACCESSORIES

A Screws: ASTM C1002, corrosion resistant treated.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verification of Conditions:

1. Inspection: Verify that project conditions and substrates are acceptable, to the installer, to begin installation of work of this section.

3.2 INSTALLATION

A. General: In accordance with GA-253, ASTM C1280 and the manufacturer's recommendations.

1. Manufacturer's Recommendations:

a. Current "Product Catalog", Georgia-Pacific Gypsum.

3.3 PROTECTION

A. Protect gypsum board installations from damage and deterioration until date of Substantial Completion.

END OF SECTION 061643

SECTION 064020 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Wood cabinets (millwork).
2. Cabinet tops (countertops).
3. Cabinet and miscellaneous hardware.
4. Plastic laminate wall panels and aluminum trim

B. Related Sections: The following sections contain requirements that relate to this section:

1. Section 061000 – ROUGH CARPENTRY for furring, blocking, and other carpentry work that is not exposed to view.

1.3 REFERENCE STANDARDS

A. American National Standard Institute (ANSI)/Builders Hardware Manufacturers Association (BHMA):

1. **ANSI/BHMA A156.9** – Cabinet Hardware.
2. **ANSI/BHMA A156.18** – Materials and Finishes.
3. **ANSI A208.2** – Medium Density Fiberboard (MDF) for Interior Applications.

B. American National Standards Institute (ANSI)/Hardwood Plywood & Veneer Association (HPVA):

1. **ANSI/HPVA HP-1-2020** – Amerian National Standard for Hardwood Decorative Plywood.

C. Federal Specifications (FS):

1. **FS FF-N-105** – Nails, Brads, Staples and Spikes: Wire, Cut and Wrought
2. **FS FF-S-111** – Screw, Wood.

D. National Electrical Manufacturers Association (NEMA):

1. **NEMA LD3** – High-Pressure Decorative Laminate (HPDL).

E. U.S. Department of Commerce Product Standard (PS):

1. PS1-95 – Construction and Industrial Plywood.

F. Architectural Woodwork Institute (AWI).

G. The Engineered Wood Association (APA):

1. **APA PS-1** – U. S. Plywood Standard.

H. Architectural Woodwork Institute (AWI)/Architectural Woodwork Manufacturers Association of Canada (AWMAC) Quality Standards Illustrated (QSI).

1.4 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Specification Section 013300 – SUBMITTAL PROCEDURES.

B. Product data for each type of product and process specified in this section and incorporated into items of architectural woodwork during fabrication, finishing, and installation.

C. Shop drawings showing location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

D. Samples for initial selection purposes of the following in form of manufacturer's color charts consisting of actual units or sections of units showing full range of colors, textures, and patterns available for each type of material indicated.

1. Plastic laminate.
2. Quartz Surfacing.

E. Samples for verification purposes of the following:

1. Exposed cabinet hardware, one unit of each type and finish.

F. Product certificates signed by woodwork manufacturer certifying that products comply with specified requirements.

G. Qualification data for firms and persons specified in "Quality Assurance" article of this section to demonstrate their capabilities and experience. Include list of completed projects with project names, addresses, names of Architects and Owners, and other information specified.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Firm experienced in successfully producing architectural woodwork similar to that indicated for this Project, with sufficient production capacity to produce required units without causing delay in the Work.

B. Single-Source Manufacturing and Installation Responsibility: Engage a qualified Manufacturer to assume undivided responsibility for woodwork specified in this section, including fabrication, finishing, and installation.

C. Installer Qualifications: Arrange for installation of architectural woodwork by a firm that can demonstrate successful experience in installing architectural woodwork items similar in type and quality to those required for this project.

C. AWI Quality Standard: Comply with applicable requirements of "Architectural Woodwork Quality Standards" published by the Architectural Woodwork Institute (AWI) except as otherwise indicated.

E. Work in this section shall comply with **Custom Grade** quality standards and applicable sections of the current edition of AWI/AWMAC Quality Standards Illustrated (QSI).

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect architectural woodwork during transit, delivery, storage, and handling to prevent damage, soilage, and deterioration.

B. Do not deliver architectural woodwork until painting, wet work, grinding, and similar operations that could damage, soil, or deteriorate architectural woodwork have been completed in installation areas. If architectural woodwork must be stored in other than installation areas, store only in areas whose environmental conditions meet requirements specified in "Project Conditions."

1.7 PROJECT CONDITIONS

A. Environmental Conditions: Obtain and comply with Woodwork Manufacturer's and Installer's coordinated advice for optimum temperature and humidity conditions for architectural woodwork during its storage and installation. Do not install architectural woodwork until these conditions have been attained and stabilized so that architectural woodwork is within plus or minus 1.0 percent of optimum moisture content from date of installation through remainder of construction period.

B. Field Measurements: Where architectural woodwork is indicated to be fitted to other construction, check actual dimensions of other construction by accurate field measurements before manufacturing architectural woodwork; show recorded measurements on final shop drawings. Coordinate manufacturing schedule with construction progress to avoid delay of Work.

PART 2 - PRODUCTS

2.1 HIGH PRESSURE DECORATIVE LAMINATE MANUFACTURERS

A. Basis of Design Manufacturers: Subject to compliance with requirements, manufacturers offering high pressure decorative laminates which may be incorporated in the Work include but are not limited to the following:

1. Wilsonart® by Wilsonart LLC, Temple, TX.

B. Refer to Drawing Sheet 601 – ROOM FINISH SCHEDULE & MATERIAL SELECTION for laminate locations, types, and colors.

2.2 QUARTZ SURFACE FABRICATION MANUFACTURERS

A. Basis of Design Manufacturers: Subject to compliance with requirements, manufacturers offering solid surface and quartz fabrications which may be incorporated in the Work include but are not limited to the following:

1. Quartz Surface: MSI Surfaces, www.msisurfaces.com.

B. Refer to Drawing Sheet A-601 – ROOM FINISH SCHEDULE & MATERIAL SELECTION for quartz surface locations and colors.

2.3 MATERIALS

A. General: Provide materials that comply with requirements of the AWI woodworking standard for each type of architectural woodwork and quality grade indicated and, where the following products are part of architectural woodwork, with requirements of the referenced product standards, that apply to product characteristics indicated:

1. Medium Density Fiberboard: ANSI A208.2.
2. Softwood Plywood: PS 1.
3. Melamine Surfacing: NEMA LD3.
4. Hardwood Plywood – APA PS-1, ANSI/HPVA HP-1.
5. Medium Density Overlay (MDO): APA PS-1.

2.4 FABRICATION, GENERAL

A. Typical Cabinet Construction shall consist of medium density fiber board (MDF) with plastic laminate veneer at all exposed surfaces including door and drawer edges. Interior of cabinets (semi-exposed) surfaces shall be veneered with melamine. Wall cabinets are to be 1'-1" clear inside – typical.

B. Fabricate architectural woodwork to dimensions, profiles, and details indicated on the Drawings. Ease edges to radius indicated for the following:

1. Corners of cabinets and edges of solid wood (lumber) members less than 1 inch in nominal thickness: 1/16 inch.
2. Edges of rails and similar members more than 1 inch in nominal thickness: 1/8 inch.

C. Complete fabrication, including assembly, finishing, and hardware application, before shipment to project site to maximum extent possible. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

D. Factory-cut openings, to maximum extent possible, to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Smooth edges of cutouts and, where located in countertops and similar exposures, seal edges of cutouts with a water-resistant coating.

E. Quality Standard: Comply with AWI Section 400 and its Division 400A "Wood Cabinets": Custom Grade.

F. AWI Type of Cabinet Construction: Flush overlay.

2.5 CABINET HARDWARE AND ACCESSORY MATERIALS

A. Cabinet Hardware Schedule: Refer to schedule at end of this section for cabinet hardware required for architectural cabinets.

B. Hardware Standard: Comply with ANSI/BHMA A156.9 "American National Standard for Cabinet Hardware" for items indicated by reference to BHMA numbers or referenced to this standard.

C. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with ANSI/BHMA A156.18 for BHMA code number indicated.

D. For concealed hardware provide manufacturer's standard finish that complies with product class requirements of ANSI/BHMA A156.9.

2.6 ARCHITECTURAL CABINET TOPS (COUNTERTOPS)

A. Quality Standard: Comply with AWI Section 400 and its Division 400C.

B. High pressure decorative laminate countertops shall comply with the following:

1. Grade: Premium.
2. Laminate Cladding for Horizontal Surface: High pressure decorative laminate as follows:

a. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:

1) Provide selections made by Architect from manufacturer's full range of standard colors and finishes in the following categories:

a) Solid colors.
b) Wood grains.
c) Patterns.

b. Grade: GP-50 (0.050-inch nominal thickness).
c. Grain Direction: Parallel to longest dimension.

3. Edge Treatment: Same as laminate cladding on horizontal surfaces.

2.7 FASTENERS AND ANCHORS

A. Screws: Select material, type, size, and finish required for each use. Comply with FS FF-S-111 for applicable requirements.

1. For metal framing supports, provide screws as recommended by metal framing manufacturer.

B. Nails: Select material, type, size, and finish required for each use. Comply with FS FF-N-105 for applicable requirements.

C. Anchors: Select material, type, size, and finish required by each substrate for secure anchorage. Provide nonferrous metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed steel or lead expansion bolt devices for drilled-in-place anchors. Furnish inserts and anchors, as required, to be set into concrete or masonry work for subsequent architectural woodwork anchorage.

2.8. PLASTIC LAMINATE WALL PANELS

A. Furnish and install plastic laminate clad ¾-inch MDF wall panels in locations as shown on the Drawings. Refer to Sheet A605 – PARTITION TYPES & INTERIOR DETAILS for typical panel construction and details.

B. Panel substrate shall be ¾-inch Medium Density Fiberboard (MDF) meeting requirements of ANSI A208.2 with Wilsonart® Standard Laminate facing. Refer to Sheet A601 – ROOM FINISH SCHEDULE & MATERIAL SELECTION for laminate color and other information.

C. Panels shall be wall mounted using prefabricated aluminum Z-clips. Panel edges shall be finished with aluminum edge and corner trim.

D. Basis of Design Manufacturer: Monarch Metals, Inc., 1330 Post & Paddock Street, Suite 800, Grand Prairie, TX 75050, Ph: (945) 202-2700, www.monarchmetal.com .

E. Basis of Design Products:

1. Aluminum Z-Clip for wall mounting: Monarch Metals MF375.
2. Aluminum Edge Trim: Monarch Metals EPS-ETO75-L, Black Anodized.
3. Aluminum Outside Corner Trim: Monarch Metals EPS-OC075-SM, Black Anodized.

PART 3 - EXECUTION

3.1 PREPARATION

A. Condition architectural woodwork to average prevailing humidity conditions in installation areas before installing.

B. Deliver concrete inserts and similar anchoring devices to be built into substrates well in advance of time substrates are to be built.

C. Before installing architectural architectural woodwork, examine shop-fabricated work for completion and complete work as required, including back priming and removal of packing.

3.2 INSTALLATION

A. Quality Standard: Install architectural woodwork to comply with AWI Section 1700 for same grade specified in Part 2 of this section for type of architectural woodwork involved.

B. Install architectural woodwork plumb, level, true, and straight with no distortions. Shim as required with concealed shims. Install to a tolerance of 1/8 inch in 8'-0" for plumb and level (including tops) and with no variations in flushness of adjoining surfaces.

C. Scribe and cut architectural woodwork to fit adjoining work and refinish cut surfaces or repair damaged finish at cuts.

D. Anchor architectural woodwork to anchors or blocking built in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk, concealed fasteners and blind nailing as required for a complete installation. Except where prefinished matching fastener heads are required, use fine finishing nails for exposed nailing, countersunk and filled flush with architectural woodwork and matching final finish where transparent finish is indicated.

E. Cabinets: Install without distortion so that doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete the installation of hardware and accessory items as indicated. Maintain veneer sequence matching (if any) of cabinets with transparent finish.

F. Tops: Anchor securely to base units and other support systems as indicated.

3.3 ADJUSTMENT AND CLEANING

A. Repair damaged and defective architectural woodwork where possible to eliminate defects functionally and visually; where not possible to repair, replace architectural woodwork. Adjust joinery for uniform appearance.

B. Clean, lubricate, and adjust hardware.

C. Clean architectural woodwork on exposed and semiexposed surfaces. Touch up factory-applied finishes to restore damaged or soiled areas.

3.4 PROTECTION

A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensures that architectural woodwork is not damaged or deteriorated at time of Substantial Completion.

3.5 HARDWARE SCHEDULE

A. Refer to Drawings for scope of cabinet Work, Hardware, and specific details. Submit product data for all cabinet hardware items furnished and installed. Provide cabinet hardware as follows (Note: Not all hardware items listed may be used):

1. Concealed Hinges: All metal, nickel plated, concealed, self-closing, with three-dimensional adjustment and 120 degree opening angle – Blum® 71T5580 Clip Top 120 degree or Blum® 73T5580 Clip Top 120 degree as manufactured by Blum, Inc., Stanley, NC, www.blum.com or approved equivalent.
2. Drawer & Door Pulls: Satin chrome wire pull, 4" hole spacing x 1-1/4" high x 5/16" diameter – Berenson™ 6130-2SC-P as manufactured by Berenson™ Cabinet Hardware, Buffalo, NY, www.berensonhardware.com or approved equivalent.
3. Drawer Slides: Soft Close, Steel, full-extension, ball-bearing for medium duty applications, 100 lb. load capacity, side mount, 1-13/16 inch height – Knape & Vogt, Model #8450FM, Soft-Close, Sidemount Drawer Slide with Force Management Technology, Knape & Vogt, 2700 Oak Industrial Drive NE, Grand Rapids, Michigan, Phone (616) 459-3311 (800-253-1561), www.kb.com, or approved equivalent.
4. Shelf Standards & Supports: Surface mounted or flush mortise-recessed, 5/8" wide x 3/16" deep steel standards with ½" vertical slot adjustability, zinc color - KV#255 ZC with KV #256 ZC steel shelf support clips as manufactured by Knape & Vogt Manufacturing Company, Grand Rapids, MI, www.knapeandvogt.com or approved equivalent.
5. Shelf Supports: No. 1F711NP spoon-shaped, press-in style for 5mm bore, 3/8" long x 5/16" wide shelf rest area, nickel plated steel as distributed by Wurth Baer Supply Company, Vernon Hills, IL, www.baersupply.com or approved equivalent.
6. Cord Grommet: 3" diameter slotted plastic cap and sleeve for 2-1/2" diameter hole, black, No. BMI-1031BK as manufactured by Bainbridge Manufacturing, Inc., Waterville, WA, www.bainbridgemfg.com or approved equivalent.
7. Trash Grommet: Mockett TM10B – 10 inch diameter x 3-inch deep stainless steel trash grommet as manufactured by Doug Mockett & Company, Inc., Manhattan Beach, CA, www.mockett.com or approved equivalent. Furnish and install in countertop locations as shown on the Drawings.
8. Z-Clip: Pair of 0.115" thick x 1-1/4" high x 2" long interlocking aluminum clips for hanging wall panels and cabinets, pre-cut and punched, No. E-7389 EAGLE-CLIP "Z" Clips as manufactured by Eagle Mouldings, Inc., Loretto, MN, www.eagle-aluminum.com, or approved equivalent.
9. Metal Support Bracket: 1/8" steel, "L" shaped bracket for workstation and countertop support, 1000 lbs. minimum load capacity, with pre-punched mounting flanges and 3" x 3" 45 degree notch for wall cleat or wire/cable routing, black powder coat finish, as manufactured by A&M Hardware, Inc., Mount Joy, PA, www.aandmhardware.com or approved equivalent.
10. Drawer & Door Bumper: Self-adhesive, clear plastic, 1-2-inch diameter (12.7mm) x 1/8" high (3.5mm) bumpers, No. SCB02 as distributed by ROK™ Hardware, Irvine, CA, www.rokhardware.com, or approved equivalent. Furnish and install on all drawers and cabinet doors.

11. Wardrobe Closet Rod: 1-1/16” diameter x 0.087” wall thickness x length as required, heavy duty round steel core rod with stainless steel finish wrap, Series 660 SS as manufactured by Knape & Vogt Manufacturing Co., Grand Rapids, MI, www.kv.com, or approved equivalent.
12. Wardrobe Closet Rod Flanges: Commercial closed wall-mount flange, chrome finish, No. 734 CHR as manufactured by Knape & Vogt Manufacturing Co., Grand Rapids, MI, www.kv.com, or approved equivalent. Provide two flanges per closet rod.
13. Cabinet Locks: Furnish and install disc tumbler locks on hinged cabinet doors and drawers where indicated on the Drawings.

    a. Disc tumbler lock shall be National Disc Tumbler Cylinder Cam Lock No. NCL-C8053-C413A-14A, Nickel finish, as manufactured by CompX® National Cabinet Lock, Greenville, SC, www.compx.com, or approved equivalent.
    b. All locks shall be keyed alike except where noted to be keyed separately.

END OF SECTION 064020

SECTION 072100 - BUILDING INSULATION

PART 1 – GENERAL

1.1 SUMMARY

A. This section includes furnishing and installing fiberglass batt insulation for thermal and acoustical control and continuous mineral fiber board insulation in locations as shown on the Drawings.

B. Related Sections

1. Section 054000 – COLD-FORMED METAL FRAMING: Metal studs for exterior wall framing.
2. Section 061643 – GYPSUM SHEATHING: Exterior wall sheathing.
3. Section 074210.41 – COMPOSITE FRAMING SUPPORT (CFS) CLIP SYSTEM: Support system for continuous mineral fiber board insulation at exterior walls.
4. Section 079200 – JOINT SEALANTS: Spray foam insulating sealant.
5. Section 092216 – NON-STRUCTURAL METAL FRAMING: Metal stud framing for interior partitions.

1.2 PERFORMANCE CHARACTERISTICS

A. Thermal resistivity or "r-value" represents the reciprocal of thermal conductivity (k-value), which is the rate of heat flow through a homogenous material exactly 1 inch thick. Thermal resistivities are expressed by the temperature difference in degrees F between the two exposed faces required to cause one BTU to flow through one sq. ft. per hour at mean temperatures indicated.

B. Fire Performance Characteristics: Provide insulation materials identical to those whose indicated fire performance characteristics have been determined per ASTM E 119, ASTM E 84, and ASTM E 136, as applicable, by Underwriters Laboratories (UL) or other testing and inspecting organizations acceptable to Authorities Having Jurisdiction (AHJ). Identify products with appropriate markings of applicable testing and inspecting organizations.

1.3 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM):

1. **ASTM C356** – Standard Test Method for Linear Shrinkage of Preformed High-Temperature Thermal Insulation Subjected to Soaking Heat.
2. **ASTM C518** - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
3. **ASTM C612** – Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
4. **ASTM C665** – Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
5. **ASTM C795** – Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.

6. **ASTM C1104** - Standard Test Method for Determining the Water Vapor Sorption of Unfaced Mineral Fiber Insulation.
7. **ASTM C1338** - Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings.
8. **ASTM E84** - Standard Test Method for Surface Burning Characteristics of Building Materials.
9. **ASTM E96** - Standard Test Method for Water Vapor Transmission of Materials.
10. **ASTM E119** - Standard Test Methods for Fire Tests of Building Construction and Materials.
11. **ASTM E136** - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C.

B. National Fire Protection Association (NFPA):

1. **NFPA 220** – Standard on Types of Building Construction.

1.4 SUBMITTALS

A. Submit product data for each form and type of insulation indicated.

PART 2 - PRODUCTS

2.1 PRODUCTS

A. Faced Fiberglass Batt Insulation: Basis of Design: 6-1/4 -inch Owens Corning™ EcoTouch® Flame Spread 25 Batt Insulation, mold and mildew resistant, PSK (Metalized Polypropylene/Scrim/Kraft) facing, white color, for thermal control in exterior walls as manufactured by Owens Corning Insulating Systems, LLC, or approved equivalent. Install as per manufacturer's recommendations in exterior metal stud walls as shown on the Drawings. Physical properties and test methods as follows:

1. Classification Type (ASTM C665): Type II, Class A.
2. Flame Spread/Smoke Developed (ASTM E84): <25/<50.
3. Fungi Resistance (ASTM C1338): Mold/Mildew Resistant.
4. Thermal Resistance (ASTM C518): 6-1/4-inch = R19.
5. Water Vapor Permeance (ASTM E96): 0.02 perms.

B. Unfaced Fiberglass Batt Acoustical Insulation: Basis of Design: 3-1/2" and 6-1/4" Owens Corning ™ EcoTouch® PINK® FIBERGLAS™ Insulation with PureFiber® Technology, noncombustible, mold and mildew resistant, unfaced fiberglass batts for thermal and acoustical control as manufactured by Owens Corning Insulating Systems, LLC, or approved equivalent. Install as per manufacturer's recommendations in interior partitions as shown on the Drawings. Physical properties and test methods as follows:

1. Classification Type per ASTM C665: Type I, Class A.
2. Flame Spread/Smoke Developed per ASTM E84: 25/50.
3. Fungi Resistance per ASTM C1338: Mold/mildew resistant.
4. Flammability Rating per ASTM E136: Noncombustible.
5. Thermal Resistance per ASTM C518: 3-1/2" = R13; 6-1/4" = R19.

C. Mineral Fiber Board Insulation: Basis of Design – 1" Thermafiber® RainBarrier® semi-rigid, non-combustible, non-deteriorating, inorganic mineral wool insulation board as manufactured by Owens Corning/Thermafiber, Inc., Toledo, OH, or approved equivalent. Install as per manufacturer's recommendations at exterior wall locations where continuous mineral fiber insulation is shown on the Drawings. Physical properties and test methods as follows:

1. Nominal Density: 6.0 PCF.
2. R Value per Inch of Thickness per ASTM C518: 4.3.
3. Flame Spread/Smoke Developed per ASTM E84: 0/0.
4. Insulation Type per ASTM C665: Non-corrosive.
5. Classification per ASTM E136/NFPA Standard 220: Noncombustible.
6. Water Vapor Permeance per ASTM E96: 25-50.
7. Water Sorption per ASTM C1104: 0.03% by volume.
8. Linear Shrinkage per ASTM C356: < 2% 1200 deg. F (650 deg. C).
9. Mineral Fiber Insulation Type per ASTM C612:Mineral Fiber Block and Board Thermal Insulation Type IA, IB, II, III, IVA, IVB.
10. Suitable for Contact with Stainless Steel per ASTM C795: Pass.
11. Installation: Mechanical attachment. Refer to Section 074210.41 – COMPOSITE FRAMING SUPPORT (CFS) CLIP SYSTEM.

D. Spray Foam Insulating Sealant: For insulating boxed header metal stud framing at window and door openings and for insulating penetrations and internal cavities of exterior wall construction in locations as shown on the Drawings. Refer to Section 079200 – JOINT SEALANTS, paragraph 2.3.E for Basis of Design product.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Comply with insulation manufacturer's instructions for installation of insulation.

B. Support insulation units by adhesive or mechanical anchorage or both as applicable to location and conditions indicated.

END OF SECTION 072100

SECTION 072615 - UNDERSLAB VAPOR RETARDER (15 MIL)

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Surface preparation.

B. Application of an underslab vapor retarder.

1.2 RELATED SECTIONS

A. Section 033000 – CAST-IN-PLACE CONCRETE.

B. Section 313116 – TERMITE CONTROL.

1.3 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM):

1. **ASTM E1745** - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil Or Granular Fill Under Concrete Slabs.
2. **ASTM E154** - Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs.
3. **ASTM E96** - Standard Test Methods for Water Vapor Transmission of Materials.
4. **ASTM E1643** - Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
5. **ASTM F1249-01** - Standard Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor.
6. **ASTM D1709** – 15a Standard Test Methods for Impact Resistance of Plastic Film by the Free-Falling Dart Method.

B. American Concrete Institute (ACI):

1. **ACI 302.1R-96** - Vapor Barrier Component (plastic membrane) is not less than 10 mils thick.

1.4 SUBMITTALS

A. Submit manufacturer's product data and application instructions.

1.5 QUALITY ASSURANCE

A. Use an experienced installer and adequate number of skilled personnel who are thoroughly trained and experienced in the application of the vapor retarder.

B. Obtain vapor retarder materials from a single manufacturer regularly engaged in manufacturing the product.

C. Provide products which comply with all state and local regulations controlling use of volatile organic compounds (VOCs).

1.6 PRE-INSTALLATION MEETING

A. Convene a pre-installation meeting one week prior to installation of underslab vapor retarder. Suggested attendees: Architect, Contractor, Vapor Retarder installer, and Vapor Retarder manufacturer representative to discuss the installation in detail.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. Store materials in a clean dry area in accordance with manufacturer's instructions.

C. Stack membrane on smooth ground or wood platform to eliminate warping.

D. Protect materials during handling and application to prevent damage or contamination.

E. Ensure membrane is stamped with manufacturer’s name, product name and membrane thickness at intervals of no more than 85” (220 cm).

1.8 ENVIRONMENTAL REQUIREMENTS

A. Product not intended for uses subject to abuse or permanent exposure to the elements.

B. Do not apply on frozen ground.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Basis of Design: W.R. Meadows, Inc., PO Box 338, Hampshire, Illinois 60140-0338. (800) 342-5976. (847) 683-4500. Fax (847) 683-4544. Web Site www.wrmeadows.com.

2.2 MATERIALS

A. Plastic Vapor Retarder

1. Vapor retarder membrane shall be manufactured from virgin polyolefin resins, and when tested according to all requirements of ASTM E 1745, shall meet the following minimum performance requirements:

a. Maximum Water Vapor Permeance (ASTM E 154, Sections 7, 8, 11, 12, 13; by ASTM E 96, Method B; or ASTM F 1249).

1) As received: 0.0063 perms.
2) After wetting and drying: 0.0052 perms.
3) Resistance to Plastic Flow and Temperature: 0.0057 perms.
4) Effect Low Temperature and Flexibility: 0.0052 perms.

5) Resistance to Deterioration from Organisms and Substances in Contacting Soil: 0.0052 perms.

b. Puncture Resistance (ASTM D 1709): > 3,200 grams.
c. Tensile Strength (ASTM E 154, Section 9): 72 lb. force/inch.
d. Water Vapor Retarder (ASTM E 1745): Meets or exceeds Class A, B, and C.
e. Thickness of Retarder (plastic) (ACI 302.1R-96): Not less than 10 mils.

B. Proprietary Specification – Basis of Design:

1. Perminator™ 15 mil by W.R. Meadows, Inc.
2. Stego®Wrap - 15 mils by Stego Industries, LLC, acceptable alternate.
3. Or approved equivalent.

2.3 ACCESSORIES

A. Seam Tape

1. High Density Polyethylene Tape with pressure sensitive adhesive. Minimum width 4 inches.

a. Basis of Design: Perminator Tape by W.R. Meadows, Inc., or approved equivalent.

B. Pipe collars

1. Construct pipe collars from vapor retarder material and pressure sensitive tape per manufacturer's instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to receive membrane. Notify Architect if surfaces are not acceptable. Do not begin surface preparation or application until unacceptable conditions have been corrected.

3.2 SURFACE PREPARATION

A. Prepare surfaces in accordance with manufacturer's instructions.

B. Level, tamp, or roll earth or granular material beneath the slab base.

3.3 APPLICATION

A. Installation shall be in accordance with manufacturer's instructions and ASTM E 1643–98.

B. Unroll vapor retarder with the longest dimension parallel with the direction of the pour.

C. Lap vapor retarder over footings and seal to foundation walls.

D. Overlap joints 6 inches and seal with manufacturer's tape.

E. Seal all penetrations (including pipes) with manufacturer's pipe boot.

F. No penetration of the vapor retarder shall be allowed except for reinforcing steel and permanent utilities.

G. Repair damaged areas by cutting patches of vapor retarder, overlapping damaged area 6 inches and taping all four sides with tape.

END OF SECTION 072615

SECTION 072726 – FLUID-APPLIED MEMBRANE AIR BARRIERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes fluid-applied, vapor-retarding membrane air barriers for use at exterior wall construction.

1.2 RELATED SECTIONS

A. Section 072100 – BUILDING INSULATION for exterior sheathing and exterior wall continuous insulation interface with membrane air barrier.

B. Section 074210.41 – COMPOSITE FRAMING SUPPORT (CFS) CLIP SYSTEM for interface with membrane air barrier and support of continuous insulation and ACM Exterior Wall Panels.

C. Section 075423 –SINGLE PLY ROOFING SYSTEM (TPO) for interface coordination with roof assembly membrane.

D. Section 081113 – HOLLOW METAL DOORS AND FRAMES for exterior door interface with membrane air barrier.

E. Section 084113 – ALUMINUM FRAMED ENTRANCES AND STOREFRONTS for exterior window system interface with membrane air barrier.

1.3 REFERENCE STANDARDS

A. References, General: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section.

B. Air Barrier Association of America (ABAA): www.airbarrier.org:

1. ABAA Quality Assurance Program (QAP).

C. American Society for Testing and Materials (ASTM): www.astm.org:

1. **ASTM C 920** - Standard Specification for Elastomeric Joint Sealants.
2. **ASTM C 1193** - Guide for Use of Joint Sealants.
3. **ASTM D 412** - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers – Tension.
5. **ASTM E 96/E 96M** - Standard Test Methods for Water Vapor Transmission of Materials.
6. **ASTM E 162** - Standard Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source.
7. **ASTM E 783** - Standard Test Method for Field Measurement of Air Leakage through Installed Exterior Windows and Doors.
8. **ASTM E 1186** - Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems.
9. **ASTM E 2178** - Standard Test Method for Air Permeance of Building Materials.

10. **ASTM E 2357** - Standard Test Method for Determining Air Leakage of Air Barrier Assemblies.

D. UL Environment Greenguard Certification: www.greenguard.org:

1. Greenguard Certification Product Guide.

E. National Fire Protection Association (NFPA): www.nfpa.org:

1. NFPA 285 - Standard Fire Test Method For Evaluation Of Fire Propagation Characteristics Of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components.

F. U. S. Environmental Protection Agency (EPA): www.epa.gov:

1. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings.

G. Accelerated Weathering Test (QUV) Standards:

1. **ASTM G154** – Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Materials.
2. **ASTM D4587** – Standard Practice for Fluorescent UV-Condensation Exposures of Paint and Related Coatings.
3. **ASTM D4329** – Standard Practice for Fluorescent Ultraviolet (UV) Lamp Apparatus Exposure of Plastics.
4. **ISO 4892** – Plastics: Methods of Exposure to Laboratory Light Sources.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate installation of joint sealants with cleaning of joint sealant substrates and other operations that may impact installation or finished joint sealant work.

B. Preinstallation Conference: Conduct conference at Project Site.

1. Review requirements for air barrier products and installation, project and manufacturer's details, mockups, testing and inspection requirements, and coordination and sequencing of air barrier work with work of other Sections.
2. Review manufacturer's instructions for air barrier application meeting Project requirements for substrates specified, including three-dimensional video model demonstrating proper application of components at wall openings.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of air barrier product specified, including:

1. Technical data indicating compliance with requirements.
2. Substrate preparation instructions and recommendations.

B. Shop Drawings: Show locations for air barrier. Show details for each type of substrate, joints, and edge conditions, including flashings, counterflashings, penetrations, transitions, and terminations.

1. Show location of transition and accessory materials providing connectivity throughout the assemblies.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer, manufacturer, and Air Barrier Inspector.

1. Certification of manufacturer's approval of Installer.
2. Certification of ABAA accreditation of Installer firm and list of Installer's ABAA-certified installers and supervisors on Project.

B. Manufacturer's Product Compatibility Certificate: Certify compatibility of air barrier products with adjacent materials.

C. Low-Emitting Product Certificate: For air barrier products specified to meet 40 CFR 59 volatile organic emissions standards, submit Greenguard Children and Schools Certification or comparable certification acceptable to Architect.

D. Fire Propagation Characteristics Certificate: From a qualified testing agency, documentation that air barrier system as a component of a wall assembly has been tested and passed NFPA 285. Include system classification number of testing agency on shop drawings.

E. Product Test Reports: Test data for air barrier products and air barrier assembly, by qualified testing agency, indicating proposed membrane air barrier meets performance requirements, when requested by Architect.

F. Warranty: Sample of unexecuted manufacturer and installer special warranties.

G. Field quality control reports.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: A firm with minimum three years’ experience in installation of specified products in successful use on similar projects, employing workers trained by manufacturer, including a full-time on-site supervisor with a minimum of three years’ experience installing similar work, able to communicate verbally with Contractor, Architect, and employees.

1. Installer shall be licensed by ABAA according to ABAA's Quality Assurance Program and shall employ ABAA-certified installers and supervisors on Project.

B. Manufacturer Qualifications: A qualified manufacturer with minimum five years’ experience in manufacture of air barrier membrane as one of its principal products.

1. Manufacturer's product submitted has been in satisfactory operation on five similar installations for at least five years.

2. Manufacturer is accredited by the Air Barrier Association of America.
3. Approval of Manufacturers and Comparable Products: Refer to Section 012500 SUBSTITUTION PROCEDURES and Section 016000 – PRODUCT REQUIREMENTS. Submit the following in accordance with project substitution requirements:

    a. Completed and signed Substitution Request form.
    b. Product data, including certified independent test data indicating compliance with requirements.
    c. Sample shop drawings from similar project.
    d. Project references: Minimum of five installations of similar system not less than five years old, with Owner and Architect contact information.
    e. Certificate of ABAA accreditation if required for Project.
    f. Sample warranty.

C. Air Barrier Inspector Qualifications: A technical representative of manufacturer not engaged in the sale of products and experienced in the installation and maintenance of the specified air barrier system, qualified to perform observation and inspection specified in Field Quality Control Article, to determine Installer's compliance with the requirements of this Project, and approved by the manufacturer to issue warranty certification. The Inspector shall be one of the following:

1. An authorized full-time technical employee of the manufacturer.
2. A independent party certified as an air barrier inspector by the ABAA or other certifying organization acceptable to Architect, retained by the Contractor.

D. Mockups: Provide air barrier mockup application within mockups required in other sections, or if not specified, in an area of not less than 150 sq. ft. (14 sq. m) of wall surface where directed by Architect for each type of backup wall construction. Include examples of surface preparation, crack and joint treatment, air barrier application, and flashing, transition, and termination conditions, to set quality standards for execution.

1. Include intersection of wall air barrier with roof air barrier and with foundation wall intersection.

1.8 DELIVERY, STORAGE AND HANDLING

A. Accept materials on site in manufacturer's unopened original packaging.

B. Store products in weather protected environment, clear of ground and moisture, within temperature ranges recommended by air barrier manufacturer.

C. Construction Waste: Store and dispose of packaging materials and construction waste in accordance with requirements of Section 017419 – CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL, and Section 015000 – TEMPORARY FACILITIES AND CONTROLS.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended by air-barrier manufacturer.

1. Protect substrates from environmental conditions that affect air-barrier performance.
2. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.

1.10 SCHEDULING

A. Coordinate installation of membrane air barrier with completion of roofing and other work requiring interface with air barrier.

B. Schedule work so air barrier applications may be inspected prior to concealment.

C. Ensure air barrier materials are cured before covering with other materials.

1.11 WARRANTY

A. Special Manufacturer's Warranty: Manufacturer's standard form in which air barrier manufacturer agrees to furnish and install air barrier material to repair or replace those materials installed according to manufacturer's written instructions that exhibit material defects or otherwise fail to perform as specified under normal use within warranty period specified.

1. Access for Repair: Owner shall provide unimpeded access to the Project and the air barrier system for purposes of testing, leak investigation, and repair, and shall reinstall removed cladding materials upon completion of repair.
2. Cost Limitation: Manufacturer's obligation for repair or replacement shall be limited to the original installed cost of the work.
3. Warranty Period: Five (5) years date of Substantial Completion.

B. Special warranties specified in this article exclude deterioration or failure of air barrier materials from the following:

1. Movement of the structure caused by structural settlement or stresses on the air barrier exceeding manufacturer's written specifications for elongation.
2. Mechanical damage caused by outside agents.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Basis-of-Design Products: Provide air barrier products manufactured by Tremco, Inc., Commercial Sealants and Waterproofing Division, An RPM Company, Beachwood OH; (866) 321-6357; email: techresources@tremcoinc.com; www.tremcosealants.com, or comparable products.

2.2 MATERIALS, GENERAL

A. Source Limitations: Obtain air-barrier materials from single source from single manufacturer.

B. Compatibility: Provide membrane air barrier materials that are compatible with one another and with adjacent materials under conditions of service and application required, as demonstrated by membrane air barrier manufacturer based on testing and field experience.

2.3 PERFORMANCE REQUIREMENTS

A. General: Membrane air barrier shall be capable of performing as a continuous vapor-retarding air barrier and as a moisture drainage plane transitioned to adjacent flashings and discharging water to the building exterior. Membrane air barriers shall accommodate substrate movement and seal expansion and control joints, construction material transitions, opening transitions, penetrations, and perimeter conditions without moisture deterioration and air leakage exceeding performance requirements.

B. Air-Barrier Assembly Air Leakage: Maximum 0.04 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft. (0.2 L/s x sq. m of surface area at 75 Pa), when tested according to ASTM E 2357.

C. Fire Propagation Characteristics: Provide air barrier system qualified as a component of a comparable wall assembly that has been tested and passed NFPA 285.

2.4 MEMBRANE AIR BARRIER

A. Fluid-Applied, Vapor-Retarding Membrane Air Barrier: Elastomeric, UV-resistant, synthetic membrane, formulated for application in a range of 80 mils (wet), 40 mils (dry)

1. Basis of Design Product: Tremco, Inc., ExoAir 130.
2. Air Permeance, ASTM E 2178: 0.004 cfm/sq. ft of surface area at 1.57-lbf/sq. ft. (0.02 L/s x sq. m of surface area at 75-Pa) pressure difference, maximum.
3. Vapor Permeance, ASTM E 96/E96M: Less than 1 perms (690 ng/Pa x s x sq. m).
4. Elongation, Ultimate, ASTM D 412, Die C: 200 percent, minimum.
5. UV Resistance, QUV-B: Over 160 cycles of UV and water spray with no observable deterioration.
6. VOC Content: Less than 50 g/L.

2.5 ACCESSORY MATERIALS

A. General: Accessory materials as described in manufacturer's written installation instructions, recommended to produce complete air barrier assembly meeting performance requirements, and compatible with air barrier membrane material and adjacent materials.

B. Primer: Liquid primer meeting VOC limitations, recommended for substrate by membrane air barrier manufacturer, when installing modified bituminous self-adhered membranes.

1. Basis of Design Product: Tremco, Inc., ExoAir Primer.

C. Transitions:

1. Counterflashing Strip: Modified bituminous, 40 mils (1.0 mm) thick self-adhering composite sheet consisting of 32 mils (0.8 mm) of SBS rubberized asphalt laminated to an 8 mils (0.2 mm) high-density, cross-laminated polyethylene film, for counterflashing of metal flashings and for substrate transitions and for termination of air barrier to bituminous roof membranes and to air barrier terminations at openings.

    a. Basis of Design Product: Tremco, Inc., ExoAir TWF Thru-Wall Flashing.

2. High Temperature Flashing Strip and Underlayment: Butyl, 24 mil thick self-adhering composite sheet consisting of 20 mils of butyl laminated to 4 mil polyethylene film; thermally stable under intermittent, non-continuous exposure up to 240 deg F (115 deg C).

    a. Basis of Design Product: Tremco, Inc., ExoAir 111.

3. Foil Flashing Strip: Butyl, 24 mil thick self-adhering composite sheet consisting of 20 mils of butyl laminated to 4 mil polyethylene film; thermally stable under intermittent, non-continuous exposure up to 240 deg F (115 deg C).

    a. Basis of Design Product: Tremco, Inc., ExoAir 111.

4. Butyl Strip: Butyl, 24 mil thick self-adhering composite sheet consisting of 20 mils of butyl laminated to 4 mil polyethylene film; thermally stable under intermittent, non-continuous exposure up to 240 deg F (115 deg C), for termination of air barrier to EPDM or TPO roof membranes.

    a. Basis of Design Product: Tremco, Inc., ExoAir 111.

5. Opening Transition Assembly: Cured low-modulus silicone extrusion, with reinforcing ribs, sized to fit opening widths, with aluminum race for insertion into aluminum framing extrusions, with the following characteristics:

    a. Basis of Design Product: Tremco, Inc., Proglaze ETA Engineered Transition Assembly. Tear Strength: 110 lb/in (19.3 kN/m).

6. Preformed Silicone-Sealant Extrusion: Manufacturer's standard system consisting of cured low-modulus silicone extrusion, sized to fit opening widths, with manufacturer's recommended silicone sealant for bonding extrusions to substrates.

    a. Basis of Design Product: Tremco, Inc.; Spectrem SimpleSeal.

D. Reinforcing Fabric: High strength mesh fabric consisting of open-weave glass fiber saturated with synthetic resins formulated for high moisture resistance, for reinforcing of liquid applications; not less than 2.5 oz/sq. yd (85 g/sq. m).

1. Basis of Design Product: Tremco, Inc., Tremco 2011.

E. Liquid Joint Sealants:

1. ASTM C 920, single-component polyurethane, approved by air barrier manufacturer for adhesion and compatibility with membrane air barrier and accessories.

a. Basis of Design Product: Tremco, Inc., Dymonic 100.

2. ASTM C 920, single-component, neutral-curing silicone, approved by air barrier manufacturer for adhesion and compatibility with membrane air barrier and accessories post installation of the membrane.

a. Basis of Design Product: Tremco, Inc., Spectrem 1.

F. Sprayed Polyurethane Foam Sealant: Sprayed Polyurethane Foam Sealant: Foamed-in-place, 1.5- to 2.0-lb/cu. ft. (24- to 32-kg/cu. m) density, with flame-spread index of 25 or less per ASTM E 162, for filling of gaps at openings and penetrations.

1. Basis of Design; Tremco Inc., Flexible Low Expanding Foam (LEF).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Surface Condition: Before applying air barrier materials, examine substrate and conditions to ensure substrates are fully cured, smooth, clean, dry, and free from high spots, depressions, loose and foreign particles and other deterrents to adhesion, and conditions comply with manufacturer's written recommendations.

1. Verify concrete and masonry surfaces are visibly dry, have cured for time period recommended by membrane air barrier manufacturer, and are free from release agents, curing agents, and other contaminates.
2. Test for capillary moisture by method recommended in writing by air barrier manufacturer..
3. Verify masonry joints are filled with mortar and struck flush.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INTERFACE WITH OTHER WORK

A. Commencement of Work: Commence work once air barrier substrates are adequately protected from weather and will remain protected during remainder of construction.

B. Sequencing of Work: Coordinate sequencing of air barrier work with work of other sections that form portions of building envelope air barrier to ensure that flashings and transition materials can be properly installed and inspected. Roofing systems shall be capped and sealed, or top of walls protected, in such a way as to eliminate the ability of water to saturate the wall or interior space, both before and after, air barrier system installation. Coordinate installation of EXOAIR® 230 with the roofing trade to ensure compatibility and continuity with the roofing system.

C. Subsequent Work: Coordinate air barrier work with work of other sections installed subsequent to air barrier to ensure complete inspection of installed air barrier and sealing of air barrier penetrations necessitated by subsequent work.

3.3 PREPARATION

A. Clean, prepare, and treat substrate in accordance with air barrier manufacturer's written instructions.

1. Mask adjacent finished surfaces.
2. Remove contaminants and film-forming coatings from substrates.
3. Remove projections and excess materials and fill voids with substrate patching material.
4. Prepare and treat joints and cracks in substrate per ASTM C 1193 and membrane air barrier manufacturer's written instructions.

3.4 APPLICATION OF ACCESSORY MATERIALS

A. General: Install strips, transition strips, and accessory materials according to air-barrier manufacturer's written instructions. Install transition materials and other accessories to form connect and seal membrane air barrier material to adjacent components of building air barrier system, including, but not limited to, roofing system air barrier, exterior fenestration systems, door framing, and other openings.

B. Primer: Apply primer to substrates when recommended by air barrier manufacturer at required rate for those substrates that will be receiving a modified bituminous self-adhered membrane. Reprime areas not covered within 24 hours.

C. Assembly Transitions: Connect and seal exterior wall air barrier material continuously to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.

1. Opening Transitions: Fill gaps at perimeter of openings with foam sealant and apply approved transition or accessory material
2. Penetrations: Fill gaps at perimeter of penetrations with foam sealant and level with approved sealant, or seal transition strips around penetrating objects and terminate with approved sealant.
3. Joints: Bridge and cover isolation joints, expansion joints, and discontinuous joints between separate assemblies utilizing approved transition or accessory materials.

4. Changes in Plane: Apply approved sealant beads at corners and edges to form smooth transition.
5. Substrate Gaps: Cover gaps with stainless steel sheet mechanically attached to substrate and providing continuous support for air barrier.

D. Flashings: Seal top of through-wall flashings to membrane air barrier with a continuous bead of approved sealant recommended by air barrier manufacturer.

E. Seal punctures, voids, and seams. Patch with approved transition and accessory materials following air barrier manufacturer's recommendations and extend repair beyond repaired areas to maintain continuity.

3.5 FLUID AIR-BARRIER MEMBRANE INSTALLATION

A. General: Apply fluid air-barrier material to form a seal with transition materials and accessories to achieve a continuous air barrier according to air-barrier manufacturer's written instructions. Apply fluid air-barrier material within manufacturer's recommended application temperature ranges.

B. Membrane Air Barrier: Apply fluid air barrier material in full contact with substrate to produce a continuous seal according to membrane air barrier manufacturers written instructions.

1. Vapor-Retarding Membrane Air Barrier: Total dry film thickness as recommended in writing by manufacturer to meet performance requirements, 40 dry film thickness depending on substrate, applied in one or more equal coats, roller- or spray- applied.

C. Connect and seal exterior wall air-barrier membrane continuously to subsequently-installed roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, wall openings, and other construction used in exterior wall openings, using approved transitions and accessory materials.

D. Wall Openings: Apply approved sealant to adhere silicone extrusion to perimeter of windows, curtain walls, storefronts, doors, and louvers. Apply opening transition assembly and preformed silicone sealant extrusion according to air barrier transition manufacturer's written instructions.

E. Seal punctures, voids, and seams. Patch with approved transition and accessory materials following air barrier manufacturer's recommendations and extend repair beyond repaired areas to maintain continuity.

F. Do not cover air barrier until it has been tested and inspected by Owner's testing agency.

G. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.

3.6 FIELD QUALITY CONTROL

A. Testing Agency: Contractor shall engage a qualified Inspector to perform tests and inspections, including documenting of membrane air barrier prior to concealment.

1. Inspections and testing shall be carried out at the following rate:

a. Up to 10,000 sq. ft. (930 sq. m): One inspection.
b. 10,001 to 35,000 sq. ft. (931 to 3,250 sq. m): Two inspections.
c. 35,001 to 75,000 sq. ft. (3,251 to 6,970 sq. m): Three inspections.
d. 75,001 to 125,000 sq. ft. (6,971 to 11,610 sq. m): Four inspections.
e. 125,001 to 200,000 sq. ft. (11,611 to 18,580 sq. m): Five inspections.
f. Over 200,000 sq. ft. (18,580 sq. m): Six inspections.

2. Scope of Testing: Testing shall include the following:

a. Qualitative air-leakage testing per ASTM E 1186.
b. Quantitative air-leakage testing per ASTM E 783.
c. Photo documentation of work to be subsequently concealed.

B. ABAA Audit: Provide Installer audit by ABAA. Coordinate scheduling of work and associated audit inspections. Arrange and pay for site inspections by ABAA to verify conformance with the manufacturer's instructions, ABAA QAP, and requirements of this Section.

C. Coordination of Testing: Cooperate with testing agency. Allow access to work areas and staging. Notify testing agency in writing of schedule for Work of this Section to allow sufficient time for testing and inspection.

1. Do not cover Work until testing and inspection is completed and accepted.

D. Reporting: Forward written inspection reports to the Architect within 10 working days of the inspection and test being performed.

E. Correction: Correct deficient applications not passing tests and inspections, make necessary repairs, and retest as required to demonstrate compliance with requirements.

3.7 CLEANING AND PROTECTING

A. Clean spills, stains, and overspray resulting application utilizing cleaning agents recommended by manufacturers of affected construction. Remove masking materials.

B. Protect membrane air barrier from damage from subsequent work. Protect membrane materials from exposure to UV light for period in excess of that acceptable to membrane air barrier manufacturer; replace overexposed materials and retest.

END OF SECTION 072726

SECTION 074210.41 - COMPOSITE FRAMING SUPPORT (CFS) CLIP SYSTEM

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Composite framing support (CFS) system with in-fill insulation integrated with metal wall panels and Aluminum Composite Material (ACM) wall panel exterior wall cladding in locations as shown on the Drawings.

1. Substrate: Exterior sheathing over metal stud framing.

1.2 RELATED SECTIONS

A. Section 054000 – COLD-FORMED METAL FRAMING: Metal stud substrate support framing.

B. Section 061643 – GYPSUM SHEATHING: Exterior sheathing over metal stud substrate support framing.

C. Section 072100 – BUILDING INSULATION: Mineral wool insulation for exterior walls.

D. Section 072726 – FLUID-APPLIED MEMBRANE AIR BARRIERS: Air, water, vapor barrier at exterior wall.

E. Section 074213.23 – ALUMINUM COMPOSITE MATERIAL (ACM) PANELS: Wall cladding system at exterior walls.

F. Section 074214 – METAL WALL PANELS: Wall cladding system at Penthouse.

G. Section 079200 – JOINT SEALANTS: Perimeter sealant.

1.3 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM):

1. **ASTM A653/A653M** – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
2. **ASTM C518** – Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2015.
3. **ASTM C553** - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013.
4. **ASTM C612** - Standard Specification for Mineral Fiber Block and Board Thermal Insulation; 2014.
5. **ASTM C754** - Standard Specification for Installation of Steel Framing Members to Receive Screw- Attached Gypsum Panel Products; 2015.
6. **ASTM C1177/C1177M** – Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2013.

7. **ASTM C1363** - Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus; 2011.
8. **ASTM D256** - Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics; 2010e1.
9. **ASTM D570** – Standard Test Method for Water Absorption of Plastics; 2010e1.
10. **ASTM D635** – Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position; 2014.
11. **ASTM D638** – Standard Test Method for Tensile Properties of Plastics; 2014.
12. **ASTM D696** - Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between minus 30 degrees C and 30 degrees C with a Vitreous Silica Dilatometer; 2008e1.
13. **ASTM D695** – Standard Test Method for Compressive Properties of Rigid Plastics; 2015.
14. **ASTM D790** – Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials; 2010.
15. **ASTM D792** – Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement; 2013.
16. **ASTM D2583** - Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor; 2013a.
17. **ASTM D4385** - Standard Practice for Classifying Visual Defects in Thermosetting Reinforced Plastic Pultruded Products; 2013.
18. **ASTM E84** – Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

B. International Building Code (IBC) (International Code Council): 2021 Arkansas Fire Prevention Code.

C. 2014 Arkansas Energy Conservation Code (Based on 2009 International Energy Conservation Code (IECC) (ASHRAE 90).

D. National Fire Protection Association (NFPA) (www.nfpa.org):

1. **NFPA 285** – Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components; 2012.

E. Underwriters Laboratories (UL).

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate construction of wall cladding support system over substrate indicated for proper drainage, flashing, trim, back-up support, soffits, and other related Work.

1. Review and finalize construction schedule.
2. Verify availability of materials, installer's personnel, equipment, and facilities needed to maintain schedule.
3. Review means and methods related to installation, including manufacturer's written instructions.
4. Examine support conditions for compliance with requirements, including alignment and attachment to structural support system.

5. Review flashings, wall cladding details, wall penetrations, openings, and condition of other construction that affects this Work.
6. Review temporary protection requirements for during and after installation of this Work.

1.5 SUBMITTALS

A. See Section 013300 – SUBMITTAL PROCEDURES, for submittal procedures.

B. Product Data: Submit for each type of product indicated; include construction details, material descriptions, dimensions of individual components and profiles, and accessories as necessary for complete fully functioning and assembled system.

C. Test and Inspection Reports: Submit test and inspection reports on each type of wall cladding/veneer system based on evaluation of comprehensive tests performed by nationally recognized testing agency.

D. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with at least three years of documented experience.

B. Installer: Company specializing in performing work of this section and the following:

1. Install system in strict compliance with manufacturer’s installation instructions.
2. Have not less than three years of documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to site in manufacturer’s original unopened containers and packaging with labels clearly identifying product name and manufacturer.

B. Deliver components and other manufactured items or accessories without damage or deformation.

C. Storage: Store materials in clean, dry, and level interior areas or outdoor areas for limited duration in accordance with manufacturer’s written instructions.

D. Protect components and auxiliary accessories during transportation, handling, and installation from moisture, excessive temperatures and other construction operations in accordance with manufacturer’s written instructions.

E. Handle components in strict compliance with manufacturer’s written instructions and recommendations, and in a manner to prevent bending, warping, twisting, and surface, edge or corner damage.

1.8 SITE CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of this Work in accordance with manufacturer's written installation instructions and warranty requirements.

1.9 WARRANTY

A. See Section 017700 – PROJECT CLOSEOUT, for additional warranty requirements.

B. CFS System Warranty: Provide written warranty by manufacturer agreeing to correct defects in manufacturing within five year period after Date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Basis of Design: Advanced Architectural Products (A2P): SMARTci GreenGirt Clips Composite Framing Support (CFS) System

1. Address: 959 Industrial Drive, Allegan, Michigan 49010.
2. Phone: (269) 355-1818; Fax: (866) 858-5568; Website: www.smartcisystems.com
3. Other equivalent products shall be submitted in accordance with Section 012500 – SUBSTITUTION PROCEDURES. Pproducts shall meet materials and performance requirements specified herein and validated third party testing.

2.2 DESCRIPTION

A. Attach CFS clip system components through exterior sheathing into metal stud framing.

1. Refer to Section 054000 – COLD-FORMED METAL FRAMING for metal stud framing.
2. Refer to Section 061643 -GYPSUM SHEATHING for exterior sheathing.

B. Install CFS clip system components vertically through exterior sheathing into stud support system as indicated on Drawings in compliance with specified requirements.

C. Attach metal hat channel, mount horizontally to vertical CFS clips, connecting adjacent clips in series to each other.

2.3 PERFORMANCE REQUIREMENTS

A. System Thermal Design: Ensure installed insulation and CFS clip system, sub-framing, clips and cladding attachment does not have thermal bridging of fasteners or framing that creates a continuous metal path from exterior surface of insulation to interior face of insulation.

1. System thermal design shall meet or exceed thermal design requirements in compliance with 2013 Arkansas Energy Conservation Code.
2. Thermal Resistance: Wall assembly R Value of 20.5 (R-13 + R 7.5 CI).

3. Thermal Performance Test: Provide thermal resistance (R-value) indicated, in compliance with ASTM C1363, corrected to 15 mph outside and still air inside, with installed condition including fastening and joints.

    a. Provide efficiency of no less than 97 to 99 percent with a maximum temperature differential of 18 degrees F from interior wall surface to interior wall cavity and node locations with a 70 degrees F exterior to interior wall temperature delta.
    b. Provide test unit with at least one insulation panel horizontal and vertical joint length and height of test chamber area.
    c. Provide finite element analysis of three dimensional simulation of described wall assembly sealed by professional engineer in compliance with performance requirements and exceeding it by at least 3 percent.

B. Temperature: Comply with structural loading requirements within temperature range of minus 55 degrees F to 180 degrees F.

C. Fire-Test-Response Characteristics: Provide composite framing support system with fire-test results indicated as determined by test standard indicated and applied by UL or other testing and inspection agency acceptable to Authorities Having Jurisdiction (AHJ).

1. Surface Burning Characteristics: In compliance with ASTM E84, for foam insulation, fiber reinforced polymer (FRP) and interior surfaces as follows:

    a. Flame Spread Index (FSI): 25 or less.
    b. Smoke Developed Index (SDI): 450 or less.

2. Intermediate Scale Multistory Fire Test: Comply with NFPA 285 and/or IBC acceptance criteria for wall height above grade and fire separation distances, when wall type and other noted conditions require such testing or compliance with requirements as indicated.

2.4 COMPOSITE FRAMING SUPPORT (CFS) CLIP

A. Basis of Design - CFS Clip: Provide CFS Clip consisting of polyester and vinyl ester bioresin matrix (FRP) with recycled materials, fire retardant additives and integral continuous metal inserts the length of clip profile. Reinforce CFS clip with glass strand rovings used internally for longitudinal (lengthwise) strength and continuous strand glass mats or stitched reinforcements used internally for transverse (crosswise) strength.

1. Length of Clip; GreenGirt: 6 inch long.
2. Depth of Clip; GreenGirt: 1-1/2-inch deep. Refer to the Drawings for locations.
3. Grid Spacing of CFS Clips; Horizontally & Vertically: spacing as required per loading conditions and Codes. Refer to Structural Drawings. Maximum area of 4 sq. ft. (576 sq. inches.)
4. Provide continuous non-corrosive steel insert for engagement of fasteners, at least 16 gage, 0.0598 inch (1.52 mm) thick with G90 galvanized coating designation in compliance with ASTM A653/A653M.

    a. Anchor sub-girts and other wall cladding support accessories to steel insert set into and part of CFS.

5. Provide integral compression seal in CFS sections to ensure insulation will not dislodge.
6. Provide integral anti-siphon grooves on exterior and interior flanges of CFS.
7. Provide force distribution zones integrally designed into profile of CFS.
8. Surface Burning Characteristics:

    a. Flame Spread Index (FSI): 25 or less, when tested in accordance with ASTM E84.
    b. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.

9. Flammability: Comply with ASTM E84.
10. Self-Extinguishing: Comply with ASTM D635.
11. Profile Visual Requirements: Comply with ASTM D4385.
12. Tensile Stress: Provide engineered lengthwise and crosswise tensile stress in compliance with performance loading criteria and specified safety factors, in accordance with ASTM D638.
13. Compressive Stress: Provide engineered lengthwise and crosswise compressive stress in compliance with performance loading criteria and specified safety factors, in accordance with ASTM D695.
14. Flexural Stress: Provide engineered lengthwise and crosswise flexural stress in compliance with performance loading criteria and specified safety factors, in accordance with ASTM D790.
15. Modulus of Elasticity: Engineered to meet performance loading criteria and specified safety factors.
16. Barcol Hardness: 45, in accordance with ASTM D2583.
17. Water Absorption: Less than 0.46 percent by weight, within 24 hours, tested in accordance with ASTM D570.
18. Density: Within range of 0.062 to 0.070 lbs/cubic inch, in accordance with ASTM D792.
19. Lengthwise Coefficient of Thermal Expansion: 7.0 x 10^{-6} inch/inch/degrees F, in accordance with ASTM D696.
20. Notched Izod Impact, Lengthwise: 24 ft lbs/inch, in accordance with ASTM D256 within temperature range indicated.
21. Notched Izod Impact, Crosswise: 4 ft lbs/inch, in accordance with ASTM D256 within temperature range indicated.

2.5 INSULATION

A. Mineral Fiber Board Insulation: Rigid or semi-rigid mineral fiber, ASTM C612 or ASTM C553.

1. Unfaced - Flame Spread Index: Zero (0) when tested in accordance with ASTM E84.
2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
3. Board Size: Coordinate with girt spacing.
4. Board Thickness: 1-inch.
5. Thermal Resistance: R-Value of 4.3 per inch thickness at 75 degrees F, minimum, when tested according to ASTM C518.

6. Basis of Design Products:

a. Thermafiber, Inc.; Product RainBarrier HD (www.thermafiber.com). Refer to Section 072100 – BUILDING INSULATION.
b. Substitutions: See Section 012500 – SUBSTITUTION PROCEDURES.

2.6 ASSEMBLY

A. Assemble CFS clip system using manufacturer's standard procedures and processes identical to tested units and as necessary to comply with performance requirements indicated.

1. Comply with CFS clip system and dimensional and structural requirements as indicated on drawings.
2. Erect CFS clip system in established sequence in accordance with manufacturer's standard installation procedures.
3. Provide spray foam sealant on backside of cantilevered fasteners that completely puncture insulation layer.

2.7 ACCESSORIES

A. Provide accessories necessary for complete CFS clip system including metal closure trim, transition angle, strapping, tie-in brackets similar items as required.

B. Horizontal Hat Channels: 7/8-inch high with 1-1/2-inch flanges, 18 gauge minimum thickness, hot dipped galvanized with standard G90 coating designation in compliance with ASTM A653/A653M.

C. Fasteners: Corrosion-resistant, self-tapping and self-drilling screws, bolts, nuts, and other fasteners as recommended by CFS clip system manufacturer for project application.

1. Cladding to CFS Clip System: Use standard self-tapping metal screws.
2. CFS System to Metal Stud Wall Framing: Use standard self-tapping metal screws.
3. DO NOT USE powder, air, or gas actuated fasteners or actuated fastener tools. DO NOT USE impact wrenches when fastening to or from the CFS.

D. Wall Sheathing: Glass mat faced gypsum, ASTM C1177/C1177M, square long edges, Type X fire-resistant.

1. Refer to Drawings for thickness and Section 061643 – GYPSUM SHEATHING for additional requirements.

E. Weather Resistant Barrier (WRB): Refer to Section 072726 – FLUID-APPLIED MEMBRANE AIR BARRIERS for requirements.

F. Sealants: Refer to Section 079200 – JOINT SEALANTS for sealant information.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas of this work, and project conditions with installer present for compliance with requirements for installation tolerances, substrates, CFS system conditions, and other conditions affecting performance of this Work.

B. Examine structural wall framing to ensure that angles, channels, studs, and other structural support members have been installed within alignment tolerances required by CFS system manufacturer.

C. Examine rough-in for components and systems penetrating CFS system to coordinate actual locations of penetrations relative to CFS systems joint locations prior to installation.

D. Verify that mechanical and electrical services for exterior walls have been installed and tested and, if appropriate, verify that adjacent materials and finishes are dry and ready to receive insulation.

E. Proceed with installation only after wall substrate surfaces have been properly prepared and unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using methods recommended by CFS manufacturer for achieving best result for substrate under project conditions.

C. Prepare sub-framing, base angles, sills, furring, and other CFS system members and provide anchorage in accordance with ASTM C754 for substrate type and wall cladding type in accordance with manufacturer’s installation instructions.

3.3 INSTALLATION

A. Install CFS clip system in accordance with manufacturer's installation instructions.

B. Install system to fill-in exterior spaces without gaps or voids, and do not compress insulation panels.

C. Trim insulation neatly to fit spaces, and insulate miscellaneous gaps and voids.

D. Fit insulation tight in spaces and tight to exterior side of Mechanical/Electrical services within plane of insulation.

E. Exposed insulation must be protected from open flame.

F. Exterior wall insulation is not intended to be left exposed for extended periods of time without adequate protection.

G. Install CFS clip system in compliance with system orientation, sizes, and locations as indicated on Drawings.

3.4 TOLERANCES

A. Shim and align CFS system within installed tolerances of 1/4 inch in 20 feet, non-cumulative, level, plumb, and on location lines as indicated.

3.5 PROTECTION

A. Protect installed products from damage until Date of Substantial Completion.

B. Ensure that insulation panels are not exposed to moisture.

1. Remove wet insulation panels or allow them to completely dry prior to installation of CFS system.

C. Replace damaged insulation prior to Date of Substantial Completion.

END OF SECTION 074210.41

SECTION 074213.23 - ALUMINUM COMPOSITE MATERIAL (ACM) PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. Related sections:

1. Section 061643 – GYPSUM SHEATHING.
2. Section 072100 – BUILDING INSULATION
3. Section 072726 – FLUID-APPLIED MEMBRANE AIR BARRIERS.
4. Section 074210.41 – COMPOSITE FRAMING SUPPORT (CFS) CLIP SYSTEM.
5. Section 079200 – JOINT SEALANTS.

C. Reference Standards:

1. American Architectural Manufacturers Association (AAMA):

a. **AAMA 501** – Method of Test for Exterior Walls.
b. **AAMA 501.2** – Quality Assurance and Water Filed Check of Installed Storefronts, Curtain Walls and Sloped Glazing Systems.
c. **AAMA 2605** – Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.

2. American Society for Testing and Materials (ASTM):

a. **ASTM A653** – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot Dip Process.
b. **ASTM A792** – Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot Dip Process.
c. **ASTM C645** – Standard Specification for Nonstructural Steel Framing Members.
d. **ASTM C754** – Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
e. **ASTM C920** – Standard Specification for Elastomeric Joint Sealants.
f. **ASTM D1781** – Standard Test Method for Climbing Drum Peel for Adhesives.
g. **ASTM D1929** – Standard Test Method for Determining Ignition Temperature of Plastics.
h. **ASTM E84** – Standard Test Method for Surface Burning Characteristics of Building Materials.
i. **ASTM E283** – Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

j. **ASTM E330** – Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
k. **ASTM E331** – Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.

3. International Building Code (IBC):

a. **IBC 1407.14** – Metal Composite Materials (ACM) – Labeling.
b. **IBC 1703.5** – Special Inspections and Tests – Labeling.

4. National Fire Protection Association (NFPA):

a. **NFPA 285** – Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load Bearing Wall Assemblies Containing Combustible Components.

5. Sheet Metal and Air Conditioning Contractors National Association (SMACNA).

1.2 SUMMARY

A. Section includes:

1. Aluminum Composite Material (ACM) panels, factory fabricated, and field installed with concealed fasteners, for exterior wall cladding, soffits, canopies, and other architectural features in locations as shown on the Drawings.
2. Girts, purlins, hat channels, and other secondary support members and trim that are required for a complete ACM system installation.

1.3 DEFINITIONS

A. ACM: Aluminum Composite Material, a type of MCM.

B. MCM: Metal Composite Materials; cladding material formed by joining two thin metal skins to fire-retardant core and bonded under precise temperature, pressure, and tension. Indicated on Drawings as “ACM Wall or Soffit Panel System”.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, Owner's insurer if applicable, ACM panel Fabricator and Installer, ACM sheet manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects ACM panels, including installers of doors, windows, and louvers.
2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review methods and procedures related to ACM panel installation, including manufacturer's written instructions.

4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
5. Review flashings, special siding details, wall penetrations, openings, and condition of other construction that affect ACM panels.
6. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
7. Review temporary protection requirements for ACM panel assembly during and after installation.
8. Review procedures for repair of panels damaged after installation.
9. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.

B. Shop Drawings:

1. Include fabrication and installation layouts of ACM panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment assembly, trim, flashings, closures, and accessories; and special details.
2. Accessories: Include details of the flashing, trim and anchorage, at a scale of not less than 1-1/2 inches per 12 inches (1:10).

C. Samples for Initial Selection: For each type of ACM panel indicated with factory-applied color finishes.

1. Include similar Samples of trim and accessories involving color selection.

D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.

1. ACM Panels: 12 inches (305 mm) long by actual panel width. Include fasteners, closures, and other ACM panel accessories. Submit color samples in paint manufacturer's standard size.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For each product, tests performed by a qualified testing agency.

1. ACM Manufacturer's Material Test Reports: Certified test reports showing compliance with specific performance or third-party listing documenting compliance to comparable code sections IBC 1407.14 and IBC 1703.5.

2. ACM System Fabricator's Certified System Tests Reports: Certified system test reports showing system compliance with specific performance or third-party listing documenting compliance code section. Base performance requirements on ACM system type provided.

   a. Wet System: Tested to AAMA 501.

C. Field quality-control reports.

D. Sample Warranties: For special warranties.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For ACM panels to include in maintenance manuals.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by ACM Fabricator.

B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for ACM fabrication and installation.

1. Build mockup of typical ACM panel assembly as directed by Architect, including corner, soffits, supports, attachments, and accessories.
2. Water-Spray Test: Conduct water-spray test of mockup of ACM panel assembly, testing for water penetration in accordance with AAMA 501.2.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, ACM panels, and other manufactured items so as not to be damaged or deformed. Package ACM panels for protection during transportation and handling.

B. Unload, store, and erect ACM panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack ACM panels on platforms or pallets, covered with suitable weathertight and ventilated covering. Store ACM panels to ensure dryness, with positive slope for drainage of water. Do not store ACM panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Retain strippable protective covering on ACM panels during installation.

1.10 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of ACM panels to be performed in accordance with manufacturers' written instructions and warranty requirements.

1.11 COORDINATION

A. Coordinate ACM panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.12 WARRANTY

A. Warranty on Panel Material: Manufacturer's standard form in which manufacturer agrees to replace ACM that fails within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace ACM panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide ACM panel systems capable of withstanding the effects of the following loads, based on testing in accordance with ASTM E330:

1. Wind Loads: As indicated on Structural Drawings.
2. Other Design Loads: As indicated on Structural Drawings.
3. Deflection Limits: As indicated on Structural Drawings.

B. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. (0.3 L/s per sq. m) of wall area when tested in accordance with ASTM E283 at the following test-pressure difference:

1. Test-Pressure Difference: 6.24 lbf/sq. ft. (300 Pa).

C. Water Penetration under Static Pressure: No water penetration to room side of assembly when tested for 15 minutes in accordance with ASTM E331 at the following test-pressure difference:

1. Test-Pressure Difference: 6.24 lbf/sq. ft. (300 Pa).

D. Thermal Movements: Locate expansion and contraction points to allow for free and noiseless thermal movements from surface temperature changes.

1. Temperature Change (Range): minus 20 deg F to 180 deg F (minus 29 to 82.2 deg C), material surfaces.

E. Fire Propagation Characteristics: ACM wall assembly passes NFPA 285 testing.

2.2 ACM PANELS

A. ACM Panel Systems: Provide factory-formed and factory-assembled ACM panels fabricated from two metal facings that are bonded to a solid, extruded fire-retardant core; formed into profile for installation method indicated. Include attachment assembly components, panel stiffeners, and accessories required for weathertight system.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Arconic Architectural Products, LLC, Eastman, GA., Reynobond® Fire Resistant (FR) Aluminum Composite Material, Reynobond® ACM RB160FR or comparable product by one of the following:

a. 3A Composites USA, Inc., Alucobond® Plus.
b. Alucoil® North America, Larson® PE Composite Panels.
c. Or Approved Equivalent.

B. Aluminum-Faced Composite Material (ACM) Panels: Formed with 0.020-inch- (0.50-mm-) thick, coil-coated aluminum sheet facings.

1. Panel Thickness: 0.157 inch (4 mm).
2. Core: Fire retardant.
3. Exterior Finish: PVDF fluoropolymer.

a. Color: Colorweld 500 Factory Finish: To be selected by the Architect.

4. Peel Strength: 22.5 in-lb/in. (100 N x mm/mm) when tested for bond integrity in accordance with ASTM D1781.
5. Fire Performance: Flame spread less than 25 and smoke developed less than 450, in accordance with ASTM E84.
6. Self-Ignition Temperature (ASTM D1929): 824 deg. F (440 Deg. C).

C. Attachment Assembly Components: Formed from extruded aluminum or material compatible with panel facing.

2.3 MISCELLANEOUS MATERIALS

A. Miscellaneous Metal Subframing and Furring: ASTM C645, cold-formed, metallic-coated steel sheet ASTM A653/A653M, G90 (Z275 hot-dip galvanized) coating designation or ASTM A792/A792M, Class AZ50 (Class AZM150) aluminum-zinc-alloy coating designation unless otherwise indicated. Provide Fabricator's standard sections as required for support and alignment of ACM panel system.

B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of ACM panels unless otherwise indicated.

C. Flashing and Trim: Provide flashing and trim formed from same material as ACM panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent ACM panels.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Reynobond® Arconic Architectural Products, LLC Trim or comparable product by one of the following:

   a. Alucobond® 3A Composites USA, LLC.
   b. Alucoil® North America.
   c. Or Approved Equivalent.

2. Aluminum Trim: Formed with 0.040-inch (1.00-mm-) thick, coil-coated aluminum sheet facings.
3. Color: Colorweld 500 Factory Finish: To match panel color.

D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of ACM panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.

E. Panel Sealants: ASTM C920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in ACM panels and remain weathertight; and as recommended in writing by ACM panel manufacturer.

2.4 FABRICATION

A. General: Fabricate and finish ACM panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. Fabricate ACM panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.

C. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations or recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.

2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
4. Sealed Joints: Form non-expansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.

    a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

2.5 FINISHES

A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Aluminum Panels and Accessories:

1. PVDF Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, ACM panel supports, and other conditions affecting performance of the Work.

1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by ACM wall panel manufacturer.
2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by ACM wall panel manufacturer.

a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Examine roughing-in for components and assemblies penetrating ACM panels to verify actual locations of penetrations relative to seam locations of ACM panels before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages in accordance with ASTM C754 and ACM panel manufacturer's written recommendations.

3.3 ACM PANEL INSTALLATION

A. General: Install ACM panels in accordance with Fabricator's written instructions in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to supports unless otherwise indicated. Anchor ACM panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Shim or otherwise plumb substrates receiving ACM panels.
2. Flash and seal ACM panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by ACM panels are installed.
3. Install screw fasteners in predrilled holes.
4. Locate and space fastenings in uniform vertical and horizontal alignment.
5. Install flashing and trim as ACM panel work proceeds.
6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
7. Align bottoms of ACM panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

B. Fasteners:

1. Aluminum Panels: Use aluminum or stainless steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.

C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by ACM panel manufacturer.

D. Attachment Assembly, General: Install attachment assembly required to support ACM wall panels and to provide a complete weathertight wall system, including subgirts, perimeter extrusions, tracks, drainage channels, panel clips, and anchor channels.

1. Include attachment to supports, panel-to-panel joinery, panel-to-dissimilar-material joinery, and panel-system joint seals.

E. Panel Installation: Attach ACM wall panels to supports at locations, spacings, and with fasteners recommended by Fabricator to achieve performance requirements specified.

1. Wet Seal Systems: Seal horizontal and vertical joints between adjacent ACM wall panels with sealant backing and sealant. Install sealant backing and sealant in accordance with requirements specified in Section 079200 - JOINT SEALANTS.

a. Clip Installation: Attach panel clips to supports at locations, spacings, and with fasteners recommended in writing by Fabricator. Attach routed-and-returned flanges of wall panels to panel clips with Fabricator's standard fasteners.
b. Panel Installation:

1) Seal horizontal and vertical joints between adjacent panels with sealant backing and sealant. Install sealant backing and sealant in accordance with requirements specified in Section 079200 - JOINT SEALANTS.
2) Seal horizontal and vertical joints between adjacent ACM wall panels with Fabricator's standard gaskets.

c. Joint Sealing: Seal all joints in accordance with AAMA 501.

F. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete ACM panel assembly including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by ACM panel Fabricator; or, if not indicated, provide types recommended in writing by ACM system Fabricator.

G. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, or SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.

1. Install exposed flashing and trim that is without buckling and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (605 mm) of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with mastic sealant (concealed within joints).

3.4 ERECTION TOLERANCES

A. Site Verifications of Conditions:

1. Verify conditions of substrate previously installed under other Sections are acceptable for the ACM system installation. Provide documentation indicating detrimental conditions to the ACM system performance.
2. Once conditions are verified, ACM system installation tolerances are as follows:

a. Shim and align ACM wall panel units within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m), non-accumulative, on level, plumb, and location lines as indicated, and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified independent testing agency to perform field tests and inspections.

B. Water-Spray Test: After installation, test area of assembly as directed by Architect for water penetration in accordance with AAMA 501.2.

C. Fabricator's Field Service: Engage a factory-authorized service representative to test and inspect completed ACM wall panel installation, including accessories.

D. ACM wall panels will be considered defective if they do not pass test and inspections.

E. Additional tests and inspections, at Contractor's expense, shall be performed to determine compliance of replaced or additional work with specified requirements.

F. Prepare test and inspection reports.

3.6 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as ACM panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of ACM panel installation, clean finished surfaces as recommended by ACM panel manufacturer. Maintain in a clean condition during construction.

B. After ACM panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

C. Replace ACM panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 074213.23

SECTION 074219 – EXTERIOR INSULATION AND FINISH SYSTEM (EIFS)

PART 1 **-** GENERAL

1.1 SUMMARY

A. Provide air and moisture barrier, and compatible EIFS for vertical above grade exterior walls in locations as shown on the Drawings.

B. Related Sections

1. Section 061643 - GYPSUM SHEATHING.
2. Section 072100 - BUILDING INSULATION.
3. Section 074213.23 – ALUMINUM COMPOSITE MATERIAL (ACM) PANELS.
4. Section 074214 - METAL WALL PANELS.
3. Section 075423 - SINGLE PLY ROOFING SYSTEM (TPO).
4. Section 076200 - SHEET METAL FLASHING AND TRIM.
5. Section 077119 - MANUFACTURED SNAP-ON COPINGS.
6. Section 079200 - JOINT SEALANTS.
7. Section 081113 - HOLLOW METAL DOORS AND FRAMES.
8. Section 084113 - ALUMINUM FRAMED ENTRANCES AND STOREFRONTS.

1.2 SUBMITTALS

A. Manufacturer's specifications, details, installation instructions and product data.

B. Manufacturer’s Code compliance report or test summary.

C. Manufacturer's standard warranty.

D. Applicator's industry training credentials.

E. Samples for approval as directed by Architect.

F. EPS board manufacturer's ICC ES Evaluation Report.

G. Sealant manufacturer's certificate of compliance with ASTM C 1382.

H. Prepare and submit project specific details.

1.3 REFERENCE STADARDS

A. American Society for Testing and Materials (ASTM):

1. **B 117 -** Test Method for Salt Spray (Fog) Testing.
2. **C150 -** Standard Specification for Portland Cement.
3. **C 297** - Standard Test Method for Flatwise Tensile Strength of Sandwich Constructions.

4. **C 578 -** Specification for Preformed, Cellular Polystyrene Thermal Insulation.
5. **C 1177 -** Specification for Glass Mat Gypsum for Use as Sheathing.
6. **C 1382 -** Test Method for Determining Tensile Adhesion Properties of Sealants When Used in Exterior Insulation and Finish Systems (EIFS) Joints.
7. **D 522 -** Test Methods for Mandrel Bend Test of Attached Organic Coatings.
8. **D 882 -** Standard Test Methods for Tensile Properties of Thin Plastic Sheeting.
9. **D 968 -** Test Method for Abrasion Resistance of Organic Coatings by Falling Abrasive.
10. **D 1784 -** Specification for Rigid Poly (Vinyl Chloride) (PVC) and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
11. **D 2247 -** Practice for Testing Water Resistance of Coatings in 100% Relative Humidity.
12. **D 3273 -** Test for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
13. **E 84 -** Test Method for Surface Burning Characteristics of Building Materials.
14. **E 96 -** Test Methods for Water Vapor Transmission of Materials.
15. **E 119 -** Method for Fire Tests of Building Construction and Materials.
16. **E 283 -** Standard Test method for Determining Rate of Air Leakage Through Exterior Windows, 17. Curtain Walls, and Doors Under Specified Pressure Differences Across the Spectrum.
17. **E 330 -** Test Method for Structural Performance of Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
18. **E 331 -** Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
19. **E 1233 -** Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls and Doors by Cyclic Static Air Pressure Difference.
20. **E 2098 -** Test Method for Determining Tensile Breaking Strength of Glass Fiber Reinforcing Mesh for Use in Class PB Exterior Insulation and Finish System after Exposure to a Sodium Hydroxide Solution.
21. **E 2134 -** Test Method for Evaluating the Tensile-Adhesion Performance of an Exterior Insulation and Finish System (EIFS) .
22. **E 2178** - Test Method for Air Permeance of Building Materials.
23. **E 2273 -** Test Method for Determining the Drainage Efficiency of Exterior Insulation and Finish System (EIFS) Clad Wall Assemblies.
24. **E2430 -** Standard Specification for Expanded Polystyrene ("EPS") Thermal Insulation Boards for Use in Exterior Insulation and Finish Systems ("EIFS").
25. **E 2357 -** Standard Test Method for Determining Air Leakage of Air Barrier Assemblies.
26. **E 2485 -** Standard Test Method for Freeze/Thaw Resistance of Exterior Insulation and Finish Systems (EIFS) and Water Resistive Barrier Coatings.
27. **E 2486 -** Standard Test Method for Impact Resistance of Class PB and PI Exterior Insulation and Finish Systems (EIFS).
28. **E 2568 -** Standard Specification for PB Exterior Insulation and Finish Systems.
29. **E 2570 -** Test Method for Water-Resistive (WRB) Coatings used Under Exterior Insulation and Finish Systems (EIFS) or EIFS with Drainage.
30. **G 153 -** Recommended Practice for Operating Light-and Water-Exposure Apparatus (Carbon-Arc Type) for Exposure of Nonmetallic Material.
31. **G 154 -** Recommended Practice for Operating Light-and Water-Exposure Apparatus (Fluorescent UV-Condensation Type) for Exposure of Nonmetallic Materials.

32. **G 155 -** Standard Practice for Opening Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials.

B. ICC Evaluation Service (ICC-ES):

1. **AC 235 -** Acceptance Criteria for EIFS Clad Drainage Wall Assemblies (November, 2009).

C. National Fire Protection Association (NFPA) Standards:

1. **NFPA 268 -** Standard Test Method for Determining Ignitability of Exterior Wall Assemblies Using a Radiant Heat Energy Source.
2. **NFPA 285 -** Standard Method of Test for the Evaluation of Flammability Characteristics of Exterior Non-Load-Bearing Wall Assemblies containing Combustible Components Using the Intermediate-Scale, Multistory Test Apparatus.

D. International Organization of Standardization (ISO).

E. Other Referenced Documents:

1. **AATCC-127 -** American Association of Textile Chemists and Colorists AATCC-127 Water Resistance: Hydrostatic Pressure Test.
2. **APA E 30 -** Engineered Wood Association E 30, Engineered Wood Construction Guide.
3. **ICC-ES ESR-1233 -** StoGuard with Gold Coat, StoGuard with EmeraldCoat, and StoGuard VaporSeal Water-Resistive Barriers and StoEnergy Guard.
4. **ICC-ES ESR-1748 -** StoTherm® ci Classic.

1.4 DESIGN REQUIREMENTS

A. Wind Load

1. Design for maximum allowable system deflection, normal to the plane of the wall, of L/240.
2. Design for wind load in conformance with code requirements.
3. Maximum wind load resistance: + 175 psf (8.37 kPa), provided structural supports and sheathing/sheathing attachment are adequate to resist these pressures.
4. Refer to Structural Drawing Sheet S001 for project specific wind load requirements.

B. Moisture Control

1. Prevent the accumulation of water behind the EIFS or into the wall assembly, either by condensation or leakage through the wall construction, in the design and detailing of the wall assembly:

a. Provide flashing to direct water to the exterior where it is likely to penetrate components in the wall assembly, including, above window and door heads, beneath window and door sills, at roof/wall intersections, decks, abutments of lower walls with higher walls, above projecting features, at floor lines, and at the base of the wall.
b. Air Leakage Prevention – provide continuity of the air barrier system at foundation, roof, windows, doors, and other penetrations through the wall with connecting and compatible air barrier components to minimize condensation and leakage caused by air movement.
c. Vapor Diffusion and Condensation – perform a dew point analysis and/or dynamic hygrothermal modeling of the wall assembly to determine the potential for accumulation of moisture in the wall assembly by diffusion. Adjust insulation thickness and/or other wall assembly components accordingly to minimize risk. Avoid the use of vapor retarders on the interior side of the wall in warm, humid climates.

C. Impact Resistance

1. Provide ultra-high impact resistance of the EIFS to a minimum height of 6'-0" (1.8 m) above finished grade at all areas accessible to pedestrian traffic and other areas exposed to abnormal stress or impact.

D. Color Selection

1. Furnish and install Sto® finish colors, medium texture, in locations as shown on the Drawings. Color(s) to be selected by Architect.

E. Joints

1. Provide minimum 3/4 inch (19 mm) wide joints in the EIFS where they exist in the substrate or supporting construction, where the cladding adjoins dissimilar construction or materials, at changes in building height, at expansion, control, and cold joints in construction, and at floor lines in multi-level wood frame construction. Size joints to correspond with anticipated movement. Align terminating edges of EIFS with joint edges of through wall expansion joints and similar joints in construction. Refer to Sto Details.
2. Provide minimum 1/2 inch (13 mm) wide perimeter sealant joints at all penetrations through the EIFS (windows, doors, mechanical, electrical, and plumbing penetrations.).
3. Provide compatible backer rod and sealant that has been evaluated in accordance with ASTM C 1382, and that meets minimum 50% elongation after conditioning.
4. Provide joints so that air barrier continuity is maintained across the joint, and drain joints to the exterior, or provide other means to prevent or control water infiltration at joints.

F. Grade Condition

1. Do not install EIFS below grade (unless designed for use below grade and permitted by Code) or for use on surfaces subject to continuous or intermittent water immersion or hydrostatic pressure. Provide minimum 6 inch (152 mm) clearance above grade or as required by Code.

G. Trim, Projecting Architectural Features and Reveals

1. All trim and projecting Architectural features must have a minimum 1:2 [27degree] slope along their top surface. All reveals must have minimum ¾ inch (19 mm) insulation thickness at the bottom of the reveal. All horizontal reveals must have a minimum 1:2 [27degree] slope along their bottom surface. Increase slope for northern climates to prevent accumulation of ice/snow and water on surface. Where trim/feature or bottom surface of reveal projects more than 2 inches (51 mm) from the face of the EIFS wall plane, protect the top surface with waterproof base coat. Periodic inspections and increased maintenance may be required to maintain surface integrity of the EIFS finish on weather exposed sloped surfaces. Limit projecting features to easily accessible areas and limit total area to facilitate and minimize maintenance. Refer to Sto Details.
2. Do not use the EIFS on weather exposed projecting ledges, sills, or other projecting features unless supported by framing or other structural support and protected with metal coping or flashing. Refer to Sto Details.

H. Insulation Thickness

1. Minimum EPS insulation thickness is 1 inch (25 mm). Refer to Drawings for insulation thickness.

2. Maximum EPS insulation thickness is 6 inches (152 mm), except as noted below for fire- resistance rated wall assemblies.

I. Fire Protection

1. Do not use EPS foam plastic in excess of 6 inches (152 mm) thick on types I, II, III, or IV construction unless approved by the local Code official or Authority Having Jurisdiction (AHJ).
2. Where a fire-resistance rating is required by code use the EIFS over a rated concrete or concrete masonry assembly. Limit use over rated frame assemblies to non-load bearing assemblies (the EIFS is considered not to add or detract from the fire-resistance of the rated assembly). Maximum allowable EPS thickness: 2.75 inches (70 mm).
3. Refer to manufacturer's testing or applicable Code compliance report for other limitations that may apply.

1.5 PERFORMANCE REQUIREMENTS

A. Comply with ASTM E 2568, ASTM E 2570, and the following:

Table 1 Air/Moisture Barrier Performance

TEST	METHOD	CRITERIA	RESULT
1. Water Penetration Resistance	AATCC 127 (Water Column)	Resist 21.6 in (55 cm) water for 5 hours before and after aging	Pass
2. Water Penetration Resistance after Cyclic Wind Loading	ASTM E 1233 / ASTM E 331	No water at exterior plane of sheathing after 10 cycles @ 80% design load and 75 minutes water spray at 6.24 psf (299 Pa) differential	No water penetration
3. Water Resistance Testing	ASTM D 2247	Absence of deleterious effects after 14 day exposure	No deleterious effects
4. Water Vapor Transmission	ASTM E 96 Method B (Water Method)	Measure	Sto Gold Fill®*: 7.10 perms [408 ng/(Pa·s·m^2)] Sto Gold Coat: > 10 perms [574 ng/(Pa·s·m^2)]
5. Air Leakage (material)	ASTM E 2178	≤ 0.004 cfm/ft2 at 1.57 psf (0.02 L/s•m2 at 75 Pa)	Pass
6. Air Leakage (assembly)	ASTM E 2357	≤ 0.04 cfm/ft2 (0.2 L/s•m2)	Pass
7. Structural Integrity	ASTM E 330	2-inches (51 mm) H_2O pressure (positive & negative) for 1 hour.	Pass
8. Dry Tensile Strength	ASTM D 882	20 lbs/in (3503 N/m), minimum before and after aging	Sto Gold Fill:* 159 lbs/in (27845 N/m)) before aging 213 lbs/in (37302 N/m) after aging
9. Pliability	ASTM D 522	No Cracking or Delamination using ⅛" (3 mm) mandrel at 14°F (-10°C) before and after aging	Pass
10. Surface Burning	ASTM E 84	Flame Spread 0 – 25 for NFPA Class A, UBC Class I	Flame Spread: 5 Smoke Density: 10
11. Tensile Adhesion	ASTM C 297	>15 psi (103 kPa)	>30 psi (207 kPa) to Plywood, OSB, Glass Mat Faced Gypsum sheathings

* Note: Sto Gold Fill testing with Sto Detail Mesh reinforcement

Table 2 EIFS Weather Resistance and Durability Performance*

TEST	METHOD	CRITERIA	RESULTS
1. Accelerated Weathering	ASTM G 153 ASTM G 155	No deleterious effects* at 2000 hours	Pass (Stolit) Pass (Stolit X)
3. Freeze/Thaw Resistance	ASTM E 2485	No deleterious effects* at 10 cycles when viewed under 5x magnification	Pass
4. Water Penetration	ASTM E 331 (modified per ICC-ES AC 235)	No water penetration beyond the plane of the base coat/insulation board interface after 15 minutes at 6.24 psf (299 Pa)	Pass
5. Drainage Efficiency	ASTM E 2273	90% minimum	> 90%
6. Tensile Adhesion	ASTM E 2134	Minimum 15 psi (103kPa) tensile strength	Pass

TEST	METHOD	CRITERIA	RESULTS
7. Water Resistance	ASTM D 2247	No deleterious effects*at 14 day exposure	Pass @ 28 days
8. Salt Spray	ASTM B 117	No deleterious effects* at 300 hours	Pass @ 300 hrs
9. Abrasion Resistance	ASTM D 968	No cracking or loss of film integrity at 528 quarts (500 L) of sand	Pass @ 528 quarts (1000 L) (Stolit)
10. Mildew Resistance	ASTM D 3273	No growth supported during 28 day exposure period	Pass* @ 28 days
11. Impact Resistance	ASTM E 2486	Level 1: 25-49 in-lbs (2.83-5.54J) Level 2: 50-89 in-lbs (5.65-10.1J) Level 3: 90-150 in-lbs (10.2-17J) Level 4: >150 in-lbs (>17J)	Pass with one layer Sto Mesh Pass with one layer Sto Mesh Pass with one layer Sto Intermediate Mesh Pass* with one layer Sto Armor Mat and one layer Sto Mesh

* No deleterious effects: no cracking, checking, crazing, erosion, rusting, blistering, peeling or delamination

Table 3 Air/Moisture Barrier and EIFS Fire Performance

TEST	METHOD	CRITERIA	RESULT
1. Fire Endurance	ASTM E 119	Maintain fire resistance of existing rated assembly	Pass (4 inch [102 mm] maximum allowable insulation thickness)
2. Intermediate Scale Multi-Story Fire Test	NFPA 285 (formerly UBC Standard 26-9)	1. Resistance to vertical spread of flame within the core of the panel from one story to the next 2. Resistance to flame propagation over the exterior surface 3. Resistance to vertical spread of flame over the interior surface from one story to the next 4. Resistance to significant lateral spread of flame from the compartment of fire origin to adjacent spaces	Pass with 12 inches (305 mm) insulation
3. Radiant Heat Ignition	NFPA 268	No ignition @ 20 minutes	Pass with 1 and 12 inches (25 and 305 mm) insulation
4. Surface Burning (individual components)	ASTM E 84	Individual components shall each have a flame spread of 25 or less, and smoke developed of 450 or less	Flame Spread: < 25 Smoke Developed: < 450

Table 4 EIFS Component Performance

TEST	METHOD	CRITERIA	RESULT
1. Alkali Resistance of Reinforcing Mesh	ASTM E 2098	Greater than 120 pli (21 dN/cm) retained tensile strength	Pass
2. Requirements for Rigid PVC Accessories	ASTM D 1784	Meets cell classification 13244C	Pass

1.6 QUALITY ASSURANCE

A. Manufacturer Requirements

1. Member in good standing of the EIFS Industry Members Association (EIMA).
2. Air/moisture barrier and EIFS manufacturer for a minimum of thirty (30) years.
3. Manufacturing facilities ISO 9001:2008 Certified Quality System and ISO 14001:2004 Certified Environmental Management System.

B. Contractor Requirements

1. Engaged in application of similar systems for a minimum of three (3) years.
2. Knowledgeable in the proper use and handling of Sto materials.
3. Employ skilled mechanics who are experienced and knowledgeable in air/moisture barrier and EIFS application, and familiar with the requirements of the specified work.
4. Successful completion of minimum of three (3) projects of similar size and complexity to the specified project.
5. Provide the proper equipment, manpower and supervision on the job site to install the system in compliance with Sto's published specifications and details and the project plans and specifications.

C. Expanded Polystyrene (EPS) Insulation Board Manufacturer Requirements

1. EPS board listed by an approved agency.
2. EPS board manufactured under Sto licensing agreement and recognized by Sto as being capable of producing EPS insulation board to meet EIFS requirements.
3. EPS board labeled with information required by Sto, the approved listing agency, and the applicable Building Code in effect at the project location.

D. Mock-up Testing

1. Construct full-scale mock-up of typical air/moisture barrier and EIFS/window wall assembly with specified tools and materials and test air and water infiltration and structural performance in accordance with ASTM E 283, ASTM E 331 and ASTM E 330, respectively, through independent laboratory. Mock-up shall comply with requirements of project specifications. Where mock-up is tested at job site maintain approved mock-up at site as reference standard. If tested off-site accurately record construction detailing and sequencing of approved mock-up for replication during construction.

E. Inspections

1. Provide independent third party inspection where required by Code or Contract Documents.
2. Conduct inspections in accordance with Code requirements and Contract Documents.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver all materials in their original sealed containers bearing manufacturer's name and identification of product.

B. Protect coatings (pail products) from freezing and temperatures in excess of 90 deg. F (32deg. C). Store away from direct sunlight.

C. Protect Portland cement based materials (bag products) from moisture and humidity. Store under cover off the ground in a dry location.

1.8 PROJECT/SITE CONDITIONS

A. Maintain ambient and surface temperatures above 40 deg. F (4 deg. C) during application and drying period, minimum 24 hours after application of Air/Moisture barrier and EIFS products.

B. Provide supplementary heat for installation in temperatures less than 40 deg. F (4 deg. C).

C. Provide protection of surrounding areas and adjacent surfaces from application of products.

1.9 COORDINATION/SCHEDULING

A. Provide site grading such that the EIFS terminates above grade a minimum of 6 inches (150 mm) or as required by Code.

B. Coordinate installation of foundation waterproofing, roofing membrane, windows, doors and other wall penetrations to provide a continuously connected air and moisture barrier.

C. Provide protection of rough openings before installing windows, doors, and other penetrations through the wall.

D. Install window and door head flashing immediately after windows and doors are installed.

E. Install diverter flashings wherever water can enter the wall assembly to direct water to the exterior.

F. Install splices or tie-ins from air/moisture barrier over back leg of flashings, starter tracks, and similar details to form a shingle lap that directs incidental water to the exterior.

G. Install copings and sealant immediately after installation of the the EIFS when coatings are dry, and such that, where sealant is applied against the EIFS surface, it is applied against the base coat or primed base coat surface.

H. Schedule work such that air/moisture barrier is exposed to weather no longer than 30 days.

I. Attach penetrations through the EIFS to structural support and provide water tight seal at penetrations.

1.10 WARRANTY

A. Provide manufacturer's standard warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Provide Air/Moisture Barrier and EIFS coatings and accessories from single source manufacturer or approved supplier.

B. The following are acceptable Basis of Design Manufacturers:

1. Sto Corp. – Air/Moisture Barrier, EIFS: Sto Therm® ci EPS Classic®.
2. Sto Corp. Insulation – Insulation Board.
3. Plastic Components, Inc. – EIFS Accessories.

2.2 AIR/MOISTURE BARRIER

A. StoGuard®

1. Joint Treatment, Rough Opening Protection, and Detail Components:

a. Sto Gold Fill® – ready mixed coating applied by trowel or knife for rough opening protection of frame walls and joint treatment of sheathing when used with StoGuard Mesh. Also used as a detail component with StoGuard Mesh to splice over back flange of starter track, flashing, and similar ship lap details.
b. Sto Gold Coat® – ready mixed coating applied by brush, roller or spray for rough opening protection of frame walls and joint treatment of sheathing when used with StoGuard Fabric. Also used as a detail component with StoGuard Fabric to splice over back flange of starter track, flashing, and similar ship lap details.
c. StoGuard RapidFill™ – one component rapid drying gun-applied joint treatment for sheathing. Also used at static transition joints or seams in construction and to seal fish mouths, wrinkles, seams, gaps, holes, or other voids in StoGuard air barrier materials. Also used as a detail component to splice over back flange of starter track, flashing, and similar ship lap details.
d. StoGuard RapidSeal™ – one component rapid drying gun-applied rough opening protection for frame and CMU walls without mesh or fabric reinforcement. Also use as a joint treatment for sheathing when used with StoGuard Mesh. Also used to seal fish mouths, wrinkles, seams, gaps, holes, or other voids in StoGuard air barrier materials.

2. Waterproof Coating: Sto Gold Coat® – ready mixed waterproof coating for concrete, concrete masonry, wood-based sheathing, and glass mat gypsum sheathing.

3. Transition Membrane: StoGuard Transition Membrane – flexible air barrier membrane for continuity at transitions such as sheathing to foundation, dissimilar materials (CMU to frame wall), wall to balcony floor slab or ceiling, flashing shingle lap transitions, floor line deflection joints, masonry control joints, and through wall joints in masonry or frame construction.

2.3 ADHESIVE

A. Sto TurboStick™ – one component polyurethane spray foam adhesive.

2.4 INSULATION BOARD

A. Sto EPS Insulation Board: Nomimal 1.0 lb/cf Expanded polystyrene (EPS) insulation board incompliance with ASTM E 2430 and ASTM C578 Type 1 requirements listed, labeled, and furnished in accordance with paragraph 1.6.C of this section.

2.5 BASE COAT

A. Sto BTS® Xtra – one component polymer modified cement based high build base coat for insulation board. Also used as a leveler for concrete and masonry surfaces.

B. Waterproof Base Coat:

1. Sto Flexyl – fiber reinforced acrylic based waterproof base coat mixed with portland cement (for use as a waterproof base coat over Sto BTS Xtra for foundations, parapets, splash areas, trim and other projecting Architectural features).

2.6 REINFORCING MESHES

A. Standard Mesh:

1. Sto Mesh – nominal 4.5 oz/yd2 (153 g/m2), symmetrical, interlaced open-weave glass fiber fabric made with alkaline resistant coating for compatibility with Sto materials achieves Medium Impact Classification.

B. Ultra-High Impact Mesh

1. Sto Armor Mat – nominal 15 oz/yd2 (509 g/m2), ultra high impact, double strand, interwoven, open-weave glass fiber fabric with alkaline resistant coating for compatibility with Sto materials. Recommended to a minimum height of 6’-0” [1.8m] above finished grade at all areas accessible to pedestrian traffic and other areas exposed to abnormal stress or impact. Achieves Ultra High Impact Classification when applied beneath Sto Mesh.

C. Specialty Meshes

1. Sto Detail Mesh – nominal 4.2 oz/yd2 (143 g/m2), flexible, symmetrical, interlaced glass fiber fabric, with alkaline resistant coating for compatibility with Sto materials used for standard back wrapping, aesthetic detailing, and reinforcement of sheathing joints and protection of rough openings with trowel applied air/moisture barrier.

2.7 PRIMER

A. StoPrime Sand – acrylic based tintable primer with sand for roller application.

2.8 FINISH COAT

A. Stolit® – acrylic based textured wall finish with graded marble aggregate.

2.9 JOB MIXED INGREDIENTS

A. Water – clean and potable.

B. Portland cement – Type I, Type II, or Type I-II in conformance with ASTM C 150.

2.10 ACCESSORIES

A. Starter Track – Rigid PVC (polyvinyl chloride) plastic track Part No. STDE as furnished by Plastic Components, Inc., 9051 NW 97th Terrace, Miami, Florida 33178 (800 327-7077).

B. Sto-Mesh Corner Bead Standard – one component PVC (polyvinyl chloride) accessory with integral reinforcing mesh for outside corner reinforcement.

C. Sto Drip Edge Profile - one component PVC (polyvinyl chloride) accessory with integral reinforcing mesh that creates a drip edge and plaster return.

2.11 MIXING

A. Sto Gold Fill – mix with a clean, rust-free high speed mixer to a uniform consistency.

B. Sto Gold Coat – mix with a clean, rust-free high speed mixer to a uniform consistency.

C. Sto BTS Xtra – mix ratio with water: 4.75- 5 quarts (4.5-4.7 L) of clean potable water per 38 pound (17.2 kg) bag of Sto BTS Xtra. Pour water into a clean mixing pail. Add Sto BTS Xtra, mix to a uniform consistency and allow to set for approximately 5 minutes. Adjust mix if necessary with additional Sto BTS Xtra or water and remix to a uniform trowel consistency. Avoid retempering. Keep mix ratio consistent. Do not exceed maximum amount of water in mix ratio.

D. Sto Flexyl – mix ratio with portland cement: 1:1 ratio by weight. Pour Sto Flexyl into a clean mixing pail. Add portland cement, mix to a uniform consistency and allow to set for approximately five minutes. Adjust mix if necessary with additional Sto Flexyl and remix to a uniform trowel consistency. Avoid retempering. Keep mix ratio consistent.

E. Sto Watertight Coat – pour liquid component into a clean mixing pail. Add dry component, mix to a uniform consistency and allow to set for approximately five minutes. Adjust mix if necessary and remix to a uniform trowel consistency. Avoid retempering. Keep mix ratio consistent.

F. Sto primer – mix with a clean, rust-free high speed mixer to a uniform consistency.

G. Stolit – mix with a clean, rust-free high speed mixer to a uniform consistency. A small amount of water may be added to adjust workability. Limit addition of water to amount needed to achieve the finish texture.

H. Mix only as much material as can readily be used.

I. Do not use anti freeze compounds or other additives.

PART 3 - EXECUTION

3.1 ACCEPTABLE INSTALLERS

A. Prequalify under Quality Assurance requirements of this specification (paragraph 1.6B).

3.2 EXAMINATION

A. Inspect concrete and masonry substrates, if applicable, prior to start of application for:

1. Contamination – algae, chalkiness, dirt, dust, efflorescence, form oil, fungus, grease, laitance, mildew or other foreign substances.
2. Surface absorption and chalkiness.
3. Cracks – measure crack width and record location of cracks.
4. Damage and deterioration such as voids, honeycombs and spalls.
5. Moisture content and moisture damage – use a moisture meter to determine if the surface is dry enough to receive the products and record any areas of moisture damage.
6. Compliance with specification tolerances – record areas that are out of tolerance (greater than ¼ inch in 8-0 feet [6mm in 2438 mm] deviation in plane).

B. Inspect sheathing application for compliance with applicable requirement and installation in conformance with specification and manufacturer requirements:

1. Glass Mat Faced gypsum sheathing compliant with ASTM C 1177.
2. Exterior Grade and Exposure I wood based sheathing – APA Engineered Wood Association E 30.
3. Cementitious sheathing – consult manufacturer.
4. Attachment into structural supports with adjoining sheets abutted (gapped if wood-based sheathing) and fasteners at required spacing to resist design wind pressures as determined by design professional.

5. Fasteners seated flush with sheathing surface and not over-driven.

C. Report deviations from the requirements of project specifications or other conditions that might adversely affect the Air/Moisture Barrier and the EIFS installation to the General Contractor. Do not start work until deviations are corrected.

3.3 SURFACE PREPARATION

A. Remove surface contaminants on concrete, concrete masonry, gypsum sheathing, or coated gypsum sheathing surfaces.

B. Repair cracks, spalls or damage in concrete and concrete masonry surfaces and level concrete and masonry surfaces to comply with required tolerances.

C. Apply conditioner (consult Sto) by spray or roller to chalking or excessively absorptive surfaces or pressure wash to remove surface chalkiness.

D. Remove fasteners that are not anchored into supporting construction and seal holes with air barrier material.

E. Seal over-driven fasteners with air barrier material and install additional fasteners as needed to comply with fastener spacing requirement.

F. Fill large gaps between sheathing or voids around pipe, conduit, scupper, and similar penetrations with spray foam and shave flush with surface (refer to Sto Details).

G. Replace weather-damaged sheathing and repair or replace damaged or cracked sheathing.

3.4 INSTALLATION

A. Transition Detailing with StoGuard Transition Membrane:

1. At floor line deflection joints up to 1 inch (25 mm) wide, and static joints and transitions such as sheathing to foundation, dissimilar materials (i.e., CMU to frame wall), flashing shingle-lap transitions, and wall to balcony floor slab or ceiling:

    a. Apply waterproof coating (Sto Gold Coat) liberally to properly prepared surfaces with brush, roller, or spray.
    b. Place pre-cut lengths of StoGuard Transition Membrane centered over the transition in the wet coating. At changes in plane crease the membrane and similarly place the membrane material in the wet coating. At floor line deflection joints achieve a slightly concave profile (recessed into the joint) of the membrane.
    c. Immediately top coat the membrane with additional coating and apply pressure with brush or roller to fully embed the membrane in the coating and achieve a smooth and wrinkle-free surface without gaps or voids.
    d. Apply coating liberally along all top horizontal edges on walls and along all edges on balcony floor slabs to fully seal the edges.

e. Overlap minimum 2 inches (51 mm) at ends and adhere lap seams together with coating. Shingle lap vertical seams and vertical to horizontal intersections with minimum 2 inch (51 mm) overlap.

2. At movement joints up to 1 inch (25 mm) wide with up to + 50% movement such as masonry control joints, and through wall joints in masonry or frame construction:

a. Insert backer rod sized to friction fit in the joint (diameter 25% greater than joint width).
b. Recess the backer rod ½ inch (13 mm).
c. Apply the waterproof coating liberally to properly prepared surfaces with brush, roller, or spray along the outer surface on each side of the joint (not in the joint).
d. Immediately place the membrane by looping it into the joint against the backer rod surface to provide slack.
e. Embed the membrane in the wet coating along the outer surface on the sides of the joint by top coating with additional coating material and applying pressure with a brush or roller.

3. For all applications, after the membrane installation is complete and the waterproof coating is dry:

a. Apply a final liberal coat of the waterproof coating to all top horizontal edges on walls to ensure waterproofing integrity. Similarly apply coating at all edges on balcony floor slabs.
b. Inspect the installed membrane for fish mouths, wrinkles, gaps, holes or other deficiencies. Correct fish mouths or wrinkles by cutting, then embedding the area with additional coating applied under and over the membrane.
c. Seal gaps, holes, and complex geometries at three dimensional corners with StoGuard RapidFill or StoGuard RapidSeal.

B. Transition Detailing with StoGuard RapidFill

1. At flashing shingle laps, and through wall penetrations such as pipes, electrical boxes, and scupper penetrations:

a. Flashing leg or penetration flange must be seated flat against the wall surface without gaps. Apply StoGuard RapidSeal liberally with a caulking gun in a zig-zag pattern across the flashing leg or flange/wall surface seam and spread to a thickness that covers the flange and fastener penetrations and directs water away from the wall. Extend application minimum 1 inch (25 mm) onto both surfaces (flashing leg/flange and wall surface).
b. At through wall penetrations without flanges ensure the penetrating element (i.e., pipe or scupper) is fitted snug against abutting wall surfaces. Apply a fillet bead with a caulking gun around the penetration and tool against both surfaces (penetration and wall surface) to create a bead profile that directs water away from the penetration. Extend application minimum 1 inch (25 mm) onto both surfaces.

C. Rough Opening Protection:

1. Sto Gold Fill with StoGuard Mesh: apply 9 inch (229 mm) wide StoGuard Mesh at rough openings. Immediately apply Sto Gold Fill by spray or trowel over the mesh and spread with a trowel to create a smooth surface that completely covers the mesh (refer to Sto Detail 20.20M).
2. StoGuard RapidSeal: apply a generous bead of StoGuard RapidSeal with a caulking gun in a zig-zag pattern along the inside and outside surface of the rough opening. Spread with a 6 inch (152 mm) wide plastic drywall knife all the way around the opening (refer to Sto Details 20.20R and 21.20R)

D. Sheathing Joint Treatment

1. Sto Gold Fill with StoGuard Mesh: place 4 inch (102 mm) wide mesh centered along sheathing joints and minimum 9 inch (229 mm) wide mesh centered and folded at inside and outside corners. Immediately apply Sto Gold Fill by spray or trowel and spread with a trowel to create a smooth surface that completely covers the mesh.

E. Air/Moisture Barrier Coating Installation

1. Plywood and Gypsum Sheathing: apply waterproof coating by spray or roller over sheathing surface, including the dry joint treatment, rough opening protection, and transition areas, to a uniform wet mil thickness of 10 mils in one coat. Use ½ inch (13 mm) nap roller for plywood. Use ¾ inch (19 mm) nap roller for glass mat faced gypsum sheathing. Protect from weather until dry.
2. CMU Surfaces:

    a. Repair static cracks up to 1/2 inch (13 mm) wide with StoGuard RapidFill. Rake the crack with a sharp tool to remove loose or friable material and blow clean with oil-free compressed air. Apply the crack filler with a trowel or putty knife over the crack and tool the surface smooth. (Note: For moving cracks or cracks larger than ½ inch, consult with a structural engineer for repair method). Protect repair from weather until dry.
    b. Liberally apply two coats of Sto Gold Coat to the surface with a ¾ inch nap roller or spray equipment to a minimum wet thickness of 10 – 30 mils each, depending on surface condition. Additional coats may be necessary to provide a void and pinhole free surface. Protect from weather until dry.

F. Air /Moisture Barrier Connections and Shingle Laps

1. Coordinate installation of connecting air barrier components with other trades to provide a continuous air tight membrane.
2. Coordinate installation of flashing and other moisture protection components with other trades to achieve complete moisture protection such that water is directed to the exterior, not into the wall assembly, and drained to the exterior at sources of leaks (windows, doors and similar penetrations through the wall assembly).

3. Splice-in head flashings above windows, doors, floor lines, roof/sidewall step flashing, and similar locations with StoGuard detail component to achieve shingle lap of the air/moisture barrier such that water is directed to the exterior.

G. EIFS Installation

1. Starter Track

a. Strike a level line at the base of the wall to mark where the top of the starter track terminates.
b. Attach the starter track even with the line into structural supports with the proper fastener: Type S-12 corrosion resistant screws for steel framing with minimum 3/8 inch (9 mm) and three thread penetration, galvanized or zinc coated nails for wood framing with minimum 3/4 inch (19 mm) penetration, and corrosion resistant concrete or masonry screws with minimum 1 inch (25 mm) penetration for concrete or CMU. Attach between studs into blocking as needed to secure the track flat against the wall surface. Attach at maximum 16 inches (406 mm) on center into framing. For solid wood sheathing or concrete/masonry surfaces, attach directly at 12 inches (305 mm) on center maximum.
c. Butt sections of starter track together. Miter cut outside corners and abut. Snip front flange of one inside corner piece (to allow EPS insulation board to be seated inside of track) and abut.
d. Install Starter Track at other EIFS terminations as designated on detail drawings: above roof along dormers or gable end walls, and beneath window sills with concealed flashing (refer to Sto Details).

2. Detail Splice Strips for Starter Track, Flashing at Floor Lines, Head of Windows and Doors

a. Starter Track, Window/Door Head Flashing, Floor Line Flashing, and Roof/Side Wall Step Flashing: Install minimum 4 inch (100 mm) wide detail component over back flange of starter track, floor line flashing, head flashing, and roof/side wall step flashing. Center the detail component so it spans evenly between the back leg of flashing (or accessory) and the coated sheathing. Make a smooth transition to the coated sheathing with a trowel, knife, or roller, depending on the detail component material being used. When Sto Gold Fill with StoGuard Mesh is the detail component apply another coat of the waterproof coating over the detail area. Do not leave detail components exposed for more than 30 days.

3. Backwrapping

a. Apply a strip of detail mesh to the dry air/moisture barrier at all system terminations (windows, doors, expansion joints, etc.) except where the Starter Track is installed. The mesh must be wide enough to adhere approximately 4 inches (100 mm) of mesh onto the wall, be able to wrap around the insulation board edge and cover a minimum of 2 ½ inches (64 mm) on the outside surface of the insulation board. Attach mesh strips to the air/moisture barrier and allow them to dangle until the backwrap

procedure is completed (paragraph 3.04 G1). Alternatively, pre-wrap terminating edges of insulation board.

4. Adhesive Application and Installation of Insulation Board

   a. Ensure the air/moisture barrier surface (Sto Gold Coat) is free of surface contamination. Install the insulation board within 30 days of the application of the air/moisture barrier coating (Sto Gold Coat), or clean the surface and recoat with Sto Gold Coat.
   b. Cut the insulation board squarely to a 2 x 4 foot (0.6 x 1.2 m) dimension (if not already furnished pre-cut).
   c. Rasp the interior lower face of insulation boards to provide a snug friction fit into the Starter Track.
   d. Apply adhesive to the back of the insulation board with the dispensing pistol approximately ¾ inch (19 mm) from ends. Apply 6 additional ribbons spaced equally at no greater than 5-6 inches (127-152 mm) apart between the end ribbons for a total of 8 ribbons. Apply uniform ribbons of adhesive parallel with the SHORT dimension of the board so that when boards are placed on the wall the ribbons will be VERTICAL. Apply adhesive ribbons approximately ½ inch (51 mm) in diameter which will expand to ¾ – 1 inch (19 – 25 mm). Keep adhesive ½ inch (51 mm) short of board edges. Allow adhesive to “dwell” and become “tacky” before placing boards on wall. Adhesive will look smooth, not jagged, when ready to apply to wall surface. Place boards while adhesive is “tacky” and before adhesive “skins”.
   e. Place insulation boards in a running bond pattern on the wall with the long dimension horizontal. Start by inserting the lower edge of the boards inside the starter track at the base of the wall until they contact the bottom of the track. Apply light pressure when placing the boards. After boards have been in place for 5-10 minutes use a straight edge to lightly press the boards inward and to keep board joints flush, as post expansion of the adhesive may force boards slightly outward.
   f. Bridge sheathing joints by a minimum of 6 inches (152 mm). Interlock inside and outside corners.
   g. Butt all board joints tightly together to eliminate any thermal breaks. Care must be taken to prevent any adhesive from getting between the joints of the boards.
   h. Cut insulation board in an L shaped pattern to fit around openings. Do not align board joints with corners of openings.
   i. Check for satisfactory contact of the insulation board with the substrate. If any boards have loose areas use the dispensing pistol to create a hole through the board and inject adhesive to attach the loose area. Allow the adhesive to expand to the outer face of the board while withdrawing the pistol. Cut excess adhesive flush with the surface of the insulation. Do not use nails, screws, or any other type of non-thermal mechanical fastener.

5. Slivering and Rasping of Insulation Board Surface

   a. Make sure insulation boards are fully adhered to the substrate before proceeding to steps in paragraph 3.4.G.6.

b. Fill any open joints in the insulation board layer with slivers of insulation or the spray foam adhesive.
c. Rasp the insulation board surface to achieve a smooth, even surface and to remove any ultraviolet ray damage.

6. Trim, Reveals and Projecting Aesthetic Features

a. Attach features and trim where designated on drawings with adhesive to a base layer of insulation board or to the coated sheathing surface. Fill any gaps between the trim and base layer of insulation with spray foam adhesive and rasp flush with the trim surface. Slope the top surface of all trim/features minimum 1:2 (27°) and the bottom of all horizontal reveals minimum 1:2 (27°).
b. Cut reveals/aesthetic grooves with a hot-knife, router or groove-tool in locations indicated on drawings.
c. Offset reveals/aesthetic grooves minimum 3 inches (75 mm) from insulation board joints.
d. Do not locate reveals/aesthetic grooves at high stress areas.
e. Ensure minimum ¾ inch (19 mm) thickness of insulation board at the bottom of the reveals/aesthetic grooves.

7. Completion of Backwrapping

a. Complete the backwrapping procedure by applying base coat to exposed edges of insulation board and approximately 4 inches (100 mm) onto the face of the insulation board. Pull mesh tight around the board and embed it in the base coat with a stainless steel trowel. Use a corner trowel for clean, straight lines. Smooth any wrinkles or gaps in the mesh.

H. Accessory Installation

1. Corner Bead: cut the corner bead accessory to proper length as needed. Use full pieces wherever possible and avoid using short filler pieces. Offset accessory butt joints from substrate joints. Apply base coat with a stainless steel trowel to an approximate thickness of 1/8 inch (3 mm) to the outside corner area that will receive the accessory. Immediately place the accessory directly into the wet base coat material. Do not slide into place. Press the accessory into place. A corner trowel is best for this purpose. Embed and completely cover the mesh and PVC by troweling from the corner to the edge of the mesh so that no mesh or PVC color is visible. Avoid excess build-up of base coat and feather along mesh edges. Adjoin separate pieces by abutting PVC to PVC and overlapping the mesh “tail” from one piece onto the next piece. Fully embed the accessory and mesh “tail” in base coat material. When installing field mesh reinforcement overlap accessory mesh and PVC. Remove any excess base coat from the outside corner..
2. Drip Edge: install the drip edge accessory prior to application of field mesh (paragraph 3.4.2 I5 below). Install with arrow on mesh pointing UP. Cut the accessory to proper length as needed. Use full pieces wherever possible and avoid using short filler pieces. Offset accessory butt joints from substrate joints. Apply base coat with a stainless steel trowel to an approximate thickness of 1/8 inch (3 mm) to the area that will receive the accessory. Immediately place the

accessory directly into the wet base coat material and press into place. Do not slide into place. Embed and completely cover the mesh and PVC by troweling from the drip edge screed rail to the edge of the mesh. Avoid excess build-up of base coat, feather along mesh edges, and remove any excess base coat from the drip edge nosing. Abut adjoining pieces and install as described above. When installing field mesh reinforcement overlap accessory mesh 4 inches (10 cm) on both vertical and horizontal faces so the PVC is overlapped, and remove any excess base coat from the drip edge nosing. On vertical and horizontal faces of the accessory install finish to the drip edge lines and remove any protruding finish from the drip edge nosing.

I. Base Coat and Reinforcing Mesh Application

1. Ensure the insulation board is firmly adhered and free of surface contamination or UV degradation, and is thoroughly rasped before commencing the base coat application.
2. Apply minimum 9x12 inch (225x300 mm) diagonal strips of detail mesh at corners of windows, doors, and all penetrations through the system. Embed the strips in wet base coat and trowel from the center to the edges of the mesh to avoid wrinkles.
3. Apply detail mesh at trim, reveals and projecting Architectural features. Embed the mesh in the wet base coat. Trowel from the base of reveals to the edges of the mesh.
4. Ultra-High impact mesh application (recommended to a minimum height of 6’-0" [1.8 m] above finished grade at all areas accessible to pedestrian traffic and other areas exposed to abnormal stress or impact, and where indicated on contract drawings): apply base coat over the insulation board with a stainless steel trowel to a uniform thickness of approximately 1/8 inch (3 mm). Work horizontally or vertically in strips of 40 inches (1016 mm), and immediately embed the mesh into the wet base coat by troweling from the center to the edge of the mesh. Butt ultra-high impact mesh at seams. Allow the base coat to dry.
5. Standard mesh application: Apply base coat over the insulation board, including areas with Ultra-High impact mesh, with a stainless steel trowel to a uniform thickness of approximately ⅛ inch (3 mm). Work horizontally or vertically in strips of 40 inches (1016mm), and immediately embed the mesh into the wet base coat by troweling from the center to the edge of the mesh. Overlap mesh not less than 2-½ inches (64 mm) at mesh seams and at overlaps of detail mesh. Feather seams and edges. Double wrap all inside and outside corners with minimum 6 inch (152 mm) overlap in each direction (optional if corner bead accessory is used – see NOTE to paragraph 3.4.2 H1 above). Avoid wrinkles in the mesh. The mesh must be fully embedded so that no mesh color shows through the base coat when it is dry. Re-skim with additional base coat if mesh color is visible.
6. Sloped Surfaces: for trim, reveals, aesthetic bands, cornice profiles, sills or other Architectural features that project beyond the vertical wall plane more than 2 inches (51 mm) apply waterproof base coat with a stainless steel trowel to the sloped surface and minimum four inches (100 mm) above and below it. Embed standard mesh or detail mesh in the waterproof base coat and overlap mesh seams a minimum of 2-½ inches (65 mm).
7. Allow base coat to thoroughly dry before applying primer or finish.

J. Primer application

1. Ensure the base coat surface is free of surface contamination before commencing the primer application.
2. Apply primer evenly with brush, roller or proper spray equipment over the clean, dry base coat and allow to dry thoroughly before applying finish.

K. Finish Coat Application

1. Ensure the base coat surface or primed base coat is free of surface contamination before commencing the finish application.
2. Apply finish directly over the base coat or primed base coat when dry. Apply finish by spray or stainless steel trowel, depending on the finish specified. Follow these general rules for application of finish:

    a. Avoid application in direct sunlight.
    b. Apply finish in a continuous application, and work to an Architectural break in the wall.
    c. Weather conditions affect application and drying time. Hot or dry conditions limit working time and accelerate drying. Adjustments in the scheduling of work may be required to achieve desired results. Cool or damp conditions extend working time and retard drying and may require added measures of protection against wind, dust, dirt, rain and freezing. Adjust work schedule and provide protection.
    d. Do not install separate batches of finish side-by-side.
    e. Do not apply finish into or over sealant joints. Apply finish to outside face of wall only.
    f. Do not apply finish over irregular or unprepared surfaces, or surfaces not in compliance with the requirements of the project specifications.

3.5 PROTECTION

A. Provide protection of installed materials from water infiltration into or behind them.

B. Provide protection of installed materials from dust, dirt, precipitation, freezing and continuous high humidity until they are fully dry.

3.6 CLEANING, REPAIR AND MAINTENANCE

A. Clean and maintain the EIFS for a fresh appearance and to prevent water entry into and behind the system. Repair cracks, impact damage, spalls or delamination promptly.

B. Maintain adjacent components of construction such as sealants, windows, doors, and flashing, to prevent water entry into or behind the EIFS and anywhere into the wall assembly.

C. Refer to Sto reStore Repair and Maintenance Guide for detailed information on restoration – cleaning, repairs, recoating, resurfacing and refinishing, or re-cladding.

END OF SECTION 072419

SECTION 075423 – SINGLE PLY ROOFING SYSTEM (TPO)

PART 1 - GENERAL

1 1 SUMMARY

A. Furnish and install a complete fully-adhered TPO roofing system, including:

1. Roofing Manufacturer's requirements for the specified warranty.
2. Preparation of roof substrates.
3. Treated wood nailers for roofing attachment.
4. Rigid polyisocyanurate insulation, adhesive attached.
5. Tapered polyisocyanurate insulation for roof slopes and roof crickets, adhesive attached.
6. Roof cover board, adhesive attached.
7. Roof-side parapet wall sheathing, mechanically attached.
8. Fully adhered TPO elastomeric membrane roofing and flashings.
9. Roof walkway pads, adhesive attached.
10. Other roofing related items specified or indicated on the Drawings or otherwise necessary to provide a complete weatherproof roofing system.

B. Disposal of demolition debris and construction waste is the responsibility of Contractor. Perform disposal in manner complying with all applicable federal, state, and local regulations. Refer to Section 017419 – CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

C. Comply with the published recommendations and instructions of the roofing membrane Manufacturer, at http://Holcimelevate.com .

D. Commencement of work by the Contractor shall constitute acknowledgement by the 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.

E. Refer to Structural Drawings, Sheet S001 – GENERAL NOTES for wind load information affecting roof components.

1.2 RELATED SECTIONS

A. Section 047200 – ARCHITECTURAL CAST STONE: Cast stone coping at masonry veneer parapet walls.

B. Section 053100 – STEEL DECK: Steel roof deck.

C. Section 055100 – METAL STAIRS: Steel Roof Access Stair.

D. Section 061000 – ROUGH CARPENTRY: Treated wood nailers associated with roofing installation.

E. Section 074213.23 – ALUMINUM COMPOSITE MATERIAL (ACM) PANELS for ACM copings at roof parapet walls.

F. Section 076200 – SHEET METAL FLASHING AND TRIM: Miscellaneous formed metal flashing and trim items associated with roofing.

G. Section 077119 – MANUFACTURED SNAP-ON COPINGS: Prefinished metal copings at exterior EIFS and metal panel parapet walls.

H. Section 077233 – ROOF HATCHES: Prefabricated roof hatch for roof access.

I. Section 077234 – ROOF HATCH RAIL SYSTEM: Prefabricated safety guardrail system for roof hatch.

J. Division 22 – PLUMBING: Roof drains and plumbing piping.

1.3 REFERENCE STANDARDS

A. Definitions in the current additions of ASTM D1079 and National Roofing Contractors Association (NRCA) "The NCRA Roofing Manual: Membrane Roof Systems" apply to the work of this section.

B. Referenced Standards: The following standards form part of this specification only to the extent they are referenced as specification requirements.

C. American Society for Testing and Materials (ASTM):

1. **ASTM C473** – Standard Test Methods for Physical Testing of Gypsum Panel Products.
2. **ASTM C518** – Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
3. **ASTM C1177** – Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
4. **ASTM C1289** – Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
5. **ASTM D1079** – Standard Terminology Relating to Roofing and Waterproofing.
6. **ASTM 6878** – Standard Specification for Thermoplastic Polyolefin Based Sheet Roofing.
7. **ASTM E84** – Standard Test Method for Surface Burning Characteristics of Building Materials.
8. **ASTM E96** – Standard Test Methods for Water Vapor Transmission of Materials.
9. **ASTM E661** – Standard Test Method for Performance of Wood and Wood-Based Floor And Roof Sheathing Under Concentrated Static and Impact Loads.

D. Factory Mutual (FM):

1. **FM 4470** – Single Ply, Polymer-Modified Bitumen Sheet, Built-Up Roof (BUR) and Liquid Applied Roof Assemblies for Use in Class 1 and Non-Combustible Roof Deck Construction.

E. US Voluntary Product Standard (PS):

1. **PS-1** – Construction and Industrial Plywood; 1995.
2. **PS-20** – American Softwood Lumber Standard; 2005.

F. Underwriters Laboratories (UL).

G. International Organization of Standardization (ISO):

1. **ISO 9001** – Quality Management Systems (QMS).

H. American Society for Civil Engineers (ASCE):

1. **ASCE 7-16** – Minimum Design Loads and Associated Criteria for Buildings and Other Structures.

1.4 SUBMITTALS

A. 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.
2. Where UL or FM requirements are specified, provide documentation that shows that the roofing system to be installed is UL-Classified or FM-approved, as applicable. Include data itemizing the components of the classified or approved system, showing compliance with required wind uplift requirements.
3. Installation Instructions: Provide Manufacturer's instructions to installer, marked up to show exactly how all components will be installed; where instructions allow installation options, clearly indicate which option will be used.

B. 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.

C. Pre-Installation Notice: Copy to show that Manufacturer's required Pre-Installation Notice (PIN) has been accepted and approved by the Manufacturer.

D. Specimen Warranty: Submit prior to starting work.

E. Samples: Submit samples of each product to be used.

F. Closeout Submittals:

1. Executed Warranty.
2. Maintenance Data.

1.5 QUALITY ASSURANCE

A. Applicator Qualifications: Roofing installer shall have the following:

1. Current Elevate Master Contractor status.
2. At least five years experience in installing specified system.
3. Capability to provide payment and performance bond to building Owner.

B. 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. Review methods and procedures related to roofing installation, with special emphasis on requirements for adhesive and mechanical fastener attachment to maintain wind uplift resistance as required by ASCE 7-16, including Manufacturer's written instructions.
3. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Examine deck substrate conditions and finishes, including flatness and fastening.
5. Review structural loading limitations on roof deck during and after roofing.
6. Review base flashings, special roof details, roofing system components, roof drainage slopes, crickets, roof penetrations, equipment curbs, and conditions of other construction that affects roofing system.
7. Review governing regulations and requirements for insurance and certificates.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.
10. Notify Architect well in advance of meeting.

1.6 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. Discard and legally dispose of material that cannot be applied within its stated shelf life.

E. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck caused by structural overloading.

1.7 FIELD CONDITIONS

A. Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed in accordance with Manufacturer's written instructions and warranty requirements.

1.8 WARRANTY

A. Comply with all warranty procedures required by Manufacturer, including notifications, scheduling, and inspections.

B. Warranty: Elevate 20-Year Red Shield[tm] Roofing System Limited Warranty covering membrane, roof insulation, and system accessories.

1. Limit of Liability: No dollar limitation (NDL).
2. Scope of Coverage: Repair leaks in the roofing system caused by:
   a. Ordinary wear and tear.
   b. Normal exposure to the elements.
   c. Manufacturing defect in Elevate brand materials.
   d. Defective workmanship used to install these materials.
   e. Damage due to winds up to 55 mph.

3. Not Covered:

   a. Damage due to winds in excess of 55 mph.
   b. Damage due to hurricanes or tornadoes.
   c. Hail.
   d. Intentional damage.
   e. Unintentional damage due to normal rooftop inspections, maintenance, or service.

1.9 SPECIAL WARRANTY

A. Refer to Section 076200 – SHEET METAL FLASHING & TRIM, paragraph 1.5 for special two (2) year General Contractor and Roofing Subcontractor warranty covering weathertightness of all roofing and flashing materials and installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design Manufacturer - Roofing System: Elevate roofing, lining, and wall systems, Nashville, Tennessee, http://www.holcimelevate.com, or approved equivalent.

B. Roofing systems manufactured by others may be acceptable provided the roofing system is completely equivalent in materials and warranty conditions and the Manufacturer meets the following qualifications:

1. Specializing in manufacturing the roofing system to be provided.
2. Minimum ten years of experience manufacturing the roofing system to be provided.
3. Able to provide a No Dollar Limit (NDL), single source roof system warranty backed by corporate assets in excess of one billion dollars.
4. ISO 9001 certified.
5. Able to provide polyisocyanurate insulation produced in own facilities.

C. Manufacturer of Insulation: Same Manufacturer as roof membrane.

D. Manufacturer of Roof Cover Board and Roof-side Parapet Wall Sheathing: Refer to paragraph 2.5 of this section.

E. Substitution Procedures: Refer to Section 012500 – SUBSTITUTION PROCEDURES and Section 016000 – PRODUCT REQUIREMENTS.

2.2 ROOFING SYSTEM DESCRIPTION

A. Roofing System:

1. Membrane: Thermoplastic Polyolefin (TPO).
2. Thickness: 0.060 inch (60 mil).
3. Membrane Attachment: Adhered.
4. Slope: Provide slope of 1/4 inch per foot (1:48) (2%) by means of tapered insulation, as specified in paragraph 2.7..
5. Comply with applicable local building code requirements.
6. Provide assembly having Underwriters Laboratories, Inc. (UL) Class A Fire Hazard Classification.

B. Insulation

1. Total System R-Value: 25 or greater.

a. Maximum Board Thickness: 3-inch (76.2 mm).
b. Use as many layers as necessary to achieve required R-value.
c. Stagger joints in adjacent layers.

2. Base Layer: Polyisocyanurate foam board, non-composite.

a. Attachment: Low-rise polyurethane adhesive.

3. Fill Layers: Polyisocyanurate foam board, non-composite.

a. Attachment: Low-rise polyurethane adhesive.

4. Top Layer: Polyisocyanurate foam board, non-composite.

a. Attachment: Low-rise polyurethane adhesive.

D. Gypsum-Based Cover Board:

1. Thickness: ½-inch (0.50-inch, 12.7 mm).
2. Attachment: Low-rise polyurethane adhesive.

2.3 TPO MEMBRANE MATERIALS

A. Roof and Flashing Membrane: Flexible, heat weldable sheet composed of thermoplastic polyolefin polymer and ethylene propylene rubber; complying with ASTM D 6878, with polyester weft inserted reinforcement and the following additional characteristics:

1. Thickness: 0.060-inch (60 mil, 1.52 mm).
2. Color: White.
3. Reinforcement: Polyester, weft-inserted scrim.
4. Sheet Width: Use widest sheet practical for jobsite conditions to minimize field seams.
5. Basis of Design: UltraPly™ TPO Membrane by Elevate.

B. 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 (457 mm) wide. Basis of Design: UltraPly™ TPO 18" Curb Flashing.

C. Formable Flashing: Non-reinforced, flexible, heat weldable sheet, composed of thermoplastic polyolefin polymer and ethylene propylene rubber.

1. Color: Same as roofing membrane.
2. Basis of Design Product: UltraPly TPO Unsupported Flashing by Elevate.

D. Factory-formed Weldable Flashing Accessories: UltraPly™ TPO Flashing (various) by Elevate.

E. Self-Adhering Flashing Membrane: Unsupported (non-reinforced) TPO membrane factory laminated to white seam tape; UltraPly™ TPO Quickseam™ Flashing by Elevate.

F. Factory-formed Self-Adhering Flashing Accessories: UltraPly™ TPO QuickSeam™ Flashing (various) by Elevate.

G. Bonding Adhesive: Formulated for compatibility with TPO membrane and wide variety of substrate materials: UltraPly™ Bonding Adhesive by Elevate.

H. Seam Edge Treatment: Clear polymer-based sealant, formulated for sealing exposed edges of membrane; UltraPly™ TPO Cut Edge Sealant by Elevate.

I. Pourable Sealer: One part polyurethane; White One-Part Pourable Sealer by Elevate.

J. Water Block Seal: Butyl rubber sealant for use between two surfaces, not exposed; Water Block Seal S-20 by Elevate.

K. Metal Plates and Strips used for Fastening Membrane and Insulation: Steel with Galvalume coating; corrosion-resistance meeting FM 4470 criteria.

L. Termination Bars: Aluminum bars with integral caulk ledge; 1-inch (33 mm) wide by 0.10-inch (2.5 mm) thick; Termination Bar by Elevate.

M. Roof Walkway Pads: TPO pad designed to provide protection from essential rooftop services and traffic and maintain integrity of the existing roof surface; UltraPly™ TPO Walkway Pad, White, by Elevate.

2.4 ACCESSORY MATERIALS

A. Wood Nailers: PS 20 dimension lumber, Structural Grade No. 2 or better Southern Pine, Douglas Fir; or PS 1, APA Exterior Grade plywood; pressure preservative treated.

1. Width: 3-1/2 inches (90 mm), nominal minimum, or as wide as the nailing flange of the roof accessory to be attached to it.
2. Thickness: Same thickness as roof insulation.

2.5 ROOF BOARD

A. Furnish and install fiberglass-mat faced gypsum roof board for roof-side parapet wall sheathing and roof cover board in locations as shown on the Drawings.

B. Submit complete product data, Manufacturer's specifications, and installation instructions.

C. Provide roof boards that comply with the following limits for surface burning characteristics when tested per ASTM E84:

1. Flame Spread: 0.
2. Smoke Developed: 0.

D. Basis of Design: Furnish and install DensDeck® Prime Roof Board as manufactured by Georgia-Pacific Gypsum, LLC, or approved equivalent with the following characteristics:

1. Thickness: ½-inch for roof cover board:

a. Width: 4 feet.
b. Length: 8 feet.
c. Weight: 2.0 lbs./sq. ft.
d. Surface: Fiberglass mat with non-asphaltic coating.
e. Flexural Strength, Parallel (ASTM C473): 80 lbf, minimum.
f. Compressive Strength (ASTM C473): 900 psi nominal.
g. Flute Span (ASTM E661): 5- inches.
h. Permeance (ASTM E96): greater than 23 perms.
i. R-Value (ASTM C518): 0.56.
j. Water Absorption (ASTM C1177): 5% maximum.
k. Surface Water Absorption (ASTM C473): 1.0 grams nominal.

2. Thickness: 5/8-inch for roof-side parapet wall sheathing.

a. Width: 4 feet.
b. Length: 8 feet.
c. Weight: 2.5 lbs./sq. ft.
d. Surface: Fiberglass mat with non-asphaltic coating.
e. Flexural Strength, Parallel (ASTM C473): 100 lbf, minimum.
f. Compressive Strength (ASTM C473): 900 psi nominal.
g. Flute Span (ASTM E661): 8-inches.
h. Permeance (ASTM E96): Greater than 17 perms.
i. R-Value (ASTM C518): 0.67.

j. Water Absorption (ASTM C1177): 5% maximum.
k. Surface Water Absorption (ASTM C473): 1.0 grams nominal.

E. Adhere and mechanically attach as recommended by roof system Manufacturer and adhesive Manufacturer to meet Factory Mutual (FM) or Underwriter's Laboratory (UL) guidelines for wind uplift resistance.

F. Follow current Georgia Pacific LLC "Product Catalog" for installation recommendations.

G. Protect gypsum roof board installations from damage and deterioration until the date of Substantial Completion.

2.7 ROOF INSULATION

A. Polyisocyanurate Board Insulation: Closed cell polyisocyanurate foam with glass reinforced mat laminated to faces, complying with ASTM C 1289 Type II Class 1, with the following additional characteristics:

1. Thickness Basis of Design: 4-1/2-inches for R27.9. Install in two (2) layers to meet and exceed minimum Code requirement of R25.

a. One layer 2.5 inch (R15.5).
b. One layer 2.0 inch (R12.4).

2. Size: 48-inch (1.22 m) by 48-inch (1.22 m) nominal if adhesive attached (adhered).
3. R-Value – Long Term Thermal Resistance (LTTR): Per inch of thickness, minimum 6.2 R at 40 deg. F (4.4 deg. C) and minimum 5.7R at 75 deg. F (23.9 deg. C).
4. Compressive Strength: 20 psi (138 kPa).
5. Ozone Depletion Potential: Zero, made without CFC or HCFC blowing agents.
6. Basis of Design Product: ISOGARD GL Polyiso board insulation by Elevate.

2.8 LOW RISE FOAM ADHESIVE

A. Two-component, low-rise polyurethane adhesive designed to attach polyisocyanurate insulation to a wide variety of acceptable substrates; Twin Jet, I.S.O.Stick™, I.S.O. Twin Pack™, or I.S.O. Spray™R by Elevate. Use adhesive as recommended by Manufacturer for project materials and substrate conditions.

2.9 METAL ACCESSORIES:

A. Aluminum Bar: Continuous 6063-T6 alloy aluminum extrusion with pre-punched slotted holes; miters welded; injection molded EPDM splice to allow thermal expansion.

B. Anchor Bar Cleat: 20-gage, 0.036-inch (0.9 mm) G90 coated commercial type galvanized steel with pre-punched holes.

C. Fasteners: Factor-provided corrosion resistant fasteners, with drivers; no exposed fasteners permitted.

PART 3 - INSTALLATION

3.1 GENERAL

A. 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.

B. Obtain all relevant instructions and maintain copies at project site for duration of installation period.

C. Do not start work until Pre-Installation Notice has been approved by Manufacturer as confirmation that this project qualifies for Manufacturer's warranty.

D. Perform work using competent and properly equipped personnel.

E. 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.

F. 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 (15 to 25 degrees C).

G. 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.

H. Until ready for use, keep materials in their original containers as labeled by the Manufacturer.

I. Consult membrane Manufacturer's instructions, container labels, and Safety Data Sheets (SDS) for specific safety instructions. Keep all adhesives, sealants, primers and cleaning materials away from all sources of ignition.

3.2 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.

3.3 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 (6 mm) wide with fill material acceptable insulation to membrane Manufacturer.

D. Seal, grout, or tape deck joints, where needed, to prevent material seepage into building.

3.4 INSULATION AND COVER BOARD INSTALLATION

A. Install insulation in configuration and with attachment method(s) specified in Part 2 – PRODUCTS, under Insulation.

B. Install only as much insulation as can be covered with the complete roofing system before the end of the day's work or before the onset of inclement weather.

C. Lay roof insulation in courses parallel to roof edges.

D. Neatly and tightly fit insulation to all penetrations, projections, and nailers, with gaps not greater than ¼-inch (6mm). Fill gaps greater than ¼-inch (6 mm) with acceptable insulation. Do not leave the roofing membrane unsupported over a space greater than ¼ inch (6 mm).

E. Adhesive Attachment: Apply in accordance with membrane Manufacturer's instructions and recommendations.; "walk-in" individual roof insulation boards to obtain maximum adhesive contact.

3.5 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. Adheres membrane: Bond membrane sheet to substrate using membrane Manufacturer's recommended bonding material, application rate, and procedures.

E. Edge Securement: Secure membrane at all locations where membrane terminates or goes through an angle change greater than 1 in 12 inches (8.3%) 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 (460 mm) in diameter and square penetrations less than 4 inches (200 mm) square.
2. Metal edging is not merely decorative; ensure anchorage of membrane as intended by roofing Manufacturer, and compliant with IBC.

3.6 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 (8.3%), 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 (200 mm) 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. Roofing Expansion Joints: Install as shown on Drawings and as recommended by roofing Manufacturer.

E. 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 (12 to 19 mm) 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.

F. Flashing at Penetrations: Flash all penetrations passing through the membrane; make flashing seals directly to the penetration.

1. Pipes, Round Supports, and Similar Items: Flash with specified pre-molded pipe flashings wherever practical; otherwise use specified self-curing elastomeric flashing.
2. Pipe Clusters and Unusual Shaped Penetrations: Provide penetration pocket at least 2 inches (50 mm) deep, with at least 1 inch (25 mm) clearance from penetration, sloped to shed water.
3. Structural Steel Tubing: If corner radii are greater than 1/4 inch (6 mm) and longest side of tube does not exceed 12 inches (305 mm), flash as for pipes; otherwise, provide a standard curb with flashing.
4. Flexible and Moving Penetrations: Provide weathertight gooseneck set in sealant and secured to deck, flashed as recommended by Manufacturer.

3.7 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. Use specified walkway pads unless otherwise indicated.

C. Walkway Pads: Adhere to the roofing membrane, spacing each pad at minimum of 1.0 inch (25 mm) and maximum of 3.0 inches (75 mm) from each other to allow for drainage.

1. If installation of walkway pads over field fabricated splices or within 6 inches (150 mm) 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 (150 mm) 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.

3.8 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 (e.g. not a salesperson).

B. Perform all corrections necessary for issuance of warranty.

3.9 CLEANING

A. Clean all contaminants generated by roofing work from roofing membrane, flashings, building and surrounding areas, including dirt, bitumen, adhesives, sealants, and coatings. Clean as recommended by roofing Manufacturer.

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.

3.10 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 075423

SECTION 076200 - SHEET METAL FLASHING & TRIM

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included: Furnish and install sheet metal flashing and other sheet metal work as shown on the Drawings, as specified herein, and as required to prevent penetration of water through the roof or exterior walls of the building and permit the proper control of discharged water.

1.2 QUALITY ASSURANCE

A. Standards: "Architectural Sheet Metal Manual", latest revision, of the Sheet Metal and Air Conditioning Contractors National Association (SMACNA), shall be applicable minimum standard for method and quality of work under this section where flashing details are not otherwise shown on the Drawings.

B. Qualifications of Manufacturer: Products used in the work of this Section shall be produced by manufacturers regularly engaged in manufacture of similar items and with a history of successful production to the Architect.

C. Qualifications of Installers: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with specified requirements and methods needed for proper performance of the work of this Section.

D. Reference Standards

1. American Society for Testing and Materials (ASTM):

a. **ASTM A755** – Standard Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products.
b. **ASTM B209** – Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
c. **ASTM D1970** – Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.

2. Society for Protective Coatings (SSPC):

a. **SSPC Paint 12** – Cold Applied Mastic Paint (Extra Thick Film).

3. Sheet Metal and Air Conditioning Contractors National Association (SMACNA).

1.3 SUBMITTALS

A. General: Comply with pertinent provisions of Section 013300 – SUBMITTAL PROCEDURES.

B. Product Data: Submit manufacturer's specifications and other product data required to demonstrate compliance with specified product requirements.

C. Shop Drawings:

1. Furnish shop drawings for approval showing fabrication details of all miscellaneous metal flashing and counterflashing as shown on the Drawings.
2. Include details of horizontal and vertical seams, expansion joints, inside and outside corners, fascia and trim attachment, and flashing.

D. Samples: Submit samples of flashing proposed for use. Provide color samples of manufacturer's standard prefinished metal flashing available. Architect will select color(s) from manufacturer's standard colors.

1.4 PRODUCT HANDLING

A. Protection: Use all means necessary to protect materials of this Section before, during, and after installation and to protect installed work and materials of all other trades.

B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

PART 2 - PRODUCTS

2.1 SHEET METAL

A. Flashing: Furnish and install all miscellaneous sheet metal flashing and counterflashing as required for flashing mechanical and electrical equipment which pass through the roof.

1. Galvanized Steel: 24 gauge, unless otherwise shown, bonderized for painting meeting ASTM A755: ZincGrip® Steel with PaintGrip® zinc-phosphate coating as manufactured by Armco Steel Corporation, Middleton, OH, or approved equivalent.
2. Aluminum Sheet: ASTM B209, alloy 3003-H14, 0.032 inch (20 gauge), mill finished.

2.2 PARAPET WALL FLASHINGS

A. Refer to Section 077119 – MANUFACTURED SNAP-ON COPING.

2.3 SELF-ADHESIVE WATERPROOFING SHEET FLASHING

A. Furnish and install as underlayment between prefinished metal coping system and treated wood blocking at parapet walls and other locations as shown on the Drawings.

B. Manufacturers:

1. Owens-Corning Roofing and Asphalt, LLC WeatherLock® Mat Self-Sealing Ice & Water Barrier.
2. GAF WeatherWatch® XT Mat-Surfaced Leak Barrier/Water & Ice Shield.

3. IKO Industries, Ltd. “Armour Guard Ice and Water Protector” (Commercial Grade).
4. Grace Construction Products Ice and Water Shield®.
5. Carlisle Coatings and Waterproofing “CCW-705 Air & Vapor Barrier”.
6. TAMKO® Moisture Guard Plus®.
7. Or approved equivalent.

C. Submit manufacturer product data for approval. Material shall meet ASTM D1970 requirements.

PART 3 - EXECUTION

3.1 INSPECTION

A. Surface Conditions: Prior to all work of this Section, carefully inspect installed work of all other trades and verify that all such work is complete. Do not proceed with sheet metal installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 WORKMANSHIP

A. General: Form all sheet metal accurately to the dimensions and shapes required. Make water and weather tight, with all angles and broken surfaces true, sharp, and straight. Where flashing intersects, cope to an accurate fit and solder securely. All flat surfaces shall be straight and free from waves and buckles.

B. Expansion: Form, fabricate, and install all sheet metal so as to adequately provide for expansion and contraction in the finished work. Provide weathertight joint covers in copings, cap flashings and fascias at not more than 12 feet o.c.

3.3 SOLDERING

A. General:

1. Thoroughly clean and tin all joint materials prior to soldering.
2. Perform all soldering slowly in order to heat seams thoroughly and to permit full penetration with solder.
3. Make all exposed soldering on finished surfaces neat, full, flowing, and smooth. Solder shall not be used where seams required a strong connection. Provide rivets at these locations, then solder watertight.

B. Cleaning: After soldering, thoroughly wash acid flux with a soda solution.

3.4 INSTALLATION

A. Anchor work in place with noncorrosive fasteners, adhesives, setting compounds, tapes, and other materials and devices as recommended by manufacturer of each material or system. Provide for thermal expansion and building movements. Comply with recommendations of “Architectural Sheet Metal Manual” by SMACNA.

B. Seal moving joints in sheet metal work with elastomeric joint sealants, complying with requirements specified in Division 7, Section 079200 – JOINT SEALANTS.

C. Clean sheet metal surfaces of soldering flux and other substances which could cause corrosion.

D. Performance: Water-tight and weatherproof performance of all flashing and sheet metal work is required.

E. Fabricate sheet metal with flat-lock seams; seal aluminum seams with epoxy metal seam cement and, where required for strength, rivet seams and joints.

F. Coat back side of fabricated sheet metal with 15-mil sulfur-free bituminous coating as per SSPC – Paint 12, where required to separate metals from corrosive substrates, including cementitious materials, wood, or other absorbent materials; or provide other permanent separation.

END OF SECTION 076200

SECTION 077119 - MANUFACTURED SNAP-ON COPING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Furnish and install premanufactured coping system per the Drawings and specifications, including all clips, sealant, fasteners, and joining to make weathertight and watertight. Components and accessories shall be factory-fabricated and supplied by specified Manufacturer.

B. Contractor shall utilize Manufacturer's technical representative to perform field measuring, takeoff, shop drawing development and order processing for all coping components specified in this section.

1.2 RELATED SECTIONS

A. Section 061000 – ROUGH CARPENTRY.

B. Section 074214 – METAL WALL PANELS.

C. Section 074219 – EXTERIOR INSULATION AND FINISH SYSTEM (EIFS).

D. Section 075423 – SINGLE-PLY ROOFING SYSTEM (TPO).

E. Section 079200 – JOINT SEALANTS.

1.3 REFERENCE STANDARDS

A. FM Global (www.fmglobal.com).

B. American National Standards Institute (ANSI) / Single Ply Roofing Industry (SPRI) (www.spri.org) / Factory Mutual (FM):

1. ANSI/SPRI/FM 4435/ES-1 – Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems.

1.4 PREINSTALLATION MEETINGS

A. Convene preinstallation meeting 1 week before start of installation of coping system.

B. Require attendance of parties directly affecting Work of this Section, including Contractor, Architect, installer, and manufacturer’s representative.

C. Review the Following:

1. Materials.
2. Examination of roof edge areas.
3. Installation.
4. Cleaning.
5. Protection.

6. Coordination with other Work, including roofing installation.

1.5 SUBMITTALS

A. Comply with Section 013300 – SUBMITTAL PROCEDURES.

B. Products shall be manufactured in specified manufacturer's facilities. Products fabricated by installer or other fabricator will not be acceptable unless fabricator can demonstrate to Architect's satisfaction that products have been tested for resistance in accordance with Test Method RE-3 of ANSI/SPRI ES-1.

C. Product Data: Submit manufacturer's product data, including installation instructions.

D. Shop Drawings: Submit manufacturer's shop drawings, including plans, elevations, sections, and details, indicating dimensions, materials, components, fasteners, finish, and accessories.

E. Samples: Submit manufacturer's sample of coping system.

1. Sample Size: Minimum 6" long.

F. Color Samples: Submit manufacturer's color samples of exterior coping covers, consisting of complete set of metal color chips representing manufacturer's full range of available colors.

G. Manufacturer's Certification: Submit manufacturer's certification that materials comply with specified requirements and are suitable for intended application.

H. Manufacturer's Project References: Submit manufacturer's list of 10 successfully completed coping system projects of similar size and scope to this Project, including project name and location, name of Architect, and type and quantity of coping systems furnished.

I. Warranty Documentation: Submit manufacturer's standard warranty.

1.6 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Manufacturer regularly engaged in the manufacturing of coping systems of similar type to that specified for a minimum of 5 years.

B. Installer's Qualifications:

1. Installer regularly engaged in installation of coping systems of similar type to that specified for a minimum of 5 years.
2. Use persons trained for installation of coping systems.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Delivery Requirements: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. Storage and Handling Requirements:

1. Store and handle materials in accordance with manufacturer's instructions.
2. Keep materials in manufacturer's original, unopened containers and packaging until installation.
3. Store materials in clean, dry area indoors.
4. Do not store materials directly on floor or ground.
5. Protect materials and finish during storage, handling, and installation to prevent damage.

1.8 WARRANTY

A. Wind Warranty Period: Warranted in wind conditions up to 120 mph with a 20-Year wind warranty. Warranty specified for individual products below.

1. Wall Width: Minimum 3.5-inches/Maximum 39.875-inches (Tested up to 16-inches).
2. Outside Face: Minimum 3-inches/Maximum 12-inches (Tested up to 6-inches).
3. Inside Face: Minimum 2.25-inches/Maximum 12-inches (Tested up to 4-inches).

B. Warranty Period, Product: 5-year workmanship warranty covering replacement or repair of products that are defective in material or workmanship.

C. Warranty Period, Finish: Limited 30-year warranty for prefinished coil-coated steel and aluminum coated with Kynar 500 standard colors covering fade, chalk, and film integrity.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Basis of Design Manufacturer: Metal-Era, LLC, 1600 Airport Road, Waukesha, Wisconsin 53188. Phone 800-558-2162. www.metalera.com. info@metalera.com.

B. Substitutions: Refer to Section 012500 – SUBSTITUTION PROCEDURES.

C. Single Source: Furnish materials from single manufacturer.

2.2 COPING SYSTEM

A. Basis of Design Coping System: "Perma-Tite" Coping System.

1. Description:

a. Snap-on tapered coping with intermittent clips for capping parapet walls.
b. Does not require exposed fasteners or joint sealants.

2. Performance Characteristics:

a. Snap-on Coping Cap Sections: Capable of expanding and contracting freely, statically engaged onto mechanically secured clips.
b. Snap-on Coping Cap Joints: Underlayed with concealed splices.

3. Approvals:

    a. ANSI/SPRI/FM 4435 ES-1 for 24 ga./0.040" – 283 psf Vertical and 164 psf Horizontal.
    b. FM Approved with 24 ga./0.040" cover – 1-165 Perimeter and 1-105 Corner.
    c. Florida Product Approval.
    d. Miami-Dade County Approved.

4. Intermittent Clips:

    a. Material: 20 ga. galvanized steel.
    b. Width: 12-inches.
    c. Fastener Holes: Pre-Punched.

5. Concealed Splices:

    a. Material: Same as snap-on coping cap.
    b. Finish and Color: Same as snap-on coping cap/
    c. Width: 8-inches.
    d. Sealant Strips: Factory-applied dual non-curing isocryl butyl sealant strips.

6. Coping-Cap Construction:

    a. Material: 24 ga. galvanized steel.
    b. Formed Lengths: 12-feet.
    c. Finish: Prefinished Kynar.
    d. Color: Selected by Architect from manufacturer's standard available colors.

7. Wall width, outside face dimension, and inside face dimension as indicated on the Drawings.
8. Fasteners:

    a. Suitable for intended substrate.
    b. Provided by coping system manufacturer.

9. Factory-Fabricated Accessories:

    a. Fabrication: Factory-Fabricated Quicklock.
    b. Material, Finish, and Color: Same as coping cap.
    c. Miters – As required for coping locations shown on the Drawings:

        1) Outside.
        2) Inside.
        3) Transition.

d. End Caps – As required for coping locations shown on the Drawings:

1) Left.
2) Right.

e. End Terms – As required for coping locations shown on the Drawings.

1) Left.
2) Right.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roof parapet areas, including roofing and blocking, to receive coping system.

B. Verify surfaces to support coping system are clean, dry, flat, level from front to back, secure, and of proper dimensions.

C. Notify Architect, Contractor, and roofing installer of conditions that would adversely affect installation.

D. Do not begin installation until unacceptable conditions are corrected.

3.2 INSTALLATION

A. Install coping system in accordance with manufacturer's instructions at locations indicated on the Drawings.

B. Roofing: Specified in Section 075423 – SINGLY PLY ROOFING SYSTEM (TPO).

C. Fasteners:

1. Install coping system using concealed fasteners in accordance with manufacturer's instructions.

D. Shim areas of walls not level from front to back.

E. Install concealed splices at all clip locations.

F. Thermal Movement: Leave ¼-inch gap between coping cap sections to allow for thermal expansion and contraction.

G. Do not use sealant at splices.

H. Review lengths of straight pieces of coping cap before cutting to avoid creating relatively short sections adjacent to full-length sections.

I. Isolate coping system from ACQ (Alkaline Copper Quatenary) treated wood blocking or other galvanically incompatible material with appropriate material. Refer to Section 076200 – SHEET METAL FLASHING & TRIM, paragraph 2.3 for underlayment materials.

3.3 CLEANING

A. Clean coping system promptly after installation in accordance with manufacturer's instructions.

B. Remove clear protective vinyl film.

C. Do not use harsh cleaning materials or methods that could damage finish.

3.4 PROTECTION

A. Protect installed coping system to ensure that, except for normal weathering, coping system will be without damage or deterioration at time of Substantial Completion.

END OF SECTION 077119

SECTION 077233 - ROOF HATCHES

PART 1 - GENERAL

1.1 SUMMARY

A. Work Included: Provide factory-fabricated roof hatch for service stair access.

B. Related Sections:

1. Section 055100 – METAL STAIRS.
2. Section 075423 – SINGLE-PLY ROOFING SYSTEM (TPO).
3. Section 077234 – ROOF HATCH RAIL SYSTEM.

1.2 SUBMITTALS

A. Product Data: Submit manufacturer's product data.

B. Shop Drawings: Submit shop drawings including profiles, accessories, location, adjacent construction interface, and dimensions.

C. Warranty: Submit executed copy of manufacturer's standard warranty.

1.3 QUALITY ASSURANCE

A. Manufacturer: A minimum of 5 years experience manufacturing similar products.

B. Installer: A minimum of 2 years experience installing similar products.

C. Manufacturer's Quality System: Registered to ISO 9001 Quality Standards including in-house engineering for product design activities.

1.4 DELIVERY, STORAGE AND HANDLING

A. Deliver products in manufacturer's original packaging. Store materials in a dry, protected, well-vented area. Inspect product upon receipt and report damaged material immediately to delivering carrier and note such damage on the carrier's freight bill of lading.

1.5 WARRANTY

A. Manufacturer's Warranty: Provide manufacturer's standard warranty. Materials shall be free of defects in material and workmanship for a period of five years from the date of purchase. Should a part fail to function in normal use within this period, manufacturer shall furnish a new part at no charge.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Basis-of-Design Manufacturer: Type L Roof Hatch by The BILCO Company, P.O. Box 1203, New Haven, CT 06505, 1-800-366-6530, Fax: 1-203-535-1582, Web: www.BILCO.com.

2.2 ROOF HATCH

A. Furnish and install where indicated on Drawings metal roof hatch Type L-50, size width: 30" (762mm) x length: 96" (2438mm). Length denotes hinge side. The roof hatch shall be single leaf. The roof hatch shall be pre-assembled from the manufacturer.

B. Performance characteristics:

1. Cover shall be reinforced to support a minimum live load of 40 psf (195 kg/m2) with a maximum deflection of 1/150th of the span or 20 psf (97 kg/m2) wind uplift.
2. Operation of the cover shall be smooth and easy with controlled operation throughout the entire arc of opening and closing.
3. Operation of the cover shall not be affected by temperature.
4. Entire hatch shall be weathertight with fully welded corner joints on cover and curb.

C. Cover: Shall be 11 gauge (2.3mm) aluminum with a 3” (76mm) beaded flange with formed reinforcing members. Cover shall have a heavy extruded EPDM rubber gasket that is bonded to the cover interior to assure a continuous seal when compressed to the top surface of the curb.

D. Cover insulation: Shall be fiberglass of 1” (25mm) thickness, fully covered and protected by a metal liner of 18 gauge (1mm) aluminum.

E. Curb: Shall be 12” (305mm) in height and of 11 gauge (2.3mm) aluminum. The curb shall be formed with a 3-1/2” (89mm) flange with 7/16” (11mm) holes provided for securing to the roof deck. The curb shall be equipped with an integral metal capflashing of the same gauge and material as the curb, fully welded at the corners, that features the Bil-Clip® flashing system, including stamped tabs, 6” (153mm) on center, to be bent inward to hold single ply roofing membrane securely in place.

F. Curb insulation: Shall be rigid, high-density fiberboard of 1” (25mm) thickness on outside of curb.

G. Lifting mechanisms: Manufacturer shall provide compression spring operators enclosed in telescopic tubes to provide, smooth, easy, and controlled cover operation throughout the entire arc of opening and closing. The upper tube shall be the outer tube to prevent accumulation of moisture, grit, and debris inside the lower tube assembly. The lower tube shall interlock with a flanged support shoe: welded to the curb assembly for aluminum construction.

H. Hardware

1. Heavy pintle hinges shall be provided
2. Cover shall be equipped with an enclosed two point spring latch with interior and exterior turn handles
3. Roof hatch shall be equipped with interior and exterior padlock hasps.
4. The latch strike shall be a stamped component bolted to the curb assembly.
5. Cover shall automatically lock in the open position with a rigid hold open arm equipped with a 1" (25mm) diameter red vinyl grip handle to permit easy release for closing.
6. All hardware shall be zinc plated and chromate sealed.
7. Cover hardware shall be bolted into heavy gauge channel reinforcing welded to the underside of the cover and concealed within the insulation space.
8. Finishes: Factory finish shall be mill finish aluminum.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and openings for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install products in strict accordance with manufacturer's instructions and approved submittals. Locate units level, plumb, and in proper alignment with adjacent work.

1. Test units for proper function and adjust until proper operation is achieved.
2. Repair finishes damaged during installation.
3. Restore finishes so no evidence remains of corrective work.

3.3 ADJUSTING AND CLEANING

A. Clean exposed surfaces using methods acceptable to the manufacturer which will not damage finish.

END OF SECTION 077233

SECTION 077234 - ROOF HATCH RAIL SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. Work Included: Provide factory-fabricated fixed roof hatch railing system for fall protection at roof hatch location as shown on the Drawings.

B. Related Sections:

1. Section 077233 – ROOF HATCHES.

C. Reference Standards:

1. International Organization for Standardization (ISO).
2. Occupational Safety and Health Administration (OSHA / Code of Federal Regulation (CFR):

a. **OSHA 29 CFR 1910.23** – Guarding Floor and Wall Openings and Holes.

1.2 SUBMITTALS

A. Product Data: Submit manufacturer's product data.

B. Shop Drawings: Submit shop drawings including profiles, accessories, location, adjacent construction interface, and dimensions.

C. Warranty: Submit executed copy of manufacturer's standard warranty.

1.3 QUALITY ASSURANCE

A. Manufacturer: A minimum of 5 years' experience manufacturing similar products.

B. Installer: A minimum of 2 years' experience installing similar products.

C. Manufacturer's Quality System: Registered to ISO 9001:2008 Quality Standards including in-house engineering for product design activities.

1.4 DELIVERY, STORAGE AND HANDLING

A. Deliver products in manufacturer's original packaging. Store materials in a dry, protected, well-vented area. Inspect product upon receipt and report damaged material immediately to delivering carrier and note such damage on the carrier's freight bill of lading.

1.5 WARRANTY

A. Manufacturer's Warranty: Provide manufacturer's standard warranty. Materials shall be free of defects in material and workmanship for a period of five years from the date of purchase. Should a part fail to function in normal use within this period, manufacturer shall furnish a new part at no charge.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Basis-of-Design Manufacturer: The BILCO Company, P.O. Box 1203, New Haven, CT 06505, 800-366-6530, Fax: 1-203-535-1582, Web: www.bilco.com.

2.2 HATCH RAIL SYSTEM

A. Basis of Design: Bilco® Bil-Guard® 2.0, Model RL2-5 Safety Railing System for 30" X 36" Roof Hatch.

B. Furnish and install where indicated on Drawings. The hatch railing and gate Model RL2-L. The hatch rail system shall be field assembled and installed (by others) per the manufacturer's instructions.

C. Performance characteristics:

1. High visibility safety yellow powder coat paint finish.
2. Hatch rail system shall attach to the capflashing of the roof hatch and shall not penetrate any roofing material.
3. Hatch rail system shall satisfy the requirements of OSHA 29 CFR 1910.23 and shall meet OSHA strength requirements with a factor of safety of two.
4. Corrosion resistant construction with a five-year warranty.
5. Hinged gate shall ensure continuous barrier around the roof hatch.
6. Self-closing gate hinge and positive latching system provided with hatch rail system.

D. Posts and Rails: 1-1/4" (32mm) 6061 T6 schedule 40 aluminum pipe.

E. Hardware: Mounting brackets shall be 3/8” (9mm) thick extruded aluminum. Pivoting post guides with compression fittings and latching mechanism shall be cast aluminum. Self-closing hinges and all fasteners shall be type 316 stainless steel.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and openings for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install products in strict accordance with manufacturer’s instructions and approved submittals. Locate units level, plumb, and in proper alignment with adjacent work.

1. Test units for proper function and adjust until proper operation is achieved.
2. Repair finishes damaged during installation.
3. Restore finishes so no evidence remains of corrective work.

3.3 ADJUSTING AND CLEANING

A. Clean exposed surfaces using methods acceptable to the manufacturer which will not damage finish.

END OF SECTION 077234

SECTION 079200 - JOINT SEALANTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Preparing substrate surfaces.

B. Interior and Exterior Sealants and joint backing.

1.2 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM):

1. **ASTM C794** – Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants.
2. **ASTM C834** – Standard Specification for Latex Sealants.
3. **ASTM C919** – Standard Practice for Use of Sealants in Acoustical Applications.
4. **ASTM C920** – Standard Specification for Elastomeric Joint Sealants.
5. **ASTM C1193** – Standard Guide for Use of Joint Sealants.
6. **ASTM C1248** – Standard Test Method for Staining of Porous Substrate by Joint Sealants.
7. **ASTM C1521** – Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints.
8. **ASTM E84** – Standard Test Method for Surface Burning Characteristics of Building Materials.
9. **ASTM E90** – Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
10. **ASTM E814** – Standard Test Method for Fire Tests of Penetration Firestop Systems.

B. Sealant, Waterproofing, and Restoration Institute (SWRI):

1. **SWRI Validation** – SWR Institute Validated Products Listing: www.swrionline.org/ValidatedSealants.

C. Sealant Classifications (ASTM C920):

1. Sealant Type:

a. M – Two or more components, chemically cured.
b. S – Single component, air or moisture cured.

2. Sealant Grades:

a. NS – Non-sag sealants.
b. P – Pourable sealants, self-leveling.

3. Sealant Classes:

a. 25 – Sealant capable of handling movement (contraction or expansion) of 25% of original joint width.
b. 35 – Sealant capable of handling movement (contraction or expansion) of 35% of original joint width.
c. 50 – Sealant capable of handling movement, either contraction or Expansion, of 50% of the original joint width.
d. 50/100 – Sealant capable of handling movement of 50% contraction and 100% expansion.

4. Sealant Uses:

a. A – In contact with aluminum.
b. G – In contact with glass.
c. M – In contact with mortar.
d. NT – Non-traffic (pedestrian or vehicular) contact.
e. O – In contact with other materials.
f. T – Traffic (pedestrian or vehicular) contact.

D. Underwriters Laboratories (UL):

1. **UL 1479** – Fire Tests of Penetration Firestops.

1.3 SUBMITTALS

A. Product Data: Provide data indicating sealant chemical characteristics, performance criteria, limitations, color availability. Provide manufacturer's test reports for joint sealants evidencing compliance with ASTM requirements.

B. Samples

1. Submit manufacturer's standard color charts for initial selection of sealant color(s).
2. Following initial color selection, submit two (2) samples of manufacturer's standard size sealant samples illustrating actual sealant color(s) for final selection.

C. Manufacturer's Installation Instructions: Indicate special procedures, surface preparation, conditions requiring special attention.

1.4 QUALITY ASSURANCE

A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

1.5 PRECONSTRUCTION TESTING

A. In conjunction with project mockup assembly, arrange for field testing of typical combinations of sealants, substrates, and joint backing to confirm adhesion and non-staining of substrates.

B. Adhesion Testing shall be as per ASTM C1521 to determine whether primer is required for cured sealants to achieve optimum bond to substrates.

C. Stain Testing shall be as per ASTM C1248 to determine the potential of staining where silicone sealants contact stone or masonry substrates.

D. Testing is not required if sealant manufacturers provide test data showing previous sealant testing, not older than twenty-four (24) months from start of project, indicates satisfactory adhesion as per ASTM C794 and absence of staining as per ASTM C1248 for comparable sealant assemblies.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

B. Applicator: Company specializing in performing the work and qualified by the sealant manufacturer.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

1.8 COORDINATION

A. Coordinate the work with all sections referencing this section.

1.9 WARRANTY

A. Provide manufacturer's twenty (20) year warranty for structural adhesion, weathersealing, and non-staining performance of all silicone sealants.

B. Warranty: Include coverage for installed sealants and accessories which fail to achieve airtight seal, water tight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 - PRODUCTS

2.1 EXTERIOR SEALANTS

A. Exterior Building Silicone Sealant: Single component silicone, non-sagging, non-staining, non-bleeding, color as selected by Architect, meeting requirements of ASTM C920 for Type S, Grade NS, Class 50 or 50/100, Use NT, M, G, A, O, and having current SWRI validation:

1. Dow Corning® No. 795 Silicone Building Sealant (Dow Corning Corporation, www.dowcorning.com).
2. Pecora 890NST or 890FTS (Field Tintable) Non-Staining, Ultra-Low Modulus Silicone Sealant (Pecora Corporation®, Harleysville, PA, www.pecora.com).
3. Momentive™ SCS2700 SilPruf LM Silicone Weatherproofing Sealant (Momentive Performance Materials, www.ge.com/silicones).

4. Or approved equivalent.

B. Exterior Building Silicone Sealant – Secondary Joint Waterproofing: Single component, medium-modulus silicone sealant meeting requirements of ASTM C920 for Type S, Grade NS, Class 50, Use NT, G, M, A, and O, and having current SWRI validation, color as selected by Architect, for secondary joint waterproofing at exterior window openings as shown on the Drawings:

1. Dow Corning® No. 756 SMS Building Sealant (Dow Corning Corporation, www.dowcorning.com).
2. Or approved equivalent.

C. Exterior Polyurethane Sealant: Single or double component, self-leveling polyurethane sealant complying with ASTM C920, color as selected by Architect, for horizontal expansion joints in paving, concrete, and sidewalks:

1. Tremco® Vulkem® 45SSL (single-component, Type S, Grade P, Class 35, Use T, M, A, O) or Tremco® THC 900 (two-component, Type M, Grade P, Class 25, Use T, M, O) (Tremco Commercial Sealants & Waterproofing, Beachwood, OH, www.tremcosealants.com).
2. Pecora Urexapan NR-201 (single-component, Type S, Grade P, Class 25, Use M, A, O; SWRI Validation) or Pecora DynaTrol® II-SG (two-component, Type M, Grade P, Class 25, Use T) (Pecora Corporation®, Harleysville, PA, www.pecora.com).
3. Or approved equivalent.

2.2 INTERIOR SEALANTS

A. Interior Building Polyurethane Sealant: Single-component, non-sagging, polyurethane, paintable, white or off-white color, meeting requirements of ASTM C920 for Type S, Grade NS, Class 25, Use NT, T, M, A, G, O and having current SWRI validation. For interior joints of aluminum storefront, and doors at exterior wall openings:

1. Pecora Dynatrol™ I-XL General Purpose Polyurethane Sealant (Pecora Corporation®, Harleysville, PA, www.pecora.com).
2. Or approved equivalent.

B. Interior Building Acrylic Latex Caulk: All purpose, Architectural grade acrylic latex caulk plus silicone, mold and mildew resistant, paintable, color as selected by Owner, meeting requirements of ASTM C834:

1. DAP® ALEX PLUS® All Purpose Acrylic Latex Adhesive Caulk Plus Silicone as manufactured by DAP, Inc., Baltimore, MD, www.dap.com.
2. Pecora AC-20®+ Silicone Non-Sag, Acrylic Latex Caulking Compound as manufactured by Pecora Corporation®, Harleysville, PA, www.pecora.com.
3. Or approved equivalent.

C. Interior Building Acoustical Sealant: Single component, flexible latex sealant, white or off-white color, meeting ASTM C834 and capable of reducing airborne sound transmission through perimeter joints and openings in building construction as determined per ASTM E90 based on installation per ASTM C919. Coordinate with Section 092900 – GYPSUM BOARD and partition types as shown on the Drawings:

1. USG Sheetrock® Brand Acoustical Sealant as manufactured by United States Gypsum Company, Chicago, IL, www.usg.com.
2. Pecora AC-20® FTR (Fire & Temperature Rated) Acoustical & Insulation Sealant or Pecora AIS-919 Acoustical & Insulation Latex Sealant as manufactured by Pecora Corporation®, Harleysville, PA www.pecora.com.
3. Or approved equivalent.

2.3 ACCESSORIES

A. Primer: Non-staining type, if recommended by sealant manufacturer to suit application, based on preconstruction testing described in paragraph 1.5.

B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.

C. Joint Backing: Round, closed cell polyethylene foam rod; oversized 30 to 50 percent larger than joint width; acceptable to manufacturer of sealant.

D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

E. Insulating Foam Sealant: Expanding polyurethane foam sealant for sealing and insulating miscellaneous exterior wall and roof penetrations, wall cavities, and gaps at head of wall and roof deck conditions in locations as shown and detailed on the Drawings.

1. Basis of Design: Abesco FP200 FR Expanding Foam, single pack, fire rated polyurethane expanding foam as manufactured by Abesco LLC, Orlando, FL, (407) 851-3300, www.FP200abesco.com having the following characteristics:

   a. Fire rated for use in 1 and 2 hour rated systems meeting ASTM E-814/UL 1479.
   b. Flame Spread 10 and Smoke Developed 35 for Class A rating as per ASTM E-84.
   c. 60% closed cell content when fully cured.

2. Or approved equivalent.

F. Miscellaneous Materials: All other materials, not specifically described in this section but required for complete and proper installation of sealant systems, shall be new, first quality of their respective kinds, and as recommended by the sealant manufacturer subject to review and approval of the Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

B. Verify that joint backing and release tapes are compatible with sealant.

3.2 PREPARATION

A. Remove loose materials and foreign matter which might impair adhesion of sealant.

B. Clean joints in accordance with manufacturer's instructions. Prime if recommended by manufacturer for application condition.

C. Perform preparation in accordance with manufacturer's instructions.

D. Protect elements surrounding the work of this section from damage or disfiguration.

3.3 INSTALLATION

A. Install sealant in accordance with manufacturer's instructions and ASTM C1193.

B. Measure joint dimensions and size materials to achieve required width/depth ratios.

C. Install joint backing to achieve a neck dimension no greater than 1/3 of the joint width.

D. Install bond breaker where joint backing is not used.

E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.

F. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

G. Tool joints concave.

3.4 CLEANING

A. Clean work as per manufacturer’s instructions.

B. Clean adjacent soiled surfaces as work progresses.

3.5 PROTECTION OF FINISHED WORK

A. Protect finished installation until sealants are cured.

3.6 SCHEDULE

	Location	Type	Color
A.	Vertical and Non-Traffic Horizontal Exterior Joints Metal-to-Metal Metal-to-Masonry Metal-to-Glass Masonry-to-Masonry	Silicone Non-staining	To Be Selected
B.	Exterior Expansion Joints Vertical, General	Silicone Non-sagging	To Be Selected
C.	Exterior Joints (Concrete) Horizontal, General	Polyurethane Self-Leveling	To Be Selected
D.	Exterior Paving Joints (Asphalt)	Polyurethane Self-Leveling	Black
E.	Interior Joints at Junction with Exterior Wall: Door & Window Frames.	Polyurethane	White or Off-White
F.	Interior Joints at Door & Window Frames (Low to No Expected Movement)	Acrylic Latex Non-sagging	White or Off-White
G.	Joints at Miscellaneous Penetrations of Exterior Wall Assemblies, and Internal Wall Cavities of Exterior Walls.	Polyurethane Insulating Foam	Orange, White, Off White

END OF SECTION 079200

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes hollow-metal doors and frames in locations shown and scheduled on the Drawings.

1.2 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM):

1. **ASTM A153** – Standard Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware.
2. **ASTM A653** – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot Dip Process.
3. **ASTM A879** – Standard Specification for Steel Sheet, Zinc Coated by the Electrolytic Process for Applications Requiring Designation of the Coating Mass on Each Surface.
4. **ASTM A1008** – Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.
5. **ASTM A 1011** – Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
6. **ASTM C143** - Standard Test Method for Slump of Hydraulic-Cement Concrete
7. **ASTM C476** – Standard Specification for Grout for Masonry.
8. **ASTM C665** – Standard Specification for Mineral Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
9. **ASTM C1363** – Standard Test Method for the Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus.

B. Builders Hardware Manufacturers Association (BHMA):

1. **BHMA A156.115** – Hardware Preparation in Steel Doors or Steel Frames.

C. National Association of Architectural Metal Manufacturers/Hollow Metal Manufacturers Association (NAAMM/HMMA):

1. **NAAMM/HMMA 803** – Hollow Metal Manual – Steel Tables.
2. **NAAMM/HMMA 840** – Guide Specification for Installation and Storage of Hollow Metal Doors and Frames.

D. Steel Door Institute (SDI):

1. **SDI A250** – Specifications for Standard Steel Doors and Frames.

1.3 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8. Gauge numbers shown are for reference purposes only.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include elevations, door edge details, frame profiles, metal thicknesses, preparations for hardware, and other details.

C. Samples for Initial Selection: For units with factory-applied color finishes.

D. Samples for Verification: For each type of exposed finish required.

E. Schedule: Prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings.

1.5 INFORMATIONAL SUBMITTALS

A. Product test reports.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Provide hollow metal doors and frames as manufactured by one of the following:

1. Amweld Building Products, Inc., Garrettsville, OH.
2. CECO Door/ASSA ABLOY Door Group LLC, Milan, TN.
3. Curries®/AADG, Inc., Mason City, IA.
4. Mesker ™ Door, Inc., Huntsville, AL.
5. Republic Doors and Frames, McKenzie, TN.
6. Steelcraft® Metal Doors and Frames/Allegion, plc, Carmel, IN.
7. Or approved manufacturer.

2.2 EXTERIOR HOLLOW-METAL DOORS AND FRAMES

A. Extra-Heavy-Duty Doors and Frames: SDI A250.8, Level 3. At locations indicated in the Door and Frame Schedule.

1. Physical Performance: Level A according to SDI A250.4.
2. Doors:

a. Type: As indicated in the Door and Frame Schedule.
b. Thickness: 1-3/4 inches (44.5 mm).
c. Face: Metallic-coated galvanized steel sheet, minimum thickness of 0.053 inch (1.3 mm), (16 gauge) with minimum A40 (ZF120) coating.

d. Edge Construction: Model 2, Seamless.
e. Core: Manufacturer's standard insulation material.

3. Thermal-Rated Doors: Provide doors fabricated with thermal-resistance value (R-value) of not less than 2.1 deg F x h x sq. ft./Btu (0.370 K x sq. m/W) when tested according to ASTM C 1363.
4. Frames:

a. Materials: Metallic-coated galvanized steel sheet, minimum thickness of 0.053 inch (1.3 mm), (16 gauge) with minimum A40 (ZF120) coating.
b. Construction: Face welded.

5. Exposed Finish: Prime.

2.3 FRAME ANCHORS

A. Jamb Anchors:

1. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch (1.0 mm) thick.

B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch (1.0 mm) (18 Gauge), and as follows:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

2.4 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Metallic-Coated Galvanized Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.

D. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z (12G) coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.

E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

F. Power-Actuated Fasteners in Concrete: From corrosion-resistant materials.

G. Grout: ASTM C 476, except with a maximum slump of 4 inches (102 mm), as measured according to ASTM C 143/C 143M.

H. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing).

I. Glazing: Section 088000 - GLAZING.

J. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mil (0.4-mm) dry film thickness per coat.

2.5 FABRICATION

A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Weld exposed joints continuously, grind, dress, and make smooth, flush, and invisible. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Hollow-Metal Doors:

1. Exterior Doors: Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.

C. Hollow-Metal 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. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
2. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
3. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor.
4. Jamb Anchors: Provide number and spacing of anchors as follows:

a. Stud-Wall Type: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c. and as follows:

1) Three anchors per jamb up to 60 inches (1524 mm) high.
2) Four anchors per jamb from 60 to 90 inches (1524 to 2286 mm) high.
3) Five anchors per jamb from 90 to 96 inches (2286 to 2438 mm) high.
4) Five anchors per jamb plus one additional anchor per jamb for each 24 inches (610 mm) or fraction thereof above 96 inches (2438 mm) high.

5. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers.

    a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
    b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

D. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.

1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.

2.6 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.

1. Shop Primer: SDI A250.10.

2.7 ACCESSORIES

A. Grout Guards: Formed from same material as frames, not less than 0.016 inch (0.4 mm) (26 gauge) thick.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Hollow-Metal Frames: Install hollow-metal frames for doors, transoms, sidelites, borrowed lites, and other openings, of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

    a. 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.
    b. Install frames with removable stops located on secure side of opening.
    c. Install door silencers in frames before grouting.
    d. Remove temporary braces necessary for installation only after frames have been properly set and secured.
    e. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.

f. Field apply bituminous coating to backs of frames that will be filled with grout containing antifreezing agents.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.

a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

3. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:

a. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
b. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
c. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
d. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs at floor.

B. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Steel Doors:

a. Between Door and Frame Jambs and Head: 1/8 inch (3.2 mm) plus or minus 1/32 inch (0.8 mm).
b. Between Edges of Pairs of Doors: 1/8 inch (3.2 mm) to 1/4 inch (6.3 mm) plus or minus 1/32 inch (0.8 mm).
c. At Bottom of Door: 3/4 inch (19.1 mm) plus or minus 1/32 inch (0.8 mm).
d. Between Door Face and Stop: 1/16 inch (1.6 mm) to 1/8 inch (3.2 mm) plus or minus 1/32 inch (0.8 mm).

C. Glazing: Comply with installation requirements in Section 088000 - GLAZING and with hollow- metal manufacturer's written instructions.

1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches (230 mm) o.c. and not more than 2 inches (51 mm) o.c. from each corner.

3.2 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow-metal work immediately after installation.

C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

D. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

E. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in Section 099110 - PAINTING.

END OF SECTION 081113

SECTION 081416 - FLUSH WOOD DOORS

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. Solid core veneer-faced flush wood doors, non-rated.
2. Sizing by manufacturer.
3. Machining by manufacturer.

B. Related Sections:

1. Section 081113 – HOLLOW METAL DOORS AND FRAMES.
2. Section 087100 – DOOR HARDWARE.
3. Section 099110 – PAINTING.

C. SCOPE

1. Furnish and install doors in locations as shown and scheduled on the Drawings.
2. Furnish doors with removable protective covering to protect veneer faces.

D. REFERENCE STANDARDS

1. Builders Hardware Manufacturers Association (BHMA):

a. **156.115-W** – Hardware Preparation in Steel Doors or Steel Frames

2. Door and Hardware Institute (DHI):

a. **WDHS-3** – Recommended Hardware Locations for Wood Flush Doors

3. Wood Door Manufacturer's Association (WDMA):

a. **I.S.-1A** – Industry Standard for Architectural Flush Wood Doors.
b. **TM-6** – Adhesive Durability: Test Method for Determining the Durability of Adhesives Used in Doors Under Accelerated Aging Conditions.
c. **TM-7** – Cycle Slam Test: The Method for Determining the Physical Endurance of Wood Doors & Associated Hardware Connections under Accelerated Operating Conditions.
d. **TM-8** – Hinge Loading Test: The Method for Determining the Hinge Loading Resistance of Wood Door Stiles.
e. **TM-10** – Screw Holding Capacity: Test Method for Determining the Screw Holding Capacity of Wood Doors.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of door. Include details of core and edge construction and trim for openings.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and the following:

1. Dimensions and locations of blocking.
2. Dimensions and locations of mortises and holes for hardware.
3. Dimensions and locations of cutouts.
4. Undercuts.
5. Doors to be factory primed (MDO Veneer only).
6. Use same door designations as shown on the Drawings.

C. Samples for Verification:

1. Actual door face materials, approximately 8 by 10 inches (200 by 250 mm), for each material and finish.
2. Provide construction samples of doors, approximately 5 by 5 inches (125 by 125 mm), with door faces and vertical edges representing actual construction to be used.

a. Provide primer finished samples of Medium Deisity Overlay (MDO).

1.5 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For special warranty.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. A qualified manufacturer that is a member in good standing of the Window and Door Manufacturers Association (WDMA).

B. Product Performance: Provide documents showing compliance to the following WDMA attributes, validating the specified WDMA Performance Duty Level:

1. Adhesive Bonding Durability: WDMA TM-6.
2. Cycle Slam: WDMA TM-7.
3. Hinge Loading: WDMA TM-8.
4. Screw Holding: WDMA TM-10.

a. Door Face.
b. Vertical Door Edge.
c. Horizontal Door Edge (applies when hardware is attached).

1.7 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of referenced standard and manufacturer's written instructions.

B. Package doors individually in manufacturer's standard plastic bags, stretch wrap, or cardboard cartons.

C. Mark each door on top rail with opening number used on Shop Drawings. Include manufacturer's order number and date of manufacture.

D. Store doors inside building in a clean and dry location.

1.8 FIELD 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 temperature between 60 and 90 deg F (16 and 32 deg C) and relative humidity between 25 and 55 percent during remainder of construction period.

1.9 WARRANTY

A. Special Warranty: 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 (6.4 mm) in a 42-by-84-inch (1067-by-2134-mm) section.
b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch (0.25 mm in a 76.2-mm) span.

2. Warranty shall also include installation that may be required due to repair or replacement of defective doors.
3. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Marshfield – Algoma™ Door Systems, Aspiro™ Series by Masonite Architectural. Phone: (877) 332-4484, Web: www.masonite.com/architecturalproducts/aspiro-series; flush wood doors or comparable products by one of the following:

1. Graham® Wood Doors – Assa Abloy.
2. VT Industries.
3. Or Approved Manufacturer.

B. Source Limitations: Obtain flush wood doors from single manufacturer.

2.2 FLUSH WOOD DOORS, GENERAL

A. Quality Standard: In addition to requirements specified, comply with WDMA I.S.1-A-11, “Architectural Wood Flush Doors."

B. Low-Emitting Materials: Fabricate doors with adhesives and composite wood products that do not contain added urea formaldehyde.

C. WDMA I.S.1-A Performance Grade:

1. Extra Heavy Duty: Public toilets, assembly spaces, exits and where indicated.

a. All doors must meet specified WDMA Performance Duty Level, including face screw holding requirement. Surface applied hardware shall be installed with screws; through bolts are not acceptable.

D. Structural-Composite-Lumber-Core Doors:

1. Provide Structural Composite Lumber core as required to meet WDMA Performance Duty Level specified
2. Structural Composite Lumber: WDMA T.M.10.

a. Screw Withdrawal, Face: 700 lbf (3100 N).
b. Screw Withdrawal, Edge: 400 lbf (1780 N), or as required to meet WDMA performance level specified.

2.3 INTERIOR SOLID CORE FLUSH WOOD DOORS FOR OPAQUE FINISH

A. Basis of Design: Aspiro™ Series/Marshfield-Algoma™ by Masonite Architectural, Premium Paintable Doors.

B. Construction: Structural Composite Lumber Core (SCLC), Bonded Construction, Non-Rated.

1. Model No: A-SCLC-B-NR.
2. Quality Standards: WDMA I.S 1.A Architectural Wood Flush Doors (Standard Construction).
3. WDMA Quality Grade: Standard Construction/
4. WDMA Performance Level: Extra Heavy Duty.
5. Surface Material: Medium Density Overlay (MDO).
6. Crossbands: One Piece High Density Fiberboard (HDF).
7. Vertical Edges: Full Length Hardboard – Structural Composite Lumber (SLC) Backer (1.281-inch before trim).
8. Horizontal Edges: Structural Composite Lumber (SCL) (1-1/4-inch before trim).
9. Core Construction: Structural Composite Lumber (SCL).
10. Face & Core Assembly Adhesive: Type 1.
11. Thickness: 1-3/4-inch.
12. Door Weight: 6 lbs./sq. ft.
13. Factory Finish: Factory standard primer.

14. Warranty: Full; life of original installation.

2.4 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard WDMA 1.S.-1A for fitting unless otherwise indicated.

1. Undercut: Maximum 3/8-inch above thresholds.

B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, BHMA-156.115-W, and hardware templates.

1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.

2.5 SHOP PRIMING

A. Doors for Opaque Finish: Factory prime door faces and vertical edge stiles with one coat of manufacturer’s standard primer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and installed door frames, with Installer present, before hanging doors.

1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs. Any deficiencies must be corrected prior to door installation.
2. Reject doors with defects.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Hardware: For installation, see Section 087100 - DOOR HARDWARE.

B. Installation Instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard WDMA 1.S.-1A, and as indicated.

C. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.

1. Clearances: Provide 1/8 inch (3.2 mm) at heads, jambs, and between pairs of doors. Provide 1/8 inch (3.2 mm) from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide ¼ inch (6.4 mm) from bottom of door to top of threshold unless otherwise indicated.
2. Bevel non-fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock and hinge edges.

3.3 ADJUSTING

A. Operation: Correct any deficiency that prohibits the door from swinging or operating freely. Do not remove hinge screws after initial insertion. Shims used for alignment purposes must be inserted between hinge and frame. Do not insert shims between hinge and door.

B. To prevent stile failure, insure that door closers are properly adjusted and do not limit the door opening swing. Limit door opening swing only with a properly located stop.

3.4 REPAIR

A. Repair of damage or defects is subject to Architect's acceptance, including removal of soiling. Provide new replacement doors for doors that cannot be satisfactorily repaired.

3.5 PROTECTING AND CLEANING

A. Protect installed doors from damage and soiling.

END OF SECTION 081416

SECTION 082110 – PLASTIC LAMINATE DOORS

PART 1 - GENERAL

1.1 SUMMARY:

A. Section Includes:

1. Solid core plastic laminate veneer-faced doors, non-rated.
2. Factory finishing.
3. Sizing by manufacturer.
4. Machining by manufacturer.

1.2 REFERENCES AND REGULATORY REQUIREMENTS:

A. International Building Code (IBC) – locally adopted edition.

B. Quality Standards:

1. American National Standards Institute (ANSI):

a. **ANSI A208.1** – Particleboard.

2. Architectural Woodwork Standards (AWS).
3. Window and Door Manufacturers Association (WDMA):

a. Industry Standard (IS) 1-A-2011 – Architectural Wood Flush Doors.
b. **WDMA TM-6** – Adhesive Durability.

1.3 SUBMITTALS:

A. Submit under provisions of Section 013300 – SUBMITTAL PROCEDURES.

B. Shop drawings: Illustrate door opening criteria, elevations, sizes, types, swings, undercuts, special beveling, hardware blocking in fire-resistant composite core doors (if required), identify cutouts.

C. Indicate compliance with specified fire rating (positive pressure or neutral pressure), if required.

D. Product Data: Indicate door core materials, thickness, construction, veneer color and type.

E. Construction samples: Submit one or more of manufacturer's standard samples demonstrating door construction.

F. Finish samples: Sample to illustrate the color of the specified door face materials.

G. Manufacturer's full lifetime warranty.

1.4 QUALITY ASSURANCE:

A. Meet or exceed WDMA I.S.1-A Premium Grade.

1.5 DELIVERY STORAGE AND HANDLING AND SITE CONDITIONS:

A. Deliver, store, protect and handle products under provisions of WDMA and AWS, and manufacturer's care and handling instructions.

B. Accept doors on site in manufacturer's standard packaging. Inspect for damage. Do not store in damp or wet areas. HVAC systems shall be operating and balanced prior to arrival of doors. Acceptable humidity shall be no less than 25% or greater than 55%. (NOTE: Any claim for warp, bow, twist, or telegraphing may be denied if required humidity requirements are not maintained).

1.6 COORDINATION:

A. Coordinate the work with door opening construction, door frame and door hardware installation with a pre-installation conference.

1.7 WARRANTY:

A. Provide manufacturer's warranty to the following term:

1. Interior Solid Core Doors: "Full Life of Original Installation" including hanging and finishing if door(s) do not comply with warranty tolerance standards.
2. Coverage for delamination, warping, bow, cup and telegraphing of core construction as outlined in the WDMA and AWS Standards.

PART 2 - PRODUCTS

2.1 MANUFACTURER:

A. Basis of Design: Products of Aspiro™ Series/Marshfield-Algoma by Masonite Architectural, www.architectural.masonite.com are specified to indicate requirements for quality and appearance.

2.2 MATERIALS:

A. WORKMANSHIP

1. Comply with WDMA workmanship for veneer faces, vertical edges, crossbands, horizontal edges and dimensional tolerances.

B. DOOR CONSTRUCTION GRADE

1. Except as otherwise shown on the drawings fabricate the work of this section to WDMA Premium Grade.
2. Standard construction is per Heavy Duty Performance Levels.

C. WOOD DOOR FACING

1. High Pressure Decorative Laminate (HPDL): Color to be selected by Architect from manufacturer's standard laminate colors.

D. DOORS IN PAIRS OR SETS (IF SCHEDULED)

1. Specify per project requirements. Refer to WDMA G-9. Door schedule shall reflect pairs and sets by door numbers, including doors separated by a mullion.

E. DOORS WITH TRANSOMS (IF SCHEDULED)

1. Continuous Match (standard unless otherwise noted), End Match.

2.3 FABRICATION

A. DOOR AND TRANSOM PANEL CORE CONSTRUCTION

1. Non-rated Solid Core – Three (3) or Five (5) ply manufacturers standard construction.

a. Wood based Particleboard – PC-5, meeting requirements of ANSI A208.1.

2. Bond stiles and rails to core, abrasive sand core assembly to achieve uniform thickness.

B. VERTICAL EDGES (STILES)

1. Non-rated.

a. Edges to match face veneer. (May include veneer banding with structural composite lumber backers or inner plies).

2. High Pressure Decorative Laminate (HPDL):

a. Same as door facing, applied after face over manufacturers standard stile.

C. HORIZONTAL EDGES (RAILS)

1. Manufacturer's standard. (MDF top and bottom rails not permitted).
2. Bottom edge is to be smooth and sealed. Top edge is to be smooth and sealed.

D. ADHESIVES

1. Face Adhesive: Per WDMA TM-6.

E. FACE MATERIAL

1. High Pressure Decorative Laminate (HPDL).
2. Grade: Horizontal.

F. MACHINING

1. Factory fit and machine doors for frame and finish hardware in accordance with hardware requirements and dimensions.
2. Do not machine for surface hardware.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Notify Architect of any conditions that would adversely affect the installation or subsequent use of the doors. Do not begin installation until all conditions are acceptable.

B. Do not install doors in frame openings that are not plumb or are out of tolerance for size or alignment.

C. Verify that opening sizes and tolerances are acceptable and ready to receive this work.

3.2 INSTALLATION

A. Install non-rated doors in accordance with manufacturers' instructions.

B. Trim non-rated door width by cutting equally on both jamb edges. Reapply veneer edges.

C. Trim door height by cutting bottom edges to a maximum 3/4 inch (19-mm).

D. Pilot drill screw and bolt holes using templates provided by hardware manufacturer. [Use threaded through bolts for half surface hinges].

E. EXERCISE CAUTION WHEN DRILLING PILOT HOLES AND INSTALLING HINGES SO THAT PILOT HOLES ARE NOT OVER DRILLED AND SCREWS ARE NOT OVER TORQUED. FOLLOW MANUFACTURERS INSTALLATION INSTRUCTIONS FOR POSITIVE PRESSURE DOORS.

F. Coordinate installation of doors with installation of frames and hardware.

3.3 WARRANTY TOLERANCES

A. Conform to WDMA standards and testing methods for warp, cup, bow, and telegraphing.

3.4 ADJUSTING

A. Adjust as required for proper fit and operation.

B. Adjust doors for smooth and balanced door movement.

3.5 CLEANING

A. Clean doors immediately after installation in accordance with manufacturers Care and Handling Instructions.

3.6 PROTECTION

A. Protect installed doors from damage during construction.

END OF SECTION 082110

SECTION 083300 –ROLLING SERVICE DOORS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Insulated heavy-duty rolling service doors with electric motor operation for locations as shown on the Drawings.

1.2 RELATED SECTIONS

A. Section 055000 - METAL FABRICATIONS: Support framing and framed opening.

B. Section 079200 – JOINT SEALANTS: Perimeter sealing of door openings.

1.3 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM):

1. **ASTM A653** – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot Dip Process.
2. **ASTM E90** – Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.

B. American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE):

1. **ASHRAE 90.1** – Energy Standard for Sites and Buildings Except Low-Rise Residential Buildings.

C. American National Standards Institute (ANSI)/Door & Access Systems Manufacturers' Association (DASMA):

1. **ANSI/DASMA 108** – Standard Method for Testing Sectional Garage Doors, Rolling Doors and Flexible Doors: Determination of Structural Performance Under Uniform Static Air Pressure Difference.

D. International Energy Conservation Code (IECC):

1. **IECC 2012/2015 C402.4.3** – Building Envelope Requirements – Air Leakage of Fenestration.

E. National Fenestration Rating Council (NFRC).

F. National Electrical Manufacturers Association (NEMA):

1. **NEMA 250** – Enclosure Types (Electrical equipment rated at 1000 Volts or less.)
2. **NEMA MG1** – Motors and Generators.

G. Underwriters Laboratories (UL).

1.4 DESIGN / PERFORMANCE REQUIREMENTS

A. Single-Source Responsibility: Provide doors, tracks, motors, and accessories from one manufacturer for each type of door. Provide secondary components from source acceptable to manufacturer of primary components.

B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories, Inc. acceptable to Authority Having Jurisdiction (AHJ) as suitable for purpose specified.

1.5 SUBMITTALS

A. 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. Details of construction and fabrication.
4. Installation instructions.

B. Shop Drawings: Include detailed plans, elevations, details of framing members, anchoring methods, required clearances, hardware, and accessories. Include relationship with adjacent construction. Include electric motor operation specifications product data, and wiring / control diagrams.

C. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

D. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) long, representing actual product, color, and patterns.

E. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

F. Operation and Maintenance Data: Submit lubrication requirements and frequency, and periodic adjustments required.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in performing Work of this section with a minimum of five years experience in the fabrication and installation of security closures.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Protect materials from exposure to moisture. Do not deliver until after wet work is complete and dry.

C. Store materials in a dry, warm, ventilated weathertight location.

1.8 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.

1.9 COORDINATION

A. Coordinate Work with other operations and installation of adjacent materials to avoid damage to installed materials.

1.10 WARRANTY

A. Warranty: Manufacturer’s limited door and operator system, except the counterbalance spring and finish, to be free from defects in materials and workmanship for 3 years or 20,000 cycles, whichever occurs first.

B. PowderGuard Finish

1. PowderGuard Max: Applied to curtain, guides, bottom bar, headplates: Manufacturer’s limited Max Finish warranty for 5 years.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Basis of Design Manufacturer: Overhead Door Corporation, 2501 S. State Hwy. 121, Suite 200, Lewisville, TX 75067. ASD. Tel. Toll Free: (800) 275-3290. Phone: (469) 549-7100. Fax: (972) 906-1499. Web Site: www.overheaddoor.com. E-mail: info@overheaddoor.com.

2.2 INSULATED ROLLING SERVICE DOORS

A. Basis of Design: Stormtite[tm] Insulated Rolling Service Doors: Overhead Door Corporation Model 625.

1. Curtain: Interlocking roll-formed slats as specified following. Endlocks shall be attached to each end of alternate slats to prevent lateral movement.

a. Flat profile type F-265i for doors up to 40 feet (12.19 m) wide.
b. Front slat fabricated of:

1) 24 gauge galvanized steel.

c. Back slat fabricated of:

1) 24 gauge galvanized steel.

d. Slat cavity filled with CFC-free foamed-in-place, polyurethane insulation.

1) R-Value: 7.7, U-Value: 0.13.
2) Sound Rating: STC-21.

2. Performance:

a. Through Curtain Sound Rating: Sound Rating: STC-28 (STC-30+ with HZ noise generator) as per ASTM E 90.
b. Installed System Sound Rating: STC-21 as per ASTM E 90.
c. U-factor: 0.91 NFRC test report, maximum U-factor of no higher than 1.00.
d. Air Infiltration: Meets ASHRAE 90.1 & IECC 2012/2015 C402.4.3 Air leakage <1.00 cfm/ft2.

3. Slats and Hood Finish:

a. Galvanized Steel: Slats and hood galvanized in accordance with ASTM A 653 and receive rust-inhibitive, roll coating process, including 0.2 mils thick baked-on prime paint, and 0.6 mils thick baked-on polyester top coat.

1) Powder Coat:

(a) PowderGuard Max powder coat, color as selected by Owner.

2) Non-galvanized exposed ferrous surfaces shall receive one coat of rust-inhibitive primer.

4. Weatherseals:

   a. Interior guide weatherseal.
   b. Lintel weatherseal.

5. Bottom Bar:

   a. Two galvanized steel angles minimum thickness 1/8 inch (3 mm) bolted back to back to reinforce curtain in the guides.

6. Guides: Three structural steel angles.
7. Brackets:

   a. Galvanized steel to support counterbalance, curtain and hood.

8. Finish; Bottom Bar, Guides, Headplate and Brackets:

   a. Finish: PowderGuard Max powder coat color as selected by the Architect.

9. Counterbalance: Helical torsion spring type housed in a steel tube or pipe barrel, supporting the curtain with deflection limited to 0.03 inch per foot of span. Counterbalance is adjustable by means of an adjusting tension wheel.
10. Hood: Provide with internal hood baffle weatherseal.

    a. 24 gauge galvanized steel with intermediate supports as required.

11. Electric Motor Operation: Provide UL listed electric operator, size as recommended by manufacturer to move door in either direction at not less than 2/3 foot nor more than 1 foot per second. Conform to requirements of NEMA 250 and NEMA MG-1.

    a. Sensing Edge Protection:

       1) Pneumatic sensing edge.

    b. Operator Controls:

       1) Push-button operated control stations with open, close, and stop buttons.
       2) Controls for interior location.
       3) Controls surface mounted.

c. Motor Voltage: 115/230 single phase, 60 Hz.

12. Wind Load Design:

a. Standard wind load shall be 20 PSF. Conform to requirements of ANSI/DASMA 108.

13. Operation: Design door assembly, including operator, to operate for not less than 20,000 cycles.
14. Locking:

a. Interior slide bolt lock for electric operation with interlock switch.

15. Wall Mounting Condition:

a. Face-of-wall mounting.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify opening sizes, tolerances and conditions are acceptable.

B. Examine conditions of substrates, supports, and other conditions under which this work is to be performed.

C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 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.

3.3 INSTALLATION

A. Install 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.

E. Coordinate installation of electrical service with Division 26 – ELECTRICAL sections. Complete wiring from disconnect to unit components.

F. Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 079200 – JOINT SEALANTS.

G. Install perimeter trim and closures.

H. Instruct Owner's personnel in proper operating procedures and maintenance schedule.

3.4 ADJUSTING

A. Test for proper operation and adjust as necessary to provide proper operation without binding or distortion.

B. Adjust hardware and operating assemblies for smooth and noiseless operation.

3.5 CLEANING

A. Clean curtain and components using non-abrasive materials and methods recommended by manufacturer.

B. Remove labels and visible markings.

C. Touch-up, repair or replace damaged products before acceptance by Architect at Substantial Completion.

3.6 PROTECTION

A. Protect installed products until completion of project.

END OF SECTION 083300

SECTION 084113 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

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: Kawneer Architectural Aluminum Thermally Broken Storefront Systems, including perimeter trims, stools, accessories, shims and anchors, and perimeter sealing of storefront units.

1. Type of Kawneer Aluminum Storefront System includes:

a. TriFab™ VersaGlaze® (VG) 601T (Thermal) Framing System, 2” x 6” nominal dimension.

1. Thermally isolated frame.
2. Front (outside) glazed for 1” insulated glass.
3. Stick Frame fabrication.
4. Captured horizontal head, jamb, and sill with Structural Silicone Glazing (SSG) option for vertical glass-to-glass joints.

b. TriFab™ 400 Framing System – 1-3/4” X 4” nominal dimensions, Non-thermal, Center Glazed, Screw Spline fabrication for interior door and sidelight frames, in locations as shown on the Drawings.

2. Furnish and install at exterior window locations as shown and scheduled on the Drawings.

B. Related Sections:

1. Section 054000 – COLD-FORMED METAL FRAMING.
2. Section 061643 – GYPSUM SHEATHING.
3. Section 072100 – BUILDING INSULATION.
4. Section 072726 – FLUID-APPLIED MEMBRANE AIR BARRIERS.
5. Section 074213.23 – ALUMINUM COMPOSITE MATERIAL (ACM) PANELS.
6. Section 079200 – JOINT SEALANTS.
7. Section 084213 – ALUMINUM FRAMED ENTRANCES (DOORS).
8. Section 088000 – GLAZING.

1.3 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM):

1. **B221** Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

2. **B456** Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.
3. **B633** Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel.
4. **C920** – Standard Specification for Elastomeric Joint Sealants.
5. **C1401** – Standard Guide for Structural Sealant Glazing.
6. **E283** Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
7. **E330** Test Method for Structural Performance of Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
8. **E331** Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

B. American Architectural Manufacturers Association (AAMA):

1. **AAMA 501** Methods of Test for Exterior Walls.
2. **AAMA 501.2** Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems.
3. **AAMA 611** Voluntary Specification for Anodized Architectural Aluminum.
4. **AAMA 1503** Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors, and Glazed Wall Sections.

C. The Society of Protective Coatings (SSPC):

1. **SSPC-Paint 12** Cold-Applied Asphalt Mastic (Extra Thick Film) [Inactive].

D. The Aluminum Association (AA).

E. Definitions: For fenestration industry standard terminology and definitions refer to American Architectural Manufacturers Association (AAMA) – AAMA Glossary (AAMA AG).

1.4 PERFORMANCE REQUIREMENTS

A. Storefront System Performance Requirements:

1. Wind loads: Provide storefront system; include anchorage, capable of withstanding wind load design pressures as indicated on Sheet S001, and in conformance with 2021 IBC (Arkansas Fire Prevention Code).
2. Air Leakage: The test specimen shall be tested in accordance with ASTM E 283. Air Leakage rate shall not exceed 0.06 cfm/ft2 (0.3 l/s • m2) at a static air pressure differential of 6.2 psf (300 Pa) with interior seal, or, rate shall not exceed 0.06 cfm/ft2 (0.3 l/s • m2) at a static air pressure differential of 1.6 psf (75 Pa) without interior seal.
3. Water Resistance: The test specimen shall be tested in accordance with ASTM E 331. There shall be no leakage at a minimum static air pressure differential of 10 psf (479 Pa) as defined in AAMA 501.

4. Uniform Load: A static air design load of 30 psf (1436 Pa) shall be applied in the positive and negative direction in accordance with ASTM E 330. There shall be no deflection in excess of L/175 of the span of any framing member. At a structural test load equal to 1.5 times the specified design load, no glass breakage or permanent set in the framing members in excess of 0.2% of their clear spans shall occur.
5. Thermal Transmittance (U-factor): When tested to AAMA Specification 1503, the thermal transmittance (U-factor) shall not be more than:

    a. Front Plane (0.28 COG) 0.52 Btu/hr/ft^2/def F.

6. Condensation Resistance (CRF): When tested to AAMA Specification 1503, the condensation resistance factor shall not be less than:

    a. Front Plane 47 Frame and 63 Glass (Low-e).

1.5 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, hardware, finishes, and installation instructions for each type of aluminum-framed storefront system indicated.

B. Shop Drawings: Include plans, elevations, sections, details, hardware, and attachments to other work, operational clearances and installation details.

C. Samples for Initial Selection: For units with factory-applied color finishes including samples of hardware and accessories involving color selection.

D. Samples for Verification: For aluminum-framed storefront system and components required.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency for each type of aluminum-framed storefront. Test reports must indicate compliance with performance requirements.

F. Fabrication Sample: Of each vertical-to-horizontal intersection of aluminum-framed systems, made from 12" (304.8 mm) lengths of full-size components and showing details of the following:

1. Joinery.
2. Anchorage.
3. Expansion provisions.
4. Glazing.
5. Flashing and drainage.

G. Other Action Submittals:

1. Entrance Door Hardware Schedule: Prepared by or under the 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, frames, and related work to ensure proper size, thickness, hand,

function, and finish of entrance door hardware. Refer to Section 084213 – ALUMINUM FRAMED ENTRANCES (DOORS) and Section 087100 – DOOR HARDWARE.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An installer which has had successful experience with installation of the same or similar units required for the project and other projects of similar size and scope.

B. Manufacturer Qualifications: A manufacturer capable of providing aluminum-framed storefront system that meet or exceed performance requirements indicated and of documenting this performance by inclusion of test reports, and calculations.

C. Source Limitations: Obtain aluminum-framed storefront system through one source from a single manufacturer.

D. Product Options: Drawings indicate size, profiles, and dimensional requirements of aluminum-framed storefront system and are based on the specific system indicated. Refer to Section 016000 - PRODUCT REQUIREMENTS. Do not modify size and dimensional requirements.

1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

E. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockup for type(s) of storefront elevation(s) indicated, in location(s) shown on Drawings. If not indicated on Drawings, as directed by Architect.
2. Mockup may be a component of the final installed storefront system if approved by the Architect.

F. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section 013100 - PROJECT MANAGEMENT AND COORDINATION.

G. Structural Silicone Glazing (SSG) option must comply with ASTM C1401 for design and installation of SSG systems. SSG sealant shall be as recommended by aluminum storefront manufacturer. Submit sealant product data for review and approval.

H. SSG Joints: Joint design shall be reviewed and approved by structural silicone sealant manufacturer.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of aluminum-framed storefront openings by field measurements before fabrication and indicate field measurements on Shop Drawings.

1.8 WARRANTY

A. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty.

1. Warranty Period: Two (2) years from Date of Substantial Completion of the project provided however that the Limited Warranty shall begin in no event later than six months from date of shipment by manufacturer.

PART 2 - PRODUCTS

2.1 Manufacturers

A. Exterior Storefront System - Basis-of-Design Product:

1. Kawneer Company Inc.

a. Trifab™ Versa Glaze® (VG)601T (Thermal) Framing System.
b. System Dimensions: 2" X 6".
c. Glass: Front (Outside) glazed, 1" insulated.
d. Fabrication: Stick Framed.
e. Structural Silicone Glazed (SSG) option for vertical glass joints.
f. Captured horizontal head and sill, and vertical jamb joints.

B. Interior Storefront System - Basis-of-Design Product:

1. Kawneer Company Inc.

a. Trifab™ 400 Framing System (Non-Thermal).
b. System Dimensions: 1-3/4" x 4" (44.5 mm x 101.6 mm).
c. Glass: Center Plane.

C. Or approved manufacturer of equivalent storefront system meeting requirements of this section.

D. Substitutions: Refer to Section 012500 – SUBSTITUTION PROCEDURES for procedures and submission requirements for submission of equivalent storefront systems..

2.2 MATERIALS

A. Aluminum Extrusions: Alloy and temper recommended by aluminum storefront manufacturer for strength, corrosion resistance, and application of required finish and not less than 0.070" (1.8 mm) wall thickness at any location for the main frame and complying with ASTM B 221: 6063-T6 alloy and temper.

B. Fasteners: Aluminum, nonmagnetic stainless steel or other materials must be non-corrosive and compatible with aluminum framing members, trim hardware, anchors, and other components.

C. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.

D. Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.

E. Sealant: For sealants required within fabricated storefront system, provide permanently elastic, non-shrinking, and non-migrating type recommended by sealant manufacturer for joint size and movement.

F. Tolerances: Reference to tolerances for wall thickness and other cross-sectional dimensions of storefront members are nominal and in compliance with AA Aluminum Standards and Data.

2.3 STOREFRONT FRAMING SYSTEM

A. Thermal Barrier (Trifab™ VG 601T):

1. Kawneer IsoLock™ Thermal Break with a 1/4" (6.4 mm) separation consisting of a two-part chemically curing, high-density polyurethane, which is mechanically and adhesively joined to aluminum storefront sections.

B. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials. Where exposes shall be stainless steel.

D. Perimeter Anchors: When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action

E. Packing, Shipping, Handling and Unloading: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

F. Storage and Protection: Store materials protected from exposure to harmful weather conditions. Handle storefront material and components to avoid damage. Protect storefront material against damage from elements, construction activities, and other hazards before, during and after storefront installation.

2.4 GLAZING SYSTEMS

A. Glazing: As specified in Section 088000 – GLAZING.

B. Glazing Gaskets: Manufacturer's standard compression types; replaceable, extruded EPDM rubber.

C. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.

D. Bond-Breaker Tape: Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.

E. Glazing Sealants for Structural Silicone Glazed (SSG) systems shall be as recommended by manufacturer for joint types as follows:

1. Weatherseal Sealant:

a. ASTM C920 for Type S, Grade NS, Class 25, Use NT, G, A, and O.
b. Single-component, neutral-curing formulation that is compatible with the structural sealant and other system components with which it comes in contact with.
c. Recommended by structural-sealant, weatherseal-sealant, and aluminum-framed system manufacturer for this use.
d. Color: Matching structural sealant.

2.5 ENTRANCE DOOR SYSTEMS

A. Entrance Doors: As specified in Section 084213 - ALUMINUM-FRAMED ENTRANCES (DOORS) .

B. Entrance Door Hardware: As specified in Section 087100 – DOOR HARDWARE.

2.6 ACCESSORY MATERIALS

A. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Section 079200 - JOINT SEALANTS.

B. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos; formulated for 30 mil (0.762 mm) thickness per coat.

2.7 FABRICATION

A. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fit joints; make joints flush, hairline and weatherproof.
3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
4. Physical and thermal isolation of glazing from framing members.
5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
6. Provisions for field replacement of glazing.
7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

B. Storefront Framing: Fabricate components for assembly using manufacturer's standard installation instructions.

1. Mechanically Glazed Members: Fabricate for flush glazing without projecting stops.
2. Structural Silicone Glazed (SSG) Framing Members: Include accommodations for using temporary support device to retain glazing in place while structural sealant cures.

C. After fabrication, clearly mark components to identify their locations in Project according to approved Shop Drawings.

2.8 ALUMINUM FINISHES

A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

B. Factory Finishing:

1. Interior Storefront System: Kawneer Permanodic™ AA-M10C21A41/AA-M45C22A41, AAMA 611, Architectural Class I Clear Anodic Coating, Color #14 Clear.
2. Exterior Storefront System: Kawneer Permanodic™ AA-M10C21A41/AA-M45C22A41, AAMA 611, Architectural Class I Clear Anodic Coating, Color #14 Clear.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work. Verify rough opening dimensions, levelness of sill plate and operational clearances. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure a coordinated, weather tight framed aluminum storefront system installation.

1. Masonry Surfaces: Visibly dry and free of excess mortar, sand, and other construction debris.
2. Metal Surfaces: Dry; clean; free of grease, oil, dirt, rust, corrosion, and welding slag; without sharp edges or offsets at joints.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with Drawings, approved Shop Drawings, and manufacturer's written instructions for installing aluminum-framed storefront system, accessories, and other components.

B. Install aluminum-framed storefront system level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.

C. Set sill members in bed of sealant or with gaskets, as indicated, for weather tight construction.

D. Install aluminum-framed storefront system and components to drain condensation, water penetrating joints, and moisture migrating within aluminum-framed storefront to the exterior.

E. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

3.3 FIELD QUALITY CONTROL

A. Field Tests: Conduct field tests to ascertain that storefront system is watertight. Conduct generally in accordance with specific requirements of AAMA 501.2 “hose nozzle testing.” A minimum of three (3) water hose tests shall be performed in areas and at a stage of construction as determined by the Architect. Coordinate field water testing of storefront systems with regular site visits. Schedule an additional dedicated site visit as required to conduct testing at additional locations. Tests shall be performed in the presence of the Architect or Building Exterior Consultant, if applicable to Project. Water penetration performance for storefront systems: 8.0 PSF.

B. Complete Work as necessary, and out of sequence as required, to allow for field testing during regular scheduled site visits.

C. Repair or remove Work if test results and inspections indicate that Work does not comply with specified requirements.

D. Additional testing and inspecting, at Contractor’s expense, will be performed to determine compliance with specified requirements of replaced or additional work.

E. Aluminum-framed assemblies will be considered defective if they do not pass tests and inspections.

F. Prepare and submit test and inspection reports.

G. Manufacturer's Field Services: Upon Owner’s written request, provide periodic site visit by manufacturer’s field service representative.

3.4 CLEANING AND PROTECTION

A. Clean aluminum surfaces immediately after installing aluminum-framed storefronts. Avoid damaging protective coatings and finishes during constructon. Remove excess sealants, glazing materials, dirt, and other substances. Repair or replace damaged instlled products.

B. Clean glass immediately after installation. Comply with glass manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.

C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

D. Remove construction debris from Project Site and legally dispose of debris.

END OF SECTION 084113

SECTION 084213 – ALUMINUM FRAMED ENTRANCES (DOORS)

PART 1 - GENERAL

1.1 GENERAL

A. Work Included: Furnish and install all aluminum entrance doors as indicated on the Drawings and as specified herein.

B. Related Sections

1. 084113 – ALUMINUM FRAMED ENTRANCES AND STOREFRONTS.
2. 087100 – DOOR HARDWARE.
3. 087113 – AUTOMATIC DOOR OPERATORS.
4. 088000 – GLAZING.

1.2 QUALITY ASSURANCE

A. Standards: Comply with the following standards:

1. American Architectural Manufacturers Association (AAMA):

a. Metal Curtain Wall, Windows, Store Front and Entrance Guide Specifications Manual, 1977.
b. **AAMA 701/702** – Voluntary Specification for Pile Weather-stripping and Replaceable Fenestration Weather seals.

2. American Society for Testing and Materials (ASTM):

a. **ASTM B456** – Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.
b. **ASTM B633** – Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel.

B. Design Criteria: Glass and Aluminum Entrance Doors shall be designed by manufacturer to withstand wind loads per Local Building Codes. Provide any and all required reinforcing inside the exterior window wall system to meet this criteria.

C. Qualifications of Manufacturer: Products used in the work of this Section shall be produced by manufacturers regularly engaged in manufacture of similar items and with a history of successful production acceptable to the Architect.

D. Qualifications of Installers: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the methods needed for proper performance of the work of this Section.

E. Manufacturer's Certification: Prior to start of installation of the work of this Section, secure a visit to the job site by a representative of the manufacturer, who shall inspect and certify that:

1. The openings in which the work of this Section is to be installed are in a condition suitable for that installation.
2. The materials to be installed comply in all respects with the requirements of this Section of these specifications.
3. The materials are to be installed in complete accordance with the manufacturer's recommendations.

1.3 SUBMITTALS

A. General: Comply with the pertinent provisions of Section 013300 - SUBMITTAL PROCEDURES.

B. Product Data: Submit the following to the Architect for approval:

1. Complete materials list of all items proposed to be furnished and installed under this Section.
2. Sufficient data to demonstrate compliance with all specified requirements.
3. Shop drawings for entire installation indicating elevations, material, thickness, dimensions, methods and details of installation.
4. Samples of the specified finish, showing lightest and darkest finish color to be supplied for this work.
5. Manufacturer's recommended methods of installation, which, when approved by the Architect, will become the basis for inspecting and accepting or rejecting actual installation methods used on the job.

C. Manufacturer's Certification: Upon completion of this portion of the work, and as a condition of its acceptance, submit the certification required by paragraph 1.2 (E) above.

D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency for each type of aluminum-framed entrance doors.

E. Entrance Door Hardware Schedule: Prepared by or under the 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, frames, and related work to ensure proper size, thickness, hand function, and finish of entrance door hardware.

1.4 PRODUCT HANDLING

A. Delivery & Storage: Deliver materials to the project with manufacturer's labels intact and legible.

B. Protection: Use all means necessary to protect materials of this Section before, during, and after installation, and to protect installed work and materials of all other trades.

C. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

1.5 GUARANTEE

A. The aluminum entrance door manufacturer shall provide the Owner with a written guarantee that their respective systems will be free from defects in materials and workmanship, and will perform satisfactorily for use as intended for a period of two (2) years after date of substantial completion. The manufacturer shall replace at his own expense any component which may prove to be defective within the guarantee period.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design Product:

1. Kawneer Company, Inc.
2. The door stile and rail face dimensions of the 350 medium stile entrance door shall be as follows:

   a. Vertical Stile: 3-1/2" (89mm).
   b. Top Rail: 3-1/2" (89mm).
   c. Optional Bottom Rail: 10" (254mm).
   d. Performance Grade: High traffic applications.

3. Major portions of the door members to be 0.125 inch (3.2mm) nominal thickness and glazing molding to be 0.05 inch (1.3mm) thick.
4. Glazing gaskets shall be either EPDM elastomeric extrusions or a thermoplastic elastomer.
5. Provide adjustable glass jacks to help center glass in the door opening.

2.2 MATERIALS

A. Aluminum Extrusions: Alloy and temper recommended by aluminum-framed entrance door manufacturer for strength, corrosion resistance, and application of required finish and not less than 0.090 inch (2.3mm) wall thickness at any location for the main frame and door leaf members.

B. Fasteners: Aluminum, nonmagnetic stainless steel or other materials to be non-corrosive and compatible with aluminum-framed entrance door members, trim hardware, anchors, and other components.

C. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B633 for SC3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressures indicated.

D. Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B456 for Type SC3 severe service conditions, or zinc-coated steel or iron complying with ASTM B633 for SC3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.

1. Weather seals: Provide weather-stripping with integral barrier fin or fins of semi-

rigid, polypropylene sheet or polypropylene-coated material. Comply with AAMA 701/702.

2.3 STOREFRONT FRAMING

A. Refer to Section 084113 – ALUMINUM FRAMED ENTRANCES AND STOREFRONTS.

2.4 GLAZING

A. Glazing: As specified in Section 088000 – GLAZING.

B. Glazing Gaskets: Manufacturer's standard compression type; replaceable, extruded EPDM rubber.

C. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.

2.5 HARDWARE

A. General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, or other corrosion-resistant material compatible with aluminum; designed to smoothly operate, tightly close, and securely lock aluminum-framed entrance doors.

B. Standard Hardware: By aluminum door manufacturer, unless otherwise indicated, as follows:

1. Weather-stripping:

a. Meeting stiles on pairs of doors shall be equipped with an adjustable astragal utilizing wool pile with polymeric fin.
b. Door weather-stripping on a single acting door and frame (single or pairs) shall be comprised of thermoplastic elastomer weathering member on a tubular shape with semi-rigid polymeric backing.

2. Sill Sweep Strips: EPDM blade gasket sweep strip in an aluminum Extrusion applied to the interior exposed surface of the bottom rail with concealed fasteners (Necessary to meet specified performance tests.)
3. Threshold: Extruded aluminum, one piece per door opening, with ribbed surface.
4. Continuous Hinge: Refer to Section 087100 – DOOR HARDWARE.
5. Push/Pull: Refer to Section 087100 – DOOR HARDWARE.
6. Exit Device: Refer to Section 087100 – DOOR HARDWARE.
7. Closer: Refer to Section 087100 – DOOR HARDWARE.
8. Cylinders: Refer to Section 087100 – DOOR HARDWARE.
9. Automatic Door Operators: Refer to Section 087113 – AUTOMATIC DOOR OPERATORS.

2.6 FINISHES

A. Door finish shall match storefront framing system in which door is installed. Refer to Section 084113 – ALUMINUM FRAMED ENTRANCES AND STOREFRONTS. Typical finish as follows:

1. Exterior Storefront Doors

a. Finish: Kawneer #14 Clear Anodized, AA-M10C21A41.

PART 3 - EXECUTION

3.1 FABRICATION

A. General: Shop fabricate all exterior aluminum storefront wall systems and entrance doors into complete units. Verify all measurements at the job site prior to fabrication.

B. Workmanship:

1. Fabricate in strict accordance with the approved shop drawings and the manufacturer's published recommendations.
2. Accurately miter and fit all members to hairline joints.
3. Weld or mechanically fasten along entire line of contact on the unexposed side.
4. No discoloration on the face after anodizing will be acceptable.

3.2 SURFACE CONDITIONS

A. Inspection:

1. Prior to installation of the work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.
2. Verify that each system may be installed in complete accordance with the original design and the approved shop drawings.

B. Discrepancies:

1. In the event of a discrepancy, immediately notify the Architect.
2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.3 INSTALLATION

A. General: Install all members with adequate provision for settling, expanding, and contracting to occur without breaking glass.

B. Anchoring: Firmly anchor all members, using all anchoring devices required to ensure positive attachment of the members for long life under hard use.

C. Protection:

1. Wherever aluminum is in contact with steel, concrete, or other material potentially creative of electrolytic action, provide all required permanent isolation of the aluminum by backpainting with first quality bituminous paint or by such other isolation as is approved in advance by the Architect.

2. Protect all finished surfaces as necessary to prevent damage during progress of the work.

3.4 CLEAN UP

A. Immediately prior to acceptance of the work, remove all protective materials from the windows and doors and clean all exposed members.

B. Abrasives: Do not use abrasives or harmful cleaning agents.

END OF SECTION 084213

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 1 Specification Sections, apply to this Section.

B. SUMMARY. This section includes the following types of automatic door operators:

1. Exterior automatic door operators, low energy, with concealed header mounting and wireless push button activation.
2. Automatic door operators shall be configured for doors as follows:

a. Dual operators for double doors where scheduled on the Drawings.

3. Operators at swinging aluminum and glass doors in aluminum storefront shall be concealed in head of frame. Coordinate with aluminum storefront manufacturer to ensure deeper head frame is used to conceal automatic operator. Automatic operator finish shall match finish of aluminum storefront.

C. Related Sections:

1. Section 084213 - ALUMINUM-FRAMED ENTRANCES (DOORS) for entrance doors furnished and installed separately.
2. Section 084113 – ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS for entrance framing furnished and installed separately.
3. Section 087100 - DOOR HARDWARE for hardware to the extent not specified in this Section.
4. Division 26 Sections for electrical connections provided separately including conduit and wiring for power to automatic door operators.

1.2 REFERENCE STANDARDS

A. General: Standards listed by reference, including revisions by issuing authority, form a part of this specification section to extent indicated. Standards listed are identified by issuing authority, authority abbreviation, designation number, title or other designation established by issuing authority. Standards subsequently referenced herein are referred to by issuing authority abbreviation and standard designation.

B. Underwriters Laboratories (UL):

1. **UL 325** – Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems.
2. **UL 10C** – Positive Pressure Fire Tests of Door Assemblies.

C. American National Standards Institute (ANSI)/Builders' Hardware Manufacturers Association (BHMA):

1. **ANSI/BHMA A156.10**: Standard for Power Operated Pedestrian Doors.
2. **ANSI/BHMA A156.19**: Power Assist & Low Energy Power Operated Doors.

D. American Society for Testing and Materials (ASTM):

1. **ASTM B221** - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
2. **ASTM B209** - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

E. American Association of Automatic Door Manufacturers (AAADM).

F. National Fire Protection Association (NFPA):

1. **NFPA 101** – Life Safety Code.
2. **NFPA 70** – National Electric Code.

G. International Code Council (ICC):

1. IBC: International Building Code.

H. Building Officials and Code Administrators International (BOCA), 1999.

I. International Standards Organization (ISO):

1. **ISO 9001** - Standard for Manufacturing Quality Management Systems.
2. **ISO 14025** – Environmental Labels and Declarations – Type III Environmental Declarations – Principles and Procedures.
3. **ISO 14040** – Environmental Management – Life Cycle Assessment – Principles and Framework.
4. **ISO 14044** – Environmental Management – Life Cycle Assessment – Requirements and Guidelines.
5. **ISO 21930** - Sustainability in Buildings and Civil Engineering Works – Core Rules for Environmental Product Declarations of Construction Products and Services.

J. National Association of Architectural Metal Manufacturers (NAAMM):

1. Metal Finishes Manual for Architectural and Metal Products.

K. American Architectural Manufacturers Association (AAMA):

1. **AAMA 607.1** - Clear Anodic Finishes for Architectural Aluminum.
2. **AAMA 611** - Voluntary Specification for Anodized Architectural Aluminum.

L. United Nations Central Product Classification (UNCPC):

1. **UNCPC 4212** – product Category Rules for Preparing an Environmental Product Declaration for Power-Operated Pedestrian Doors and Revolving Doors.

M. Aluminum Association (AA).

1.3 DEFINITIONS

A. Activation Device: Device that, when actuated, sends an electrical signal to the door operator to open the door.

B. Knowing Act: Consciously initiating the opening of a power operated door using acceptable methods including wall mounted switches such as push plates and controlled access devices such as keypads, card readers and key switches..

1.4 PERFORMANCE REQUIREMENTS

A. General: Provide automatic door operators capable of withstanding loads and thermal movements based on testing manufacturer's standard units in assemblies similar to those indicated for this Project.

B. Operating Range: Minus 30 deg F (Minus 34 deg C) to 130 deg F (54 deg C).

C. Opening-Force Requirements for Egress Doors: In the event power failure to the operator, swinging automatic entrance doors shall open with a manual force, not to exceed 30 lbf (133 N) to set door in motion, and not more than 15lbf to fully open door. Forces shall be applied at 1” (25 mm) from the latch edge of the door.

1.5 SUBMITTALS

A. General: Submit listed submittals in accordance with Conditions of the Contract and Section 013300 – SUBMITTAL PROCEDURES.

B. Shop Drawings: Include plans, elevations, sections, details, hardware mounting heights, and attachments to other work. Indicate wiring for electrical supply.

C. Color Samples for selection of factory-applied color finishes.

D. Closeout Submittals: Provide the following with project close-out documents.

1. Owner’s Manual.
2. Warranties.

E. Reports: Based on evaluation performed by a qualified agency, for automatic door operators.

1. Environmental Product Declaration.
2. Evaluation Report for compliance with IBC.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative, with certificate issued by AAADM, who is trained for installation and maintenance of units required for this Project.

B. Manufacturer Qualifications: A qualified manufacturer with a manufacturing facility certified under ISO 9001.

C. Manufacturer shall have in place a national service dispatch center providing 24 hours a day, 7 days a week, emergency call back service.

D. Certifications: Automatic door operators shall be certified by the manufacturer to meet performance design criteria in accordance with the following standards:

1. ANSI/BHMA A156.10 and A156.19.
2. NFPA 101.
3. UL 325 Listed.
4. UL 10C Listed.
5. IBC 2018.
6. BOCA.

E. Environmental Product Declaration (EPD): EPD for automatic door operators shall be certified by the manufacturer to comply with the following:

1. Prepared un Product Category Rule (PCR) UNCPC 4212.
2. Conform to ISO Standards 14025, 14040, 14044, and 21930.
3. Life Cycle Assessment Basis: Cradle to Gate, minimum.

F. Source Limitations: Obtain automatic door operators through one source from a single manufacturer.

G. Product Options: Drawings indicate sizes, profiles, and dimensional requirements of swinging doors equipped with automatic door operators and are based on the specific system indicated. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

H. Power Operated Door Standard: ANSI/BHMA A156.19.

I. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to Authorities Having Jurisdiction (AHJ), and marked for intended use.

J. Emergency-Exit Door Requirements: Comply with requirements of Authorities Having Jurisdiction (AHJ) for swinging automatic entrance doors serving as a required means of egress.

1.7 PROJECT CONDITIONS

A. Field Measurements: General Contractor shall verify openings to receive automatic door operators by field measurements before fabrication and indicate measurements on Shop Drawings.

B. Mounting Surfaces: General Contractor shall verify all surfaces to be plumb, straight and secure; substrates to be of proper dimension and material.

C. Other trades: General Contractor Advise of any inadequate conditions or equipment.

1.8 COORDINATION

A. Templates: Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing automatic door operators to comply with indicated requirements.

B. Electrical System Roughing-in: Coordinate layout and installation of automatic door operators with connections to, power supplies, remote activation devices, and electric door latching hardware.

C. System Integration: Integrate automatic door operators with other systems as required for a complete working installation. Where required for proper operation, provide a time delay relay to signal automatic door operator to activate only after electric lock system is released.

1.9 WARRANTY

A. Automatic door operators shall be free of defects in material and workmanship for a period of one (1) year from the date of substantial completion.

B. During the warranty period the Owner shall engage a factory-trained technician to perform service and affect repairs. A safety inspection shall be performed after each adjustment or repair and a completed inspection form shall be submitted to the Owner.

C. During the warranty period all warranty work, including but not limited to emergency service, shall be performed during normal working hours.

PART 2 - PRODUCTS

2.1 AUTOMATIC DOOR OPERATORS

A. Basis of Design Manufacturer: Stanley Access Technologies; M-Force^{tm} Series automatic door operator.

2.2 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

1. Headers: 6063-T6.

2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
3. Sheet and Plate: ASTM B 209.

2.3 COMPONENTS

A. Header Case: Header case shall not exceed 6” (152 mm) square in section and shall be fabricated from extruded aluminum with structurally integrated end caps, designed to conceal door operators and controls. The operator shall be sealed against dust, dirt, and corrosion within the header case. Access to the operator and electronic control box shall be provided by a full-length removable cover, edge rabbetted to the header to ensure a flush fit. Removable cover shall be secured to prevent unauthorized access.

B. Door Arms: A combination of door arms and linkage shall provide positive control of door through entire swing; units shall permit use of butt hung, center pivot, and offset pivot-hung doors.

C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding fasteners and accessories compatible with adjacent materials.

D. Signage: Provide signage in accordance with ANSI/BHMA A156.19.

2.4 SWINGING DOOR OPERATORS

A. General: Provide door operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for long-term, maintenance-free operation under normal traffic load for type of occupancy indicated.

B. Electromechanical Operators: Self-contained unit powered by a minimum 3/16 horsepower, permanent-magnet DC motor; through a high torque reduction gear system.

1. Operation: Power opening and spring closing.
2. Operator Type: Low energy; readily convertible to full energy; no tools required to change type.
3. Handing: Non-handed; no tools required to change handing.
4. Capacity: Rated for door panels weighing up to 700 lb (318 kg).
5. Mounting: Concealed.
6. Features:

a. Adjustable opening and closing speeds.
b. Adjustable opening and closing force.
c. Adjustable back-check.
d. Adjustable hold-open time between 0 and 30 seconds.
e. Reverse on obstruction.
f. Time delay for electric lock integration.
g. Force compensation and closed loop speed control with active braking and acceleration.
h. Power Close.
i. Slam Protection.
j. Power Assist.
k. Lock Release.
l. Stall Sensor Ignore.

m. Electronic Coordination.
n. Optional Switch to open/Switch to close operation.
o. Optional push to activate operation.
p. Fire alarm interface, configurable to safely open or close doors on signal from fire alarm system.

C. Field Adjustable Spring Closing Operation: The operator shall close the door by spring energy employing the motor, as a dynamic brake to provide closing speed control. The closing spring shall be a helical compression spring, adjustable for positive closing action. The spring shall be adjustable, without removing the operator from the header, to accommodate a wide range of field conditions.

D. Independent Adjustable Closing and Latching Speed Control: The operator shall employ a rheostat module to allow for independent field adjustment of closing and latching speeds using the motor as a dynamic brake.

E. Field Adjustable Open Stop: The operator shall provide a field adjustable open stop to accommodate opening angles from 80 to 135 degrees without the need for additional components.

F. Consistent Cycle: The operator shall deliver an even, consistent open manual push force across the entire transition from door fully closed to door fully open. Additionally, the force shall be field adjustable to accommodate a wide range of on-site conditions.

G. Quiet Performance: The operator shall be designed to output audible noise ratios less than or equal to 50dba.

H. Manual Use: The operator shall function as a manual door closer in the direction of swing with or without electrical power. The operator shall deliver an even, consistent open force across the entire transition from door fully closed to door fully open.

I. Electrical service to door operators shall be provided under Division 26 Electrical. Minimum service to be 120 VAC, 5 amps.

2.5 ELECTRICAL CONTROLS

A. Electrical Control System: Electrical control system shall include a microprocessor controller and a high-resolution position encoder. The encoder shall monitor revolutions of the operator shaft and send signals to microprocessor controller to define door position and speed.

1. The high-resolution encoder shall have a resolution of not less than 1024 counts per revolution. Systems utilizing external magnets and magnetic switches are not acceptable.
2. Electrical control system shall include a 24 VDC auxiliary output rated at 1 amp.

B. Performance Data: The microprocessor shall collect, and store performance data as follows:

1. Counter: A non-resettable counter to track operating cycles.

2. Event Reporting: Unit shall include non-volatile event and error recording including number of occurrences of events and errors, and cycle count of most recent events and errors.
3. LED Display: Display presenting the current operating state of the controller.

C. Controller Protection: The microprocessor controller shall incorporate the following features to ensure trouble free operation:

1. Automatic Reset Upon Power Up.
2. Main Fuse Protection.
3. Electronic Surge Protection.
4. Internal Power Supply Protection.
5. Resetable sensor supply fuse protection.
6. Motor Protection, over-current protection.

D. Power Close: When enabled, engages the operator to close a door that does not close completely at the end of a cycle.

E. Force Compensation: Utilizing the closed loop speed control, the operator shall maintain constant opening and closing speeds when subjected to excessive outside forces, such as positive or negative stack pressures.

F. Slam Protection: The operators speed control system prevents door from slamming at the full open or full closed position.

G. Power Assist: Operator mode that lowers opening forces when the door is used manually. Power assist is active only while pushing or pulling the door. The door will close when an opening force is no longer applied.

H. Lock Release: On doors with electric locking, operator shall include a closing function to release tension on a latch mechanism prior to opening the door.

I. Stall Sensor Ignore: Adjustable setting to disable swing side safety sensors at a specific angle.

J. Electronic Coordination: On pairs of doors, allows independent timing of opening and closing of each leaf as required for astragal coordination.

K. Soft Start/Stop: A “soft-start” “soft-stop” motor driving circuit shall be provided for smooth normal opening and recycling.

L. Obstruction Recycle: Provide system to recycle the swinging panels when an obstruction is encountered during the closing cycle.

M. Programmable Controller: Microprocessor controller shall be field programmable.

1. The following parameters may be adjusted:

a. Operating speeds and forces as required to meet specified ANSI/BHMA standard.
b. Adjustable and variable features specified.

2. Manual programming shall be available through local interface which has a two-digit display with a selection control including three push buttons.

N. Emergency Breakout Switch: A cam actuated emergency breakout switch shall be provided to disconnect power to the motor when an in-swinging door is manually pushed in the emergency out direction. The operator will then automatically reset, and power will be resumed.

O. Control Switch: Automatic door operators shall be equipped with a three-position function switch to control the operation of the door. Control switch shall provide three modes of operation, Automatic, Off, and Hold-Open.

P. Power Switch: Automatic door operators shall be equipped with a two position On/Off switch to control power to the door.

2.6 ACTIVATION DEVICES

A. Provide wireless activation devices for surface mounting to existing wall construction. Submit complete product data for review and approval. Mount in locations as shown on the Drawgins.

2.7 ALUMINUM FINISHES

A. General: Comply with NAAMM Metal Finishes Manual for Architectural and Metal Products for recommendations for applying and designing finishes. Finish designations prefixed by AA comply with system established by Aluminum Association for designing finishes.

B. Operators Exterior Doors: Class II, Color Anodic Finish: AA-M12C22A42/A44 Mechanical Finish: as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.40 mils minimum complying with AAMA 611-98, and the following:

1. AAMA 607.1.
2. Applicator must be fully compliant with all applicable environmental regulations and permits, including wastewater and heavy metal discharge.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances, header support, and other conditions affecting performance of swinging automatic entrance doors. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Do not install damaged components. Fit joints to produce hairline joints free of burrs and distortion. Rigidly secure non-movement joints.

B. Mounting: Install automatic door operators/headers plumb and true in alignment with established lines and grades. Anchor securely in place.

1. Install surface-mounted hardware using concealed fasteners to greatest extent possible.
2. Set headers, arms and linkages level and true to location with anchorage for permanent support.

C. Door Operators: Connect door operators to electrical power distribution system as specified in Division 26 Sections.

3.3 FIELD QUALITY CONTROL

A. Testing Services: Factory Trained Installer shall test and inspect each swinging automatic entrance door to determine compliance of installed systems with applicable ANSI standards.

3.4 ADJUSTING

A. Adjust door operators, controls, and hardware for smooth and safe operation, for tight closure, and complying with requirements in ANSI/BHMA A156.19 by AAADM Certified Technician.

3.5 CLEANING AND PROTECTION

A. Clean surfaces promptly after installation. Remove excess sealant compounds, dirt, and other substances. Repair damaged finish to match original finish.

END OF SECTION 087113

SECTION 088000 – GLAZING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included: Provide all glass and glazing, complete in place, as shown on the Drawings, specified herein, and needed for a complete and proper installation.

1.2 RELATED SECTIONS

A. Section 084113 – ALUMINUM FRAMED ENTRANCES AND STOREFRONTS.

B. Section 084213 – ALUMINUM FRAMED ENTRANCES (DOORS).

1.3 REFERENCE STANDARDS

A. American National Standards Institute (ANSI):

1. **ANSI Z97.1** – American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test.

B. American Society for Testing & Materials (ASTM):

1. **ASTM C1036** – Standard Specification for Flat Glass.
2. **ASTM C1048** – Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass.
3. **ASTM E2190** – Standard Specification for Insulating Glass Unit Performance and Evaluation.

C. Flat Glass Marketing Association (FGMA).

1.4 QUALITY ASSURANCE

A. Standards: Comply with the following standards:

1. All applicable City, State, and Federal Codes, Ordinances, and Regulations.

B. Qualifications of Installers: Use adequate number of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the special requirements and the methods needed for proper performance of the work of this section.

C. Manufacturers: Obtain glass and glazing materials from one source for each product indicated. Coatings and finished assemblies, such as insulating units and laminated units, to be manufactured by the same fabricator in order to have a common source of warranty.

1.5 SUBMITTAL

A. General: Comply with the provisions of Section 013000 – SUBMITTAL PROCEDURES.

B. Samples:

1. Submit samples of insulating and safety glass for review and approval.

1.6 PRODUCT HANDLING

A. Protection: Use all means necessary to protect glass and glazing materials before, during, and after installation and to protect the installed work and materials of all other trades.

B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

C. Warranties:

1. Provide a written 10-year warranty from date of manufacture for insulating glass. Warranty shall cover deterioration due to normal conditions of use and not to handling, installing, and cleaning practices contrary to the glass manufacturer's published instructions.

PART 2 - PRODUCTS

2.1 GLASS AND GLAZING SHEETS

A. All glass shall bear the label of its manufacturer and shall conform in all respects with the pertinent requirements of ASTM C1036 and ASTM C1048. Glass shall be annealed, heat-strengthened, or tempered as required by Code, or as required to meet thermal stress and wind loads.

B. The following GL-(Glazing) type numbers correspond with the GL numbers indicated on the Drawings.

GL-1: 1" Clear Tempered Insulating Glass: 1" insulating assembly consisting of ¼" (6mm) VITRO® Clear Architectural Glass Solarban® 90 tempered Low-e #2 + ½"air space + ¼" (6mm) VITRO® clear tempered as manufactured by Oldcastle Building Envelope™, CRL/US Aluminum, Dallas Texas (214) 634-7305, or approved equivalent. Provide in exterior window frames at locations as scheduled on the Drawings. Insulating glass assembly shall have the following performance characteristics:

1. UV Transmittance: 7%.
2. Visible Light Transmittance: 51%.
3. Total Solar Energy Transmittance: 19%.
4. Visible Reflectance Out: 12%.
5. Visible Reflectance In: 19%.
6. U-Value – Winter- Nighttime: 0.29.
7. Shading Coefficient (SC): 0.27.
8. Solar Heat Gain Coefficient (SHGC): 0.23.
9. Light to Solar Gain (LSG): 2.18.

GL-2: 1" Clear Annealed Insulating Glass: 1" insulating assembly consisting of ¼" (6mm) VITRO® Clear Architectural Glass Solarban® 90 annealed Low-e #2 + ½"air space + ¼" (6mm) VITRO® clear annealed as manufactured by Oldcastle Building Envelope™, CRL/US Aluminum, Dallas Texas (214) 634-7305, or approved equivalent. Provide in exterior window frames at locations as scheduled on the Drawings. Insulating glass assembly shall have same performance characteristics as GL-1.

GL-3: ¼" Clear Safety Glass: ¼" clear tempered safety glass. Provide at all aluminum and glass doors and interior borrowed light windows in locations as scheduled on the Drawings.

2.2 TEMPERED GLASS

A. Fully tempered glass shall comply with the following:

1. ASTM C1048, Type 1, Class 1 (Clear), Quality Q3, Kind FT.
2. ANSI Z97.1.
3. Permit minimum warpage practicable.

2.3 INSULATED GLASS UNITS

A. Insulated glass units shall consist of glass lites separated by a dehydrated airspace that is hermetically dual sealed with a primary seal of polyisobutylene (PIB) or Thermoplastic Spacer (TPS) and a secondary seal of silicone or an organic sealant depending on the application.

B. Insulated glass units shall be certified through the Insulating Glass Certification Council (IGCC) to meet requirements of ASTM E2190.

2.4 GLAZING COMPOUNDS AND SEALANTS

A. General: Use glazing compounds and sealants approved for the application and, except as otherwise specified, conforming to the Glazing Materials portion of FGMA Glazing Manual.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine the areas and conditions under which work of this section will be installed. Correct conditions detrimental to the proper execution of the work. Do not proceed until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Cut and install glass with the visible lines or waves running with the horizontal direction.

B. Glass Installation:

1. Items to be glazed shall be shop-glazed or field-glazed with glass of the quality and thickness as shown on the Drawings.
2. Prepare surrounds and glass, unless otherwise directed, in conformance with the details and general conditions governing glazing in the FGMA Glazing Manual.
3. Use beads or stops furnished with the items to be glazed to secure the glass in place.

3.3 CLEANING

A. Glass Cleaning:

1. Thoroughly clean all glass and remove all labels, paint spots, and other defacements.

END OF SECTION 088000

SECTION 092216 - NON-STRUCTURAL 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. Non-load-bearing steel framing systems for interior partitions.

B. Related Sections:

1. Section 017300 – EXECUTION: Wood blocking for interior walls.
2. Section 054000 – COLD-FORMED METAL FRAMING: Exterior wall framing.
3. Section 061000 – ROUGH CARPENTRY: Wood blocking requirements.
4. Section 081113 – HOLLOW METAL DOORS AND FRAMES: Interior hollow metal door frames.
5. Section 084113 – ALUMINUM FRAMED ENTRANCES AND STOREFRONTS: Interior aluminum and glass window frames.
6. Section 092226 – METAL SUSPENSION SYSTEMS: Prefabricated ceiling systems for gypsum board ceilings.
7. Section 092900 – GYPSUM BOARD: Gypsum board for interior partitions.

C. Reference Standards:

1. American Iron and Steel Institute (AISI):

a. **AISI S220** – North American Standard for Cold-Formed Steel Framing – Nonstructural Members.

2. American Society for Testing and Materials (ASTM):

a. **ASTM A641** – Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
b. **ASTM C645** – Standard Specification for Nonstructural Steel Framing Members.
c. **ASTM A653** – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanneled) by the Hot Dipped Process.
d. **ASTM C754** – Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
e. **ASTM C840** – Standard Specification for Application and Finishing of Gypsum Board.
f. **ASTM E90** – Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.

g. **ASTM E119** – Standard Test Method for Fire Tests of Building Construction and Materials.
h. **ASTM E413** – Classification for Rating Sound Insulation.
i. **ASTM G40** – Standard Terminology Relating to Wear and Erosion.

3. International Accreditation Service (IAS).
4. International Building Code (IBC).
5. International Code Council (ICC):

a. **ICC-ES-AC86** – Cold-formed Steel Framing Members – Interior Nonload-bearing Wall Assemblies.
b. **ICC-ES AC98** – Acceptance Criteria for Quality Control Agency Accreditation.

6. Steel Framing Industry Association (SFIA) – Code Compliance Certification Program.
7. Steel Stud Manufacturers' Association (SSMA).
8. Underwriters Laboratories (UL):

a. **UL Design No. U419** – Interior Partitions – Steel Studs (Non-Load Bearing) – I Hour Fire Rating.
b. **UL Design No. V438** – Non-Bearing Wall Ratings – 1, 2, 3, or 4 Hour.
c. **UL Design No. V450** – Fire Rated Wall Assemblies.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of code-compliance certification for studs and tracks.

B. Evaluation Reports: Submit evaluation reports certified under an independent third-party inspection program administered by an agency accredited by IAS to ICC-ES AC98 accreditation criteria for inspection agencies.

C. Manufacturer's Certification: Submit manufacturer's certification of product compliance with codes and standards along with product literature and data sheets for specified products.

1.5 QUALITY ASSURANCE

A. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified in accordance with the product-certification program of the Steel Framing Industry Association (SFIA) or a similar organization that provides a verifiable code-compliance program.

B. Contractor shall provide effective, full-time quality control over all fabrication and erection complying with pertinent codes and regulations of government agencies having jurisdiction. Conduct preinstallation meeting to verify Project requirements, substrate conditions, and manufacturer's written installation instructions.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Notify manufacturer of damaged materials received prior to installation.

B. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

C. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling as required by AISI S202, "Code of Standard Practice for Cold-Formed Steel Structural Framing."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, in accordance with ASTM E119, and displaying a classification label from an independent testing agency acceptable to Authorities Having Jurisdiction (AHJ).

1. Construct fire-resistance-rated partitions in compliance with tested assembly requirements indicated on Drawings.
2. Rated assemblies to be substantiated from applicable testing using proposed products, by Contractor.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated on Drawings, in accordance with ASTM E90 and classified in accordance with ASTM E413 by an independent testing agency.

C. Horizontal Deflection: For composite wall assemblies, limited to 1/240 of the wall height based on horizontal loading of 5 lbf/sq. ft. (239 Pa).

D. Design framing systems in accordance with AISI S220, "North American Standard Cold-Formed Steel Framing - Nonstructural Members," unless otherwise indicated.

E. Design Loads: As indicated on Structural Drawings or 5 lbf/sq. ft. (239 Pa) minimum as required by the IBC.

F. Design framing systems to accommodate deflection of primary building structure and construction tolerances and to withstand design loads with a maximum deflection of ¾ inches (19.05 mm) to 1 inch (25.4 mm).

2.2 FRAMING SYSTEMS

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

B. Framing Members, General: Comply with ASTM C645, AISI S220 and ASTM C645, Section 10 for conditions indicated.

1. Steel Sheet Components: Comply with ASTM C645, AISI S220 and ASTM C645, Section 10 requirements for metal unless otherwise indicated.
2. Protective Coating: Comply with ASTM C645, AISI S220; ASTM A653/A653M, ASTM G40 (Z120); or coating with equivalent corrosion resistance. Galvannealed products are unacceptable.

    a. Coating shall demonstrate equivalent corrosion resistance with an evaluation report acceptable to Authorities Having Jurisdiction (AHJ).
    b. Basis-of-Design Coating: Subject to compliance with requirements, provide ClarkDietrich; DiamondPlus Coating on ProSTUD and ProTRAK 20.

C. Non-Structural Studs and Track: ASTM C645, AISI S220 and ASTM C645, Section 10.

1. Non-Structural Studs: Cold-formed steel C-studs meeting conditions indicated below:

    a. Studs shall comply with non-composite fully braced only if gypsum wall board exists on both sides of studs full height or braced at 48" on center with appropriate wall bridging in place where gypsum board is missing on one side or both sides.
    b. Studs shall not exceed the following spans unless design data with load tables are submitted for non-composite design:

MEMBER	Max Span
Standard Studs	
SSMA 362S125-33	16' – 0"
SSMA 600S125-33	23' – 9"
EQ Studs	
ProStud 20 362PDS125-18	13' – 2"
ProStud 20 600PDS125-18	18' – 9"

    c. Subject to compliance with requirements specified herein, provide standard structural stud framing complying with Steel Stud Manufacturers Association (SSMA), ClarkDietrich ProSTUD 20 (20 EQ) 70 ksi (483 MPa) product with Smart Edge Technology, or equivalent product by one of the following current members of the SFIA:

        1) CEMCO; California Expanded Metal Products Co., City of Industry, CA.
        2) Telling Industries, Willoughby, OH.
        3) Or approved manufacturer.

    d. Flange Size: 1-1/4 inches (1.25 in.) (32mm).
    e. Web Depth: 3-5/8 inches (3.625 in.) (92mm) and 6 inches (6.0 in.) (152 mm).
    f. Standard Stud Minimum Thickness: 0.0329 inch (33 mils) (0.8356 mm).
    g. Standard Stud Minimum Design Thickness: 0.0346 inch (35 mils) (0.8788 mm).
    h. Standard Stud Gauge Reference: 20 ga.

i. EQ Stud Minimum Base-Steel Thickness: 0.0181 inch (18 mils) (0.4597 mm).
j. EQ Stud Minimum Design Thickness: 0.0190 inch (19 mils) (0.4826 mm).
k. EQ Stud Gauge Reference: 20 EQ ga.

2. Non-Structural Track: Cold-formed steel drywall track for conditions indicated below:

   a. Subject to compliance with requirements specified herein, provide standard steel drywall track complying with Steel Stud Manufacturers Association (SSMA), ClarkDietrich ProTRAK with Smart Edge technology, or equivalent product by one of the following current members of the SFIA:

      1) CEMCO; California Expanded Metal Products Co., City of Industry, CA.
      2) Telling Industries, Willoughby, OH.
      3) Or approved manufacturer.

   b. Flange Size: 1-1/4 inches (1.25 in.) (32mm).
   c. Web Depth: Track web to match stud web size.
   d. Minimum Base-Steel Thickness: Track thickness to match wall stud thickness or as per design.
   e. Track Gauge Reference: To match wall stud gauge.

3. Equivalent Gauge Thickness (EQ) Steel Studs and Runners: Members that can show certified third-party testing with gypsum board in accordance with ICC-ES AC86 need not comply with minimum thickness limitation or minimum section properties set forth in ASTM C645. Submission of an evaluation report is acceptable to show compliance with this requirement.

4. Special Studs and Track: Furnish and install 8-inch studs and track for framing chase wall partitions at back-to-back patient toilets in locations as shown on the Drawings. Stud and track properties as follows:

   a. Clark Dietrich Standard Studs and Track, or approved equivalent, complying with Steel Stud Manufacturers Association (SSMA):

      1) Stud Designation: SSMA 800S137-33.

         a) Flange Size: 1-3/8 inches (1.375 in.) (35 mm).
         b) Web Depth: 8 inches (8.00 in.) (203 mm).
         c) Minimum Thickness: 0.0329 inch (33 mils) (0.8356 mm).
         d) Minimum Design Thickness: 0.0346 inch (35 mils) (0.8788 mm).
         e) Gauge Reference: 20 gauge.

2) Track Designation: SSMA 800T137-33.

a) Flange Size: 1-3/8 inches (1.375 in.) (35 mm).
b) Web Depth: Match stud web depth.
c) Minimum Thickness: Match stud minimum thickness.
d) Gauge Reference: 20 gauge.

b. Optional Clark Dietrich ProStud 20 EQ Studs and ProTrak 20 Track, or approved equivalent:

1) Stud Designation: ProStud 20 800PDS.

a) Strength: 70 ksi.
b) Flange Size: 1-3/8 inches (1.375 in.) (35 mm).
c) Web Depth: 8 inches (8.00 in.) (203 mm).
d) Minimum Thickness: 0.0181 in. (18 mils) (0.4597 mm).
e) Minimum Design Thickness: 0.0190 in. (19 mils) (0.4826 mm).
f) Gauge Reference: 20EQ.

2) Track Designation: ProTrak 20 800PDT.

a) Strength: 50 ksi.
b) Flange Size: 1-3/8 inches (1.375 in.) (35 mm).
c) Web Depth: Match stud web depth.
d) Minimum Thickness: Match stud minimum thickness.
e) Gauge Reference: 20EQ.

D. Slip-Type Head Joints: Where indicated or required, provide one of the following:

1. Clip System: Clips designed for use in head-of-wall deflection conditions that provide a positive attachment of studs to tracks while allowing 2-1/2-inch- (64-mm-) minimum vertical movement.

a. Basis-of-Design Product: Subject to compliance with requirements, provide ClarkDietrich; Fast Top Clip FTC3, FTC5, or equivalent product by one of the following current member of the SFIA:

1) CEMCO; California Expanded Metal Products Co., City of Industry, CA.
2) The Steel Network, Inc., Durham, NC.
3) Approved Manufacturer.

2. Single Long-Leg Track System: Top track with 2-inch- (51-mm-) deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top track and cold-formed channel with clip angles located within 12 inches (305 mm) of the top of studs to provide lateral bracing.

a. Basis-of-Design Product: Subject to compliance with requirements, provide ClarkDietrich; Cold-Formed Channel and EasyClip U-Series Angle U543, U545, U547, or equivalent product by a manufacturer that is a current member of the SFIA:

3. Double-Track System: Top outer tracks, inside track with 2-inch- (51-mm-) deep flanges in thickness not less than indicated for studs and fastened to studs, and outer track sized to friction-fit over inner track.
4. Deflection Track: Steel sheet top track manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.

a. Basis-of-Design Product: Subject to compliance with requirements, provide ClarkDietrich MaxTrak SLT Slotted Deflection Track or equivalent product by one of the following current members of the SFIA:

1) CEMCO; California Expanded Metal Products Co., City of Industry, CA.
2) Telling Industries, Willoughby, OH.
3) Approved Manufacturer.

E. Backing Plate: Proprietary fire-retardant-treated wood blocking and bracing in width indicated.

1. Basis-of-Design Product: Subject to compliance with requirements, provide ClarkDietrich; Danback Fire-Retardant Treated Wood Backing Plate D16F, D24F, or equivalent product by a manufacturer that is a current member of the SFIA:

F. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.

1. Basis-of-Design Product: Subject to compliance with requirements, provide ClarkDietrich; Backing Plate or equivalent product by a manufacturer that is a current member of SFIA:
2. Minimum Base-Steel Thickness: As indicated on Drawings, 0.0179 inch (0.45 mm) or 0.0296 inch (0.75 mm).

G. Channel Bridging and Bracing: Pre-notched steel, 7/8 by 7/8 by 50 inches (22.2 by 22.2 by 1270 mm), 0.0329-inch- (0.84-mm-) minimum base-steel thickness.

1. Basis-of-Design Product: Subject to compliance with requirements, provide ClarkDietrich; Spazzer 9200 Bridging and Spacing Bar or equivalen product by a manufacturer that is a current member of the SFIA:

H. U-Channel Bridging: Steel, 0.0538-inch- (1.37-mm-) minimum base-steel thickness, with minimum 1/2-inch- (13-mm-) wide flanges.

1. Basis-of-Design Product: Subject to compliance with requirements, provide ClarkDietrich; Cold-Formed U-Channel and Channel Clip (CC33), FastBridge

(FB33), Bridging Clip or equivalent product by a manufacturer that is a current member of the SFIA.

2. U-Channel Depth: 3/4 inch (19 mm), 1-1/2 inches (38 mm), or As indicated on Drawings.

I. Rigid Furring Channels: Hat-shaped channels for furring out walls.

1. Basis-of-Design Product: Subject to compliance with requirements, provide ClarkDietrich; Furring Channel or equivalent product by a manufacturer that is a current member of the SFIA.
2. Minimum Base-Steel Thickness: 0.0179 inch (0.45 mm) or 0.0296 inch (0.75 mm).
3. Depth: 7/8 inch (22.2 mm), 1-1/2 inches (38 mm).

J. Resilient Furring Channels: 1/2-inch- (13-mm-) deep, steel sheet members designed to reduce sound transmission.

1. Basis-of-Design Product: Subject to compliance with requirements, provide ClarkDietrich; RC Deluxe (RCSD) Resilient Channel or equivalent product by a manufacturer that is a current member of the SFIA.
2. Configuration: Asymmetrical.

K. Carrying Channels: 0.053-inch (1.37-mm) base-steel thickness, with minimum 1/2-inch- (13-mm-) wide flanges.

1. Depth: 3/4 inch (19 mm).
2. Furring Brackets: Adjustable, corrugated-edge-type steel sheet with minimum base-steel thickness of 0.0296 inch (0.75 mm).
3. Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.062-inch- (1.57-mm-) diameter wire, or double strand of 0.048-inch- (1.21-mm-) diameter wire.

L. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches (32 mm), wall attachment flange of 3/4 inch (19 mm), minimum base-steel thickness of 0.0179 inch (0.45 mm), and depth required to fit insulation thickness indicated.

1. Basis-of-Design Product: Subject to compliance with requirements, provide ClarkDietrich; Z-Furring Channel or equivalent product by a manufacturer that is a current member of the SFIA.

M. Radius Framing: Steel sheet runner for non-load-bearing curves, bends, variable radii, and arches using expandable ribbon technology.

1. Basis-of-Design Product: Subject to compliance with requirements, provide ClarkDietrich; Interior Contour Track or equivalent product by a manufacturer that is a current member of the SFIA.
2. Minimum Base-Steel Thickness: 0.0296 inch (0.75 mm).
3. Depth: 2-1/2 inches (63.5 mm), 3-5/8 inches (92.1 mm), 6 inches (152.4 mm).

N. Headers and Jambs: Manufacturer's proprietary shape used to form header beams and jambs, columns or posts, of web depths indicated, unpunched, with stiffened flanges and as follows:

1. Basis-of-Design Product: Subject to compliance with requirements, provide ClarkDietrich; Heavy-Duty Studs (HDS) and Type HDSC Header Bracket or equivalent product by a manufacturer who is a current member of the SFIA.
2. Minimum Base-Steel Thickness: 0.0329 inch (0.84 mm), 0.0428 inch (1.09 mm), 0.0538 inch (1.37 mm), 0.0677 inch (1.72 mm), 0.0966 inch (2.45 mm).
3. Web Size: 3-5/8 inches (92.1 mm) or 6 inches (152 mm).
4. Flange Size: 3 inches (76.2 mm).

O. Special Prefabricated Jamb and Header Framing for Interior Wall Openings:

1. Contractor has option to furnish and install Red Header PRO™ Rough Opening System, a one-piece header and jamb framing system engineered to replace conventional multi-component boxed headers and built-up jamb framing at door and window rough openings, as manufactured by ClarkDietrich, www.clarkdietrich.com.
2. Size and thickness of jamb studs shall be as required to match interior wall stud framing. Header studs shall be sized as required for span of rough openings.
3. Provide headers, jamb studs, brackets, clips, and all other components as required for a complete installation.
4. Submit shop drawings showing locations of framed openings and typical installation details.
5. Submit complete product data describing all components being used for review and approval.

2.3 SUSPENSION SYSTEMS

A. Refer to Section 092226 – METAL SUSPENSION SYSTEMS.

2.4 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards.

1. Fasteners for Steel Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.

1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

B. Coordination with Sprayed Fire-Resistive Materials (if specified for Work and indicated on Drawings):

1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling tracks to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches (610 mm) o.c.
2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that are required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

3.3 INSTALLATION, GENERAL

A. Installation Standard: ASTM C754.

1. Gypsum Board Assemblies: Also comply with requirements in ASTM C840 that apply to framing installation.

B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.

C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

D. Install bracing at terminations in assemblies.

E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.4 INSTALLING FRAMED ASSEMBLIES

A. Install framing system components in accordance with spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

1. Single-Layer Application: 16 inches (406 mm) o.c. unless otherwise indicated.
2. Multilayer Application: 16 inches (406 mm) o.c. unless otherwise indicated.
3. Tile Backing Panels: 16 inches (406 mm) o.c. unless otherwise indicated.

B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

C. Install studs so flanges within framing system point in same direction.

D. Install tracks at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.

1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install track section (for cripple studs) at head and secure to jamb studs.

    a. Install two studs at each jamb unless otherwise indicated.
    b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch (13-mm) clearance from jamb stud to allow for installation of control joint in finished assembly.
    c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.

3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
4. Fire-Resistance-Rated Partitions (if indicated on Drawings): Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.

    a. Install fire-resistant partitions using manufacturer's standard gauge studs or proprietary equivalent-gauge studs in compliance with requirements of UL U419, UL V450, UL V438.

5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
6. Curved Partitions (if indicated on Drawings):

    a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
    b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of no fewer than two studs at ends of arcs, place studs 6 inches (152.4 mm) o.c.

E. Direct Furring:

1. Screw to wood framing.
2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches (610 mm) o.c.

F. Z-Shaped Furring Members (if indicated on Drawings):

1. Erect insulation, specified in Section 072100 - BUILDING INSULATION, vertically and hold in place with Z-shaped furring members spaced 24 inches (610 mm) o.c.
2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches (610 mm) o.c.
3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches (305 mm) from corner and cut insulation to fit.

G. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch (3 mm) from the plane formed by faces of adjacent framing.

END OF SECTION 092216

SECTION 092226 – METAL SUSPENSION SYSTEM

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: Furnish and install metal suspension system for gypsum board ceilings, and acoustical panel ceilings in locations as shown and scheduled in the Drawings and as specified herein.

B. Related Sections and Divisions:

1. Section 092900 – GYPSUM BOARD.
2. Section 095113 – ACOUSTICAL PANEL CEILINGS.
3. Division 23 – HEATING, VENTILATING, AND AIR CONDITIONING.
4. Division 26 – ELECTRICAL.

1.3 REFERENCES

A. Abbreviations and Acronyms:

1. Ceilings & Interior Systems Construction Association (CISCA); www.cisca.org.

B. Reference Standards:

1. American Society of Civil Engineers (ASCE):

a. **ASCE 7-10** - Minimum design loads for buildings and other structures.

2. American Society for Testing and Materials (ASTM):

a. **ASTM A653/A653M** – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
b. **ASTM C635/C635M** - Standard Specification for Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings
c. **ASTM C636/C636M** - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels
d. **ASTM C754** - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products
e. **ASTM C841** - Standard Specification for Installation of Interior Lathing and Furring
f. **ASTM E84** – Standard Test Method for Surface Burning Characteristics of Building Materials.

3. International Code Council – Evaluation Services (ICCES):

a. **ICC ES AC 156** - Acceptance Criteria for Seismic Certification by Shake-Table Testing of Nonstructural Components

1.4 SUBMITTALS

A. Product Data: Submit sheets listing dimensions, load carrying capacity and standard compliance.

B. Samples: Submit samples of main tee and cross tee with couplings.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Supply additional material equal to five (5%) of ceiling area. Additional material shall match products installed and have the appropriate labels and identification.

B. Extra material shall be packaged with protective covering for storage and identified with labels describing contents.

1.6 QUALITY ASSURANCE

A. Single-Source Responsibility: Provide metal suspension grid components by a single manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect system components from excessive moisture in shipment, storage, and handling. Deliver in unopened bundles and store in a dry place with adequate air circulation. Do not deliver material to building until wet conditions such as concrete, plaster, paint, and adhesives have been completed and cured to a condition of equilibrium.

1.8 WARRANTY

A. Manufacturer Warranty: Submit a written warranty executed by manufacturer for a period of 40 years from date of Substantial Completion, agreeing to repair or replace suspension system components that fail or are compromised within the specified warranty period. Failed or compromised parts can include, but are not limited to:

1. Rusting or defects directly made by the manufacturer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: Chicago Metallic Double Web Heavy Duty Fire Rated Suspension Systems manufactured by ROCKFON, 4849 South Austin Avenue, Chicago, IL 60638. 1-800-323-7164; www.rockfon.com.

2.2 MATERIALS

A. Seismic Performance: Acoustical ceiling and metal suspension components shall withstand the effects of earthquake motions determined according to ASCE 7 and ICC ES AC 156, and as specified herein. Refer to Structural Drawings, Sheet S001 for Seismic class for this Project.

B. Basic Steel Material and Finish: Commercial quality, CS Type A to ASTM A653/A653M, hot-dip galvanized to not less than G30 zinc coating designation.

C. Main Tees and Cross Tees: All suspension main tee and cross tee components shall be manufactured from commercial quality steel with factory punched cross tee slots, hanger holes and integral bayonet-style end couplings. The main tees shall be capped with steel aluminum capping affixed to a flange and coated with factory applied baked-on enamel paint.

D. Perimeter Treatment Components:

1. Angle Moldings: Manufactured from 0.020" thick steel and finished identical to main tees and cross tees.

E. Suspension Systems – Basis of Design:

1. Rockfon® Chicago Metallic® 4000 Tempra™ 9/16:

a. Use With: Rockfon® Alaska® Acoustical Ceiling Tile (ACT-1).
b. Base Material: Hot-Dip Galvanized Steel Body (HDG-30).
c. Capping: Painted Steel Capping (HDG-30).
d. Color: White.
e. End Detail -Main Runners: Non-Directional Bayonet Coupling.
f. End Detail – Cross Tees: Stab-End.
g. Structural Classification: Heavy Duty (HD) per ASTM C635.
h. Seismic Rating: Class D.
i. Flame Spread Rating: Class A per ASTM E84.
j. Warranty: 40 Year Suspension System Warranty.

2. Rockfon® Chicago Metallic® 1260 Aluminum Cap 15/16":

a. Use With: Rockfon® Hygienic Plus™ Acoustical Ceiling Tile (ACT-2).
b. Base Material: Hot-Dip Galvanized Steel Body (HDG-30).
c. Capping/Finish: Aluminum/Baked Polyester Enamel.
d. Color: White.
e. End Detail -Main Runners: Non-Directional Bayonet Coupling.
f. End Detail – Cross Tees: Stab-End.
g. Structural Classification: Heavy Duty (HD) per ASTM C635.
h. Seismic Rating: Class D.
i. Flame Spread Rating: Class A per ASTM E84.
j. Warranty: 40 Year Suspension System Warranty.

3. Rockfon® Chicago Metallic® 640 Drywall Grid Suspension System:

a. Use With: Gypsum board ceilings.
b. Base Material: Hot-Dip Galvanized Steel (HDG-40).
c. Capping: None. Knurled Face, 1-1/2” wide.
d. End Detail -Main Runners: Bayonet-End Coupling.
e. End Detail – Cross Tees: Stab-End.
f. Structural Classification: Heavy Duty (HD) per ASTM C635.
g. Seismic Rating: Class D.
h. Flame Spread Rating: Class A per ASTM E84.
i. Warranty: 40 Year Suspension System Warranty.

4. Rockfon® Chicago Metallic® 1200 15/16”:

a. Use With: Rockfon® Cinema Black™-D Acoustical Ceiling Tile (ACT-3).
b. Base Material: Hot-Dip Galvanized Steel (HDG-30).
c. Capping Material/Finish: Hot-Dip Galvanized Steel (HDG-30)/Baked Polyester Enamel.
d. Color: 08 Black.
e. End Detail -Main Runners: Non-Directional Bayonet Coupling.
f. End Detail – Cross Tees: Stab-End.
g. Structural Classification: Heavy Duty (HD) per ASTM C635.
h. Seismic Rating: Class D.
i. Flame Spread Rating: Class A per ASTM E84.
j. Warranty: 40 Year Suspension System Warranty.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas and conditions, including structural framing to which metal acoustical ceiling suspension assemblies attach or abut, with installer present, for compliance with requirements specified in this and other Sections affecting ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of metal acoustical ceiling suspension assemblies.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install metal acoustical ceiling suspension assemblies to comply with ASTM C636/C636M and seismic design requirements indicated, according to manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

B. Main Tees: Installed 48” on center, by direct suspension from existing structure in accordance with ASTM C754 and ASTM C841 with not less than 12 ga steel hanger wires, wrapped tightly 3 full turns, spaced 48” on center along component length.

C. Cross Tees:

1. Installed perpendicular to main tees 24” on center to form 24” by 24” modules.
2. Installed adjacent to each unsupported side of recessed fixtures.

D. Angle Moldings: Installed on vertical surfaces, intersecting suspension components by appropriate method in accordance with industry accepted practice.

3.3 REPAIR

A. Remove damaged or compromised components; replace with undamaged components.

3.4 CLEANING

A. Clean exposed grid with non-solvent based non-abrasive commercial cleaning solution. Comply with manufacturer’s instructions for cleaning grid components. Remove any components that cannot be effectively cleaned or repaired and replace with new components.

END OF SECTION 092226

SECTION 092816 - GLASS-MAT FACED GYPSUM BACKING BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Fiberglass-mat faced, moisture resistant gypsum backer board for wall tile installations in locations as scheduled on the Drawings.

B. Related Sections:

1. Section 092900 – GYPSUM BOARD.
2. Section 012500 – SUBSTITUTION PROCEDURES.
3. Section 016000 – PRODUCT REQUIREMENTS.
4. Section 093000 – TILING.

1.2 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM):

1. **ASTM C627 -** Standard Test Method for Evaluating Ceramic Floor Tile Installation Systems Using the Robinson-Type Floor Tester.
2. **ASTM C840 -** Standard Specification for Application and Finishing of Gypsum Board.
3. **ASTM C1002 -** Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
4. **ASTM C1178 -** Standard Specification for Glass Mat Water-Resistant Gypsum Backing Panel.
5. **ASTM D3273 -** Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
6. **ASTM D6329 -** Standard Guide for Developing Methodology for Evaluating the Ability of Indoor Materials to Support Microbial Growth Using Static Environmental Chambers.
7. **ASTM E96 -** Standard Test Methods for Water Vapor Transmission of Materials.

B. Tile Council of North America, Inc. (TCNA): TCA Handbook for Ceramic Tile Installation, Current Edition.

1.3 SUBMITTALS

A. Product Data: Manufacturer’s specifications and installation instructions for each product specified.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design:

1. Georgia-Pacific Gypsum LLC:
2. Or Approved Manufacturer.

2.2 MATERIALS

A. Fiberglass-Mat Faced Gypsum Backing Board: ASTM C1178, Type X:

1. Thickness: 5/8 inch.
2. Width: 4 feet.
3. Length: 8 feet.
4. Weight: 2.5 lb/sq. ft.
5. Edges: Square.
6. Surfacing: Coated fiberglass mat on face, back, and long edges.
7. Mold Resistance (ASTM D3273): Not less than 10, in a test as manufactured.
8. Microbial Resistance (ASTM D6329): Will not support microbial growth.
9. Permeance (ASTM E96): Not more than 1.0 perms when tiled.
10. Robinson Floor Test Rating (ASTM C627): Light commercial.
11. Acceptable Products – Basis of Design:

a. 5/8 inch DensShield Fireguard Tile Backer, Georgia-Pacific Gypsum.
b. Or Approved Equivalent

2.3 ACCESSORIES

A. Screws: ASTM C1002, with corrosion resistant treatment.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions:

1. Inspection: Verify that project conditions and substrates are acceptable, to the installer, to begin installation of work of this section.

3.2 INSTALLATION

A. General: In accordance with ASTM C840, manufacturer's recommendations and TCA Handbook for Ceramic Tile Installation.

1. Manufacturer's Recommendations:

a. Current "Product Catalog", Georgia-Pacific Gypsum.

3.3 PROTECTION

A. Protect gypsum board installations from damage and deterioration until the date of Substantial Completion.

END OF SECTION 092816

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 TESTS

A. Fire-Test-Response Characteristics: Where fire-rated gypsum board assemblies are indicated, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by Underwriters Laboratory (UL). See Drawings for U.L. Gypsum Board assemblies required.

B. REFERENCE STANDARDS

1. American Society for Testing And Materials (ASTM):

a. **ASTM A641** – Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire..
b. **ASTM C475** – Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
c. **ASTM C630** – Standard Specification for Water-Resistant Gypsum Backing Board.
d. **ASTM C645** – Standard Specification for Nonstructural Steel Framing Members.
e. **ASTM C754** – Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
f. **ASTM C840** – Standard Specification for Application and Finishing of Gypsum Board.
g. **ASTM C954** – Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) Thickness.
h. **ASTM C1002** – Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
i. **ASTM C1047** – Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
j. **ASTM C1177** – Standard Specification for Glass Mat Gypsum for Use as Sheathing.
k. **ASTM C1396** – Standard Specification for Gypsum Board.
l. **ASTM E119** – Standard Test Methods for Fire Tests of Building Construction and Materials.

2. Gypsum Association (GA):

a. **GA-214** – Recommended Levels of Gypsum Board Finish.
b. **GA-216** – Application and Finishing of Gypsum Panel Products.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Manufacturers: Basis of Design: Subject to compliance with requirements, provide gypsum board and related products by one of the following:

1. Georgia-Pacific Gypsum, LLC, Georgia-Pacific Building Products, Atlanta, GA.
2. CertainTeed Gypsum, Inc., Malvern, PA.
3. Gold Bond Building Products Div., National Gypsum Co., Charlotte, SC.
4. United States Gypsum Corporation, Chicago, IL.
5. Or Approved Manufacturer.

2.2 PRODUCTS, GENERAL

A. Steel Framing for Interior Walls and Partitions: Comply with ASTM C754 and the following general requirements:

1. Interior metal studs shall be 3-5/8" and 6" wide electro-galvanized channels spaced at 16" on center with openings for routing conduit and piping unless otherwise noted on the Drawings.
2. Provide metal stud runners (tracks) at top and bottom of each wall and partition, anchored securely to floor and structure above. Metal stud runners (tracks) shall be the same thickness as the metal stud framing in the walls or partitions in which they occur, unless indicated otherwise.
3. Refer to paragraph 2.2.B below for optional special framing system at interior door and window openings.
4. Refer to Section 092216 – NON-STRUCTURAL METAL FRAMING for detailed metal stud requirements for interior wall and partition framing.
5. Furnish and install additional metal stud framing as required to brace partitions, door frames, furr-downs, and other special framing conditions shown on the Drawings.
6. Refer to Section 054000 – COLD-FORMED METAL FRAMING for exterior wall metal studs.
7. Grid Suspension System for Interior Gypsum Board Ceilings: Prefabricated system complying with ASTM C645 and composed of interlocking main beams and cross furring members forming a modular supporting network. Refer to Section 092226 – METAL SUSPENSION SYSTEMS for additional requirements.
8. Wire for Hangers and Ties: Comply with ASTM A641, soft temper, Class 1 zinc coating.
9. Protective Coating for All Framing Members: Manufacturer's standard corrosion-resistant coating.
10. Steel Rigid Furring Channels: Comply with ASTM C645, minimum 0.0179 inch, 18 mils, 0.455 mm (25 gauge) base metal thickness, hat-shaped, 7/8" deep x 2-3/4" wide. Where shown as resilient, provide manufacturer's special type designed to reduce sound transmission.

11. Fasteners for Metal Framing: Type, material, size, corrosion resistance, holding power, and other properties required to fasten steel framing and furring members securely to substrates and complying with the recommendations of gypsum board manufacturers for applications indicated.

B. Special Jamb and Header Framing for Interior Wall Openings.

1. Contractor has option to furnish and install Red Header PRO^{tm} Header and Jamb Studs, a one piece header and jamb framing system engineered to replace conventional multi-component boxed headers and built-up jamb framing at door and window rough openings, as manufactured by ClarkDietrich, www.clarkdeitrich.com.
2. Size and thickness of jamb studs shall be as required to match interior wall stud framing. Header studs shall be sized as required for span of rough openings.
3. Provide headers, jamb studs, brackets, clips, and all other components as required for a complete installation.
4. Submit shop drawings showing locations of framed openings and typical installation details.
5. Submit complete product data describing all components being used for review and approval.

C. Gypsum Board: Provide gypsum board of types indicated, in maximum lengths available, to minimize end joints:

1. Gypsum Wallboard: ASTM C 1396, thickness as indicated.

a. Type: Type X at all areas.
b. Type: Sag-resistant type for ceiling surfaces.
c. Edges: Tapered.
d. Fire Rated Gypsum Board: Subject to requirements specified herein, provide one of the following gypsum core panels with a solid set, fire-resistive core for use in fire-resistive Type C (Enhanced Type X) designs complying with ASTM C1396, Type X for all gypsum board indicated on the Drawings:

1) 5/8" ToughRock® Fireguard X® Gypsum Board, Georgia Pacific Gypsum LLC.
2) 5/8" Gold Bond® Fire-Shield®Gypsum Board, Gold Bond Building Products Division, National Gypsum Company.
3) 5/8" Sheetrock®Brand Firecode® C Gypsum Panels, United States Gypsum Corporation.
4) 5/8" CertainTeed Type X, CertainTeed Gypsum, Inc.
5) Or approved equivalent.

2. Water-Resistant Gypsum Backing Board: ASTM C 630, thickness as indicated on the Drawings.

a. Type: Type X at all areas.

3. Exterior Gypsum Board: ASTM C 1177, thickness as indicated on the Drawings.

   a. Type: Dens Glass ® Fireguard ® Sheathing at all areas. Refer to Section 061643 – GYPSUM SHEATHING.

4. Fiberglass-faced Water and Mold Resistant Gypsum Board: If sequencing of actual construction results in interior gypsum board partitions being installed before completion of the building envelope(exterior walls, windows, doors, or roof) resulting in an increased risk of moisture intrusion inside the building, install the product described below during the time the building envelope is incomplete and building interior may experience water entry . Once building is “in the dry”, furnish and install standard paper-faced gypsum board products specified in paragraph 2.2.C.1 above.

   a. 5/8” DensArmor Plus® Fireguard® interior gypsum board as manufactured by Georgia-Pacific Gypsum LLC, or approved equivalent.
   b. Gypsum board panels shall consist of a moisture-resistant gypsum core with fiberglass mat facings to provide superior protection from damage caused by wetting during and after construction and to prevent the growth of mold. Panels shall be Type X non-combustible construction and shall be approved for use in rated wall assemblies.

D. Tile Backer Board: Refer to Section 092816 – GLASS-MAT FACED GYPSUM BACKING BOARD.

E. Accessories for Interior Installation: Corner beads, edge trim, and control joints complying with ASTM C 1047 and requirements indicated below:

1. Material: Formed metal, plastic, or metal combined with paper, with metal complying with the following requirement:

   a. Sheet steel zinc-coated by hot-dip process.

2. Shapes indicated below by reference to Fig. 1 designations in ASTM C 1047:

   a. Cornerbead on all outside corners, unless otherwise indicated.
   b. LC-bead with both face and back flanges; face flange formed to receive joint compound: USG Sheetrock®, Brand Dur-A Bead®, Corner Bead, or approved equivalent. Use LC-beads for edge trim unless otherwise indicated.
   c. L-bead with face flange only; face flange formed to receive joint compound. Use L-bead where required by industry standard.
   d. U-bead with face and back flanges; face flange formed to be left without application of joint compound. Use U-bead where required by industry standard.

e. One-piece control joint formed with V-shaped slot, with removable strip covering slot opening, USG Sheetrock® Zinc Control Joint No. 093, or approved equivalent. Control joints shall extend full height of wall, from floor slab to deck above. Se paragraph 3.1.B.8 below.

F. Gypsum Board Joint Treatment Materials: ASTM C 475 and ASTM C 840, and as follows:

1. Joint Tape: Paper reinforcing tape, unless otherwise indicated.

   a. Use open-weave glass-fiber tape where recommended by gypsum board manufacturer with setting-type joint compound.

2. Setting-Type Joint Compound: Factory-packaged, job-mixed chemical-hardening powder products formulated for uses indicated.

   a. For topping compound, use sandable formulation.

3. Drying-Type Joint Compounds: Factory-packaged, vinyl-based products complying with the following requirements:

   a. Ready-Mixed Formulation: Factory premixed.
   b. Job-Mixed Formulation: Powder product, mixed with water at Project Site.
   c. Taping compound formulated for embedding tape and first coat over fasteners and flanges of corner beads and edge trim.
   d. Topping compound formulated for fill (second) and finish (third) coats.
   e. All-purpose compound formulated as both taping and topping compound.

G. Special Drywall Treatment

1. Furnish and install “Westpac Prep Coat”, a multi-purpose drywall completion coat designed to improve drywall finish quality, as manufactured by Westpac Materials, 341 West Meats Avenue, Orange, CA 92865, (714) 974-6837, Fax: (714) 637-9033, www.westpacmaterials.com.
2. Install at finished drywall locations receiving painted final finishes in locations as scheduled on the Drawings.
3. Apply product by roller, following manufacturer’s installation recommendations.

H. Miscellaneous Materials: As follows, recommended by gypsum board manufacturer:

1. Laminating Adhesives: Product recommended by gypsum board manufacturer.
2. Steel drill screws complying with ASTM C 1002 for fastening gypsum board to steel members less than 0.03 inch thick.
3. Steel drill screws complying with ASTM C 954 for fastening gypsum board to steel members from 0.033 to 0.112 inch thick.
4. Corrosion-resistant-coated steel drill screws of size and type recommended by board manufacturer for fastening cementitious backer units.
5. Acoustical Sealant: Refer to Section 079200 – JOINT SEALANTS. Color shall be white only. No other colors permitted.

6. Fire Sealant: Refer to Section 078400 – FIRESTOPPING. Color shall be red only. No other colors permitted.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install steel framing to comply with ASTM C 754 and ASTM C 840.

1. Do not bridge building expansion joints with support systems; frame both sides of joints with furring and other supports as indicated.
2. Secure hangers to structural support by connecting directly to structure where possible. Otherwise connect to inserts, clips, other anchorage devices, or fasteners, as indicated.
3. Provide indirectly hung metal support system with carrying channels (main runners) spaced 4'-0" o.c., hangers 4'-0" o.c. along runners, and rigid furring members 16 inches o.c., unless otherwise indicated.
4. Install directly hung grid suspension system, including perimeter wall track or angle, with members spaced and installed to comply with manufacturers instructions.
5. Install steel studs with bottom and top runner tracks anchored to substrates. Isolate system from building structure to prevent transfer of loading and deflections into metal support system, both vertically and horizontally.
6. Frame door and other openings with studs and runners of thickness, number, and arrangement to comply with manufacturer's recommendations for size of opening, weight and height of doors, and stud size, unless otherwise indicated.
7. Install supplementary framing, runners, furring, blocking, and bracing at openings and terminations in gypsum board assemblies and where required to support other work that cannot be adequately supported on gypsum board alone.

B. Install and finish gypsum board to comply with ASTM C 840 and as follows:

1. Isolate gypsum board construction from abutting structural and masonry work. Provide pre-manufactured edge trim on all exposed or cut edges of gypsum board that are exposed to view and contact dissimilar materials (i.e. window frames, door frames, and exposed structural components) in order to create a clean, finished edge condition. Exposed field cut edges of gypsum board panels without edge trim are not acceptable. Provide acoustical sealant as recommended by manufacturer. Acoustical sealant color shall be white. No gray, yellow or blue sealant will be allowed.
2. Install sound attenuation blankets in partitions where indicated on the Drawings, without gaps, and support, where necessary, to prevent movement or dislocation.
3. Screw gypsum board to wood supports.
4. Screw gypsum board to metal supports.
5. Screw both layers to supports where double-layer work is indicated or otherwise required.
6. Direct Bonding: Comply with manufacturer's recommendations where gypsum board is indicated to be directly bonded to substrate.
7. Do not bridge building expansion joints. Leave a space of the width indicated between boards, and trim both edges for installation of sealant or gasket.

8. Control Joints

   a. Furnish and install wall and ceiling control joints as indicated and detailed on the Drawings. If not specifically indicated, provide a minimum as follows:

      1) Wall control joints shall be installed where a wall or partition runs in an uninterrupted straight plane exceeding 30 linear feet, or at a maximum wall area of 900 sq. ft.
      2) Wall control joints shall be continuous for the full height of the wall or partition in which they occur.
      3) At interior ceilings without perimeter relief, control joints shall be installed so that dimensions between control joints do not exceed 30 ft.

   b. Control joints shall be installed in compliance with GA-216.

C. Finishing Gypsum Board Assemblies: Apply joint treatment at gypsum board joints (both directions); flanges of corner bead, edge trim, and control joints; penetrations; fastener heads, surface defects, and elsewhere, as required, to prepare gypsum board surfaces for decoration and levels of gypsum board finish indicated.

1. Apply joint tape over gypsum board joints to prevent cracks from developing in joint treatment at flange edges, except those with trim accessories having concealed face flanges not requiring taping.
2. Apply joint tape over gypsum board joints and to trim accessories with concealed face flanges as recommended by trim accessory manufacturer and as required to prevent cracks from developing in joint compound at flange edges.
3. Levels of Gypsum Board Finish: Provide the following levels of gypsum board finish per GA-214.

   a. Level 1 for above ceiling areas, concealed areas, and where indicated, unless a higher level of finish is required for fire-resistive-rated assemblies and sound-rated assemblies.
   b. Level 4 for gypsum board to receive wall coverings.
   c. Level 4 for gypsum board to receive paint.

4. For level 4 gypsum board finish, embed tape in finishing compound plus two separate coats applied over joints, angles, fastener heads, and trim accessories.
5. Where level 1 gypsum board finish is indicated, apply joint compound and tape specified for embedding coat.

END OF SECTION 092900

SECTION 093000 – TILING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. REFERENCE STANDARDS

1. American National Standards Institute (ANSI):

a. **ANSIA108/A118/A136 –** American National Specifications for Installation of Ceramic Tile – 2021.
b. **ANSI A108.10** – Installation of Grout in Tilework.
c. **ANSI A118.3** – Chemical Resistant, Water-Cleanable Tile-Setting and – Grouting Epoxy and Water Cleanable Tile-Setting Epoxy Adhesive Superseded by ANSI A108/A118/A136].
d. **ANSI A118.4 --** Latex Portland Cement Mortar.
e. **ANSI A118.12** – American National Standard Specification for Crack Isolation Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation – 2014 [Reaffirmed 2019].
f. **ANSI A137.1** – Standard Specification for Ceramic Tile – 2022.

2. American Society for Testing and Materials (ASTM):

a. **ASTM C627** – Standard Test Method for Evaluating Ceramic Floor Tile Installation Systems Using the Robinson-Type Floor Tester.
b. **ASTM C920** – Standard Specification for Elastomeric Joint Sealants.
c. **ASTM D412** – Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers – Tension.
d. **ASTM D1000** – Standard Test Methods for Pressure-Sensitive Adhesive-Coated Tapes Used for Electrical and Electronic Applications.

3. Tile Council of North America (TCNA).

C. RELATED SECTIONS

1. Section 079200 – JOINT SEALANTS
2. Section 092816 – GLASS-MAT FACED GYPSUM BACKING BOARD.
3. Section 093019 – LARGE FORMAT PORCELAIN FLOOR TILE.

1.2 SUMMARY

A. This Section includes the following:

1. Porcelain Ceramic Wall and Floor Tile.
2. Porcelain Ceramic Base.
3. Mortar and Grout.
4. Accessories.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data for each type of product specified.

C. Shop drawings indicating tile patterns and locations and widths of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.

D. Samples for verification purposes of each item listed below, prepared on samples of size and construction indicated, products involve color and texture variations, in sets showing full range of variations expected.

1. Each type and composition of tile and for each color and texture required, at least 12 inches square, mounted on plywood or hardboard backing and grouted.
2. Full-size units of each type of trim and accessory for each color required.
3. Metal edge strips in 6-inch lengths.

E. Qualification data for firms and persons specified in "Quality Assurance" article below to demonstrate their capabilities and experience. Include list of completed projects with project names, addresses, names of Architects and Owners, plus other information specified.

1.4 QUALITY ASSURANCE

A. Single-Source Responsibility for Tile: Obtain each color, grade, finish, type, composition, and variety of tile from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.

B. Single-Source Responsibility for Setting and Grouting Materials: Obtain ingredients of a uniform quality from one manufacturer for each cementitious and admixture component and from one source or producer for each aggregate.

C. Installer Qualifications: Engage an experienced Installer who has successfully completed tile installations similar in material, design, and extent to that indicated for Project.

D. Field-Constructed Mock-Up: Before installing tile, erect mock-ups for each form of construction and finish required to verify selections made under sample submittals and to demonstrate aesthetic effects as well as qualities of materials and execution. Build mock-ups to comply with the following requirements, using materials indicated for final unit of Work.

1. Locate mock-ups on site in location and size indicated or, if not indicated, directed by Architect.
2. Obtain Architect's acceptance of mock-ups before start of final unit of Work.
3. Retain and maintain mock-ups during construction in undisturbed condition as a standard for judging completed unit of Work.

a. Accepted mock-ups in undisturbed condition at time of Substantial Completion may become part of completed unit of Work.

E. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Section 012400 - PROJECT MEETINGS.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirement of ANSI A137.1 for labeling sealed tile packages.

B. Prevent damage or contamination to materials by water, freezing, foreign matter, and other causes.

1.6 PROJECT CONDITIONS

A. Maintain environmental conditions and protect work during and after installation to comply with referenced standards and manufacturer's printed recommendations.

B. Vent temporary heaters to exterior to prevent damage to tile work from carbon dioxide buildup.

C. Maintain temperatures at 50 deg F (10 deg C) or more in tiled areas during installation and for 7 days after completion, unless higher temperatures are required by referenced installation standard or manufacturer's instructions.

1.7 EXTRA MATERIALS

A. Deliver extra materials to Owner. Furnish extra materials that match products installed as described below, packaged with protective covering for storage and identified with labels clearly describing contents.

1. Tile and Trim Units: Furnish quantity of full-size units equal to 5% of floor and wall tile area installed, for each type, composition, color, pattern, and size.

PART 2 - PRODUCTS

2.1 FLOOR TILE:

A. Refer to Drawing Sheet A601 – ROOM FINISH SCHEDULES AND MATERILAS SELECTION for specific manufacturers, floor tile and grout products, and color selections.

2.2 WALL TILE:

A. Refer to Drawing Sheet A601 – ROOM FINISH SCHEDULES AND MATERIALS SELECTION for specific manufacturers, wall tile and grout products, and color selections.

B. Refer to Drawings for wall tile patterns and locations

2.3 SETTING MATERIAL:

A. Manufacturer - Basis of Design: LATICRETE International, Inc., Bethany, CT, www.laticrete.com, or approved equivalent.

1. Floor Tile:

a. Thin-set mortar shall be LATICRETE LHT™ polymer modified mortar, specifically formulated to provide one-step installation for large format ceramic and porcelain tile. Mortar shall exceed applicable ANSI A118.4 bond strength requirements.

b. Grout (GT-1) shall be LATICRETE SPECTRALOCK® PRO Premium Grout, a high-performance epoxy grout meeting requirements of ANSI A118.3 and having stain protection, uniform color, non-sag formulation, and Microban Anti-Microbial protection. Grout shall be suitable for commercial use with interior floor and wall tile with grout joint widths of 1/16-inch to ½-inch. Grout color to be selected from standard LATICRETE grout colors.

2. Wall Tile:

a. Thin-set mortar shall be LATICRETE 4-XLT multi-use, polymer fortified adhesive mortar for non-sag wall installations and thin-set applications. Mortar shall meet “Extra Heavy” rating per ASTM C627.

b. Grout (GT-1) shall be LATICRETE SPECTRALOCK® PRO Premium Grout, a high-performance epoxy grout meeting requirements of ANSI A118.3 and having stain protection, uniform color, non-sag formulation, and Microban Anti-Microbial protection. Grout shall be suitable for commercial use with interior floor and wall tile with grout joint widths of 1/16-inch to ½-inch. Grout color to be selected from standard LATICRETE grout colors.

2.4 PRODUCTS, GENERAL

A. ANSI Standard for Ceramic Tile: Comply with ANSI A137.1 "American National Standard Specifications for Ceramic Tile" for types, compositions, and grades of tile indicated.

1. Furnish tile complying with "Standard Grade" requirements unless otherwise indicated.

B. ANSI Standard for Tile Installation Materials: Comply with ANSI standard referenced with products and materials indicated for setting and grouting.

C. Colors, Textures, and Patterns: Where manufacturer's standard products are indicated for tile, grout, and other products requiring selection of colors, surface textures, patterns, and other appearance characteristics, provide specific products or materials complying with the following requirements:

1. Match color, texture, and pattern indicated by reference to manufacturer's

standard designations for these characteristics.

D. Factory Blending: For tile exhibiting color variations within the ranges selected during sample submittals, blend tile in factory and package accordingly so that tile units taken from one package show the same range in colors as those taken from other packages and match approved samples.

E. Trim Units: Provide tile trim units to match characteristics of adjoining flat tile and to comply with following requirements:

1. Size: As indicated, coordinated with sizes and coursing of adjoining flat tile where applicable.
2. Shapes: As follows, selected from manufacturer's standard shapes:

a. Base for Thinset Mortar Installations: Coved (In bathrooms and toilets only).
b. Wainscot Cap for Thinset Mortar Installations: Surface bullnose.
c. External Corners for Thinset Installations: Surface bullnose.
d. Internal Corners: Field-butted square corners, except use coved base and cap angle pieces designed to fit with stretcher shapes.

2.5 ELASTOMERIC SEALANTS

A. General: Provide manufacturer's standard chemically curing, elastomeric sealants of base polymer indicated that comply with requirements of Section 079200 – JOINT SEALANTS including ASTM C 920 as referenced by Type, Grade, Class, and Uses.

B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints unless otherwise indicated.

C. Multi-part Pourable Urethane Sealant for Use T (Traffic-pedestrian): Type M (two or more components, chemically cured), Grade P (pourable, self-leveling), Class 25 (sealant capable of handling movement - contraction or expansion - of 25% of original joint width); Uses T (traffic – pedestrian), M (contact with mortar), A (contact with aluminum), and O (contact with other materials).

1. Multipart Pourable Urethane Sealant:

a. "Chem-Calk 550"; Bostik Construction Products Div, Wauwatosa, WI.
b. "Vulkem 245"; Mameco International, Inc., Cleveland, OH.
c. "Urexpan NR-200"; Pecora Corp., Harleysville, PA.
d. "THC-900"; Tremco Corp., Beechwood, OH.
e. Or Approved Equivalent.

D. Chemical-Resistant Sealants: For chemical-resistant floors, provide sealants compatible with chemical-resistant mortars and grouts, approved for use indicated by manufacturers of both mortar/grout and sealant and with chemical-resistance properties equivalent to mortar/grout.

2.6 MISCELLANEOUS MATERIALS

A. Crack Isolation Membrane:

1. Basis of Design: Crack Buster® Pro Crack Prevention Mat Underlayment as manufactured by Custom Building Products, 10422 Pioneer Blvd., Santa Fe Springs, CA 90670, (800) 272-8786, www.custombuildingproducts.com .
2. A self-binding, fabric reinforced, asphaltic membrane that isolates ceramic and natural stone tile from cracks in the substrate.
3. Extra heavy duty rated for both full coverage and partial coverage.
4. Peel and stick application providing secure bonding for all types of ceramic, natural stone, and terrazzo tile.
5. Elastomeric properties reduce crack transmission up to 3/8-inch (9.5 mm) in tile and stone floors.
6. Complies with requirements of ANSI A118.12 as a crack isolation membrane.
7. Characteristics and Testing:

    a. Thickness: 0.040-inch (1 mm).
    b. Weight per roll: 65 lbs.
    c. Roll Dimensions: 36-inches x 75 inches.
    d. Robinson Floor Test (ASTM C627): Extra Heavy Duty.
    e. Elongation (ASTM D412): 1200%.
    f. Bacteria and Fungus Resistance (ANSI A118.12): No growth.
    g. Peel Adhesion (ASTM D1000): Over 10 lbs./inch.

8. Install as per manufacturer's written instructions and recommendation of Tile Council of North America (TCNA).

2.7 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with requirements of referenced standards and manufacturers including those for accurate proportioning of materials, water, or additive content; type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other procedures needed to produce mortars and grouts of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and areas where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.

1. Verify that substrates for setting tile are firm, dry, clean, and free from oil or waxy films and curing compounds.

2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed before installing tile.

B. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Blending: For tile exhibiting color variations within the ranges selected during sample submittals, verify that tile has been blended in factory and packaged accordingly so that tile units taken from one package show the same range in colors as those taken from other packages and match approved samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 INSTALLATION, GENERAL

A. ANSI Tile Installation Standard: Comply with parts of ANSI 108 series of tile installation standards included under "American National Standard Specifications for the Installation of Ceramic Tile" that apply to type of setting and grouting materials and methods indicated.

B. TCA Installation Guidelines: TCA "Handbook for Ceramic Tile Installation"; comply with TCA installation methods indicated.

C. Extend tile work into recesses and under or behind equipment and fixtures to form a complete covering without interruptions except as otherwise shown. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

D. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so that plates, collars, or covers overlap tile.

E. Jointing Pattern: Unless otherwise shown, lay tile in grid pattern. Align joints when adjoining tiles on floor, base, walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths unless otherwise shown.

F. Lay out tile wainscots to next full tile beyond dimensions indicated.

G. Expansion Joints: Locate expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated during installation of setting materials, mortar beds, and tile. Do not saw cut joints after installation of tiles.

1. Locate joints in tile surfaces directly above joints in concrete substrates.
2. Prepare joints and apply sealants to comply with requirements of Section 079200 – JOINT SEALANTS.

H. Grout tile to comply with the requirements of the following installation standards:

1. For ceramic tile grouts (sand-portland cement, dry-set, commercial portland cement, and latex-portland cement grouts), comply with ANSI A108.10.

3.4 CLEANING AND PROTECTION

A. Cleaning: Upon completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

1. Remove latex-portland cement grout residue from tile as soon as possible.
2. Unglazed tile may be cleaned with acid solutions only when permitted by tile and grout manufacturer's printed instructions, but no sooner than 14 days after installation. Protect metal surfaces, cast iron, and vitreous plumbing fixtures from effects of acid cleaning. Flush surface with clean water before and after cleaning.
3. Remove temporary protective coating by method recommended by coating manufacturer that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent it from clogging drains.

B. Finished Tile Work: Leave finished installation clean and free of cracked, chipped, broken, unbonded, and otherwise defective tile work.

C. Provide final protection and maintain conditions in a manner acceptable to manufacturer and installer that ensures that tile is without damage or deterioration at time of Substantial Completion.

1. When recommended by tile manufacturer, apply a protective coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear.
2. Prohibit foot and wheel traffic from tiled floors for at least 7 days after grouting is completed.

D. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

END OF SECTION 093000

SECTION 093019 – LARGE FORMAT PORCELAIN FLOOR TILE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. REFERENCES

1. American National Standards Institute (ANSI):

a. **ANSI A108.1** – American National Standard Specifications for the Installation of Ceramic Tile.
b. **ANSI A108.10** – American National Standard Specification for Installation of Grout In Tilework.
c. **ANSI A108.19** – American National Standard Specifications for Gauged Porcelain Tiles and Gauged Porcelain Tile Panels/Slabs.
d. **ANSI A118.3** – American National Standard Specifications for Chemical Resistant, Water Cleanable Tile-Setting and Grouting Epoxy and Water Cleanable Tile-Setting Epoxy Adhesive.
e. **ANSI A118.4TE** - American National Standard Specifications for Modified Dry Set Cement Mortar.
f. **ANSI A118.11** – American National Standard Specifications for EGP (Exterior Glue Plywood) Latex Portland Cement Mortar.
g. **ANSI A118.12** - Specification for Crack Isolation Membranes for Thin-Set Ceramic Tile and Dimension Stone Installations [Superseded by ANSI A108/A118/A136].
h. **ANSI A118.13** – Specifications for Bonded Sound Reduction Membranes for Thin-Set Ceramic Tile Installation [Superseded by ANSI A108/A118/A136].
i. **ANSI A137.1** – American National Standards Specifications for Ceramic Tile.
j. **ANSI A118.15TE** – American National Standard Specifications for Improved Latex Modified Portland Cement Mortar.

2. American Society for Testing and Materials (ASTM):

a. **ASTM C109** – Standard Test Method for Compression Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens).
b. **ASTM C348** – Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars.
c. **ASTM C627** – Standard Test Method for Evaluating Ceramic Floor Tile Installation Systems Using the Robinson-Type Floor Tester.
d. **ASTM C827** – Standard Specification for Metal Lath.
e. **ASTM C920** – Standard Specification for Elastomeric Joint Sealants.
f. **ASTM C1248** – Standard Test Method for Staining of Porous Substrate by Joint Sealants.
g. **ASTM C1708** – Standard Test Methods for Self-leveling Mortars Containing Hydraulic Cements.

h. **ASTM D412** – Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers – Tension.
i. **ASTM D1000** – Standard Test Methods for Pressure-Sensitive Adhesive-Coated Tapes Used for Electrical and Electronic Applications.

3. International Organization for Standardization (ISO):

a. **ISO 13007-2** – Ceramic Tiles – Grouts and Adhesives – Part 2: Test Methods for Adhesives.

4. Tile Council of North America (TCNA):

a. **TCNA EJ171** – Movement Joint Guidelines for Ceramic, Glass, and Stone.

C. RELATED SECTIONS

1. Section 079200 – JOINT SEALANTS.
2. Section 093000 – TILING.

1.2 SUMMARY

A. This Section includes the following:

1. Large Format Porcelain Floor Tile.
2. Mortar and Grout.
3. Bedding Materials.

B. Definitions

1. Large Format Tile: Tile having any face dimension greater than 23-inches (584mm) as per ANSI A137.1.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data for each type of product specified.

C. Shop drawings indicating tile patterns and locations and widths of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.

D. Samples for verification purposes of each item listed below, prepared on samples of size and construction indicated, products involve color and texture variations, in sets showing full range of variations expected.

1. Each type and composition of tile and for each color and texture required, at least 12 inches square, mounted on plywood or hardboard backing and grouted.
2. Full size units of each type of trim and accessory for each color required.
3. Metal edge strips in 6 inch lengths.

E. Qualification data for firms and persons specified in "Quality Assurance" article BELOW to demonstrate their capabilities and experience. Include list of completed projects with project names, addresses, names of Architects and Owners, plus other information specified.

1.4 QUALITY ASSURANCE

A. Single-Source Responsibility for Tile: Obtain each color, grade, finish, type, composition, and variety of tile from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.

B. Single-Source Responsibility for Bedding, Setting and Grouting Materials: Obtain ingredients of a uniform quality from one manufacturer for each cementitious and admixture component and from one source or producer for each aggregate.

C. Installer Qualifications: Engage an experienced Installer who has successfully completed tile installations similar in material, design, and extent to that indicated for Project.

D. Field-Constructed Mock-Up: Before installing tile, erect mock-ups for each form of construction and finish required to verify selections made under sample submittals and to demonstrate aesthetic effects as well as qualities of materials and execution. Build mock-ups to comply with the following requirements, using materials indicated for final unit of Work.

1. Locate mock-ups on site in location and size indicated or, if not indicated, directed by Architect.
2. Obtain Architect's acceptance of mock-ups before start of final unit of Work.
3. Retain and maintain mock-ups during construction in undisturbed condition as a standard for judging completed unit of Work.

a. Accepted mock-ups in undisturbed condition at time of Substantial Completion may become part of completed unit of Work.

E. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Section 012400 - PROJECT MEETINGS.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirement of ANSI A137.1 for labeling sealed tile packages.

B. Prevent damage or contamination to materials by water, freezing, foreign matter, and other causes.

1.6 PROJECT CONDITIONS

A. Maintain environmental conditions and protect work during and after installation to comply with referenced standards and manufacturer's printed recommendations.

B. Vent temporary heaters to exterior to prevent damage to tile work from carbon dioxide buildup.

C. Maintain temperatures at 50 deg F (10 deg C) or more in tiled areas during installation and for 7 days after completion, unless higher temperatures are required by referenced installation standard or manufacturer's instructions.

1.7 EXTRA MATERIALS

A. Deliver extra materials to Owner. Furnish extra materials that match products installed as described below, packaged with protective covering for storage and identified with labels clearly describing contents.

1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed, for each type, composition, color, pattern, and size.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Floor Tile

1. Basis of Design Manufacturer: Concept Surfaces.
2. Representative Contact: Kelly Fitchett, (214) 927-9985.

B. Bedding, Mortar and Accessories:

1. Manufacturer – Basis of Design: Custom Building Products' 10400 Pioneer Boulevard, Unit 3, Santa Fe Springs, CA 90670; (800) 272-8786 / Fax: (800) 200 – 7765; Email: contactus@cbpmail.net; Web: www.custombuildingproducts.com
2. Local Representative/Distributor: C. Michael Smith, Emser Tile, 10068 Maumelle Boulevard, North Little Rock, AR 72113-6612; (501) 771-9111.

C. Grout:

1. Manufacturer – Basis of Design: LATICRETE International Inc., Bethany, CT, www.laticrete.com .\
2. Local Representative: Bobby Mitchell, (203) 671-3855.

2.2 FLOOR TILE

A. Refer to Drawings, Sheet A601 – ROOM FINISH SCHEDULE & MATERIALS SELECTION, for floor tile size, pattern/color, installation remarks, and installation locations.

2.3 CLEAVAGE MEMBRANE

A. Basis of Design: Crack Buster® Pro Crack Prevention Mat Underlayment by Custom Building Products, Santa Fe Springs, CA., or approved equivalent.

B. Product Description: A self-bonding, adhesive-backed, fabric reinforced asphaltic membrane meeting requirements of ANSI A118.12 that isolates ceramic tile from cracks in the substrate. Furnish and install at all large format porcelain floor tile locations.

C. Properties:

1. Thickness: 0.040” (40 mils, 1 mm).
2. Weight per Roll: 65 lbs.
3. Roll Dimensions: 36” x 75”.
4. Robinson Floor Test Classification: Extra Heavy Duty (ASTM C627).
5. Elongation: 1200% (ASTM D412).
6. Bacteria and Fungus Resistance: No growth. (ANSI A118.12).
7. Peel Adhesion: Over 10 lb./in. (ASTM D1000).
8. Sound Reduction: 18 dB (ANSI A118.13).

2.4 SELF-LEVELING UNDERLAYMENT

A. Basis of Design: Level Quik® RS (Rapid Setting) Self-Leveling Underlayment by Custom Building Products, Santa Fe Springs, CA, or approved equivalent.

B. Product Description: A calcium aluminate-based, crack resistant, high compressive strength, self-leveling underlayment for leveling floors prior to the installation of ceramic tile, resilient tile, and other floor coverings. Furnish and install if required to correct slab defects that may affect tile installation.

C. Properties:

1. Compressive Strength at 28 days: > 4,300 psi. (ASTM C 1708).
2. Flexural Strength at 28 days: > 850 psi. (ASTM C 348).
3. Robinson Floor Test Classification: Extra Heavy (ASTM C 627).

2.5 METAL LATH REINFORCING

A. Flat expanded type, weighing not less than 2.5 lb. per sq. yd., complying with ASTM C847 for interior application except steel need not be copper bearing and may be painted. Furnish and install, if required, to correct slab defects that may affect tile installation.

2.6 THIN-SET MORTAR

A. Basis of Design: “MegaLite® Ultimate Crack Prevention Large Format Tile Mortar”, formulated to provide flexibility and withstand horizontal substrate movement to prevent cracks in tile, as manufactured by Custom Building Products, or approved equivalent.

B. Mortar shall offer non-sag, non-slip installation on walls, and be suitable for thin-set or medium-bed use, especially for large format tile.

C. Mortar shall exceed standards of ANSI A118.4TE, A118.15TE, and A118.11 without the need for additives.

D. Mortar shall comply with the following standards:

1. ISO 13007-2.
2. ASTM C109.
3. ASTM C627.

E. Install in accordance with manufacturer's written instructions.

2.7 GROUT

A. Basis of Design: Grout (GT-1) shall be LATICRETE SPECTRALOCK® PRO Premium Grout, a high-performance epoxy grout meeting requirements of ANSI A118.3 and having stain protection, uniform color, non-sag formulation, and Microban Anti-Microbial protection, or approved equivalent.

B. Grout shall be suitable for commercial use with interior floor tile with grout joint widths of 1/16-inch to ½-inch. Grout color to be selected from standard LATICRETE grout colors.

2.8 SEALANT

A. "Commercial 100% Silicone Sealant", a permanently flexible silicone sealant for use in expansion joints of interior floor tile as manufactured by Custom Building Products, or approved equivalent.

B. Sealant shall meet the following requirements:

1. ASTM C-920, Type S, Grade NS, Class 25, Use T, NT, A, I, M, and G.
2. ASTM C1248.
3. TCNA EJ171.

C. Furnish samples of manufacturer's complete sealant colors available for selection of floor tile sealant color.

2.9 PRODUCTS, GENERAL

A. ANSI Standard for Tile Installation Materials: Comply with ANSI standard referenced with products and materials indicated for setting and grouting.

B. Colors, Textures, and Patterns: Where manufacturer's standard products are indicated for tile, grout, and other products requiring selection of colors, surface textures, patterns, and other appearance characteristics, provide specific products or materials complying with the following requirements:

1. Match color, texture, and pattern indicated by reference to manufacturer's standard designations for these characteristics.

C. Factory Blending: For tile exhibiting color variations within the ranges selected during sample submittals, blend tile in factory and package accordingly so that tile units taken from one package show the same range in colors as those taken from other packages and match approved samples.

2.10 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with requirements of referenced standards and manufacturers including those for accurate proportioning of materials, water, or additive content; type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other procedures needed to produce mortars and grouts of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and areas where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.

1. Verify that substrates for setting tile are firm, dry, clean, and free from oil or waxy films and curing compounds.
2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed before installing tile.

B. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Blending: For tile exhibiting color variations within the ranges selected during sample submittals, verify that tile has been blended in factory and packaged accordingly so that tile units taken from one package show the same range in colors as those taken from other packages and match approved samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 INSTALLATION, GENERAL

A. ANSI Tile Installation Standard: Comply with parts of ANSI 108 series of tile installation standards included under "American National Standard Specifications for the Installation of Ceramic Tile" that apply to type of setting and grouting materials and methods indicated. Install Large Format Porcelain Tile in accordance with requirements of ANSI A108.19.

B. TCA Installation Guidelines: TCA "Handbook for Ceramic Tile Installation"; comply with TCA installation methods indicated.

C. Extend tile work into recesses and under or behind equipment and fixtures to form a complete covering without interruptions except as otherwise shown. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

D. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so that plates, collars, or covers overlap tile.

E. Jointing Pattern: Refer to Drawings for tile installation pattern. Align joints when adjoining tiles on floor, base, walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths unless otherwise shown.

F. Expansion Joints: Locate expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated during installation of setting materials, mortar beds, and tile. Do not saw cut joints after installation of tiles.

1. Locate joints in tile surfaces directly above joints in concrete substrates.
2. Prepare joints and apply sealants to comply with requirements of Section 079200 – JOINT SEALANTS.

G. Grout tile to comply with the requirements of the following installation standards:

1. For porcelain tile grouts (sand-portland cement, dry-set, commercial portland cement, and latex-portland cement grouts), comply with ANSI A108.10.

3.4 CLEANING AND PROTECTION

A. Cleaning: Upon completion of placement and grouting, clean all porcelain tile surfaces so they are free of foreign matter.

1. Remove latex-portland cement grout residue from tile as soon as possible.
2. Unglazed tile may be cleaned with acid solutions only when permitted by tile and grout manufacturer's printed instructions, but no sooner than 14 days after installation. Protect metal surfaces, cast iron, and vitreous plumbing fixtures from effects of acid cleaning. Flush surface with clean water before and after cleaning.
3. Remove temporary protective coating by method recommended by coating manufacturer that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent it from clogging drains.

B. Finished Tile Work: Leave finished installation clean and free of cracked, chipped, broken, unbonded, and otherwise defective tile work.

C. Provide final protection and maintain conditions in a manner acceptable to manufacturer and installer that ensures that tile is without damage or deterioration at time of Substantial Completion.

1. When recommended by tile manufacturer, apply a protective coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear.

2. Prohibit foot and wheel traffic from tiled floors for at least 7 days after grouting is completed.

D. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

END OF SECTION 093019

SECTION 095113 – ACOUSTICAL PANEL CEILINGS

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. Section Includes: Furnish and install suspended ceiling acoustical ceiling in locations as shown and scheduled on the Drawings and as specified herein.:

1. Acoustical Ceiling Panels ACT-1, ACT-2 and ACT-3.

B. Related Sections and Divisions:

1. Section 092226 – METAL SUSPENSION SYSTEMS.
2. Division 21 – FIRE SUPPRESSION.
3. Division 23 – HEATING, VENTILATING, AND AIR CONDITIONING.
4. Division 26 – ELECTRICAL.

1.3 REFERENCE

A. Abbreviations and Acronyms:

1. CISCA: Ceilings & Interior Systems Construction Association.
2. EPD: Environmental Product Declaration.
3. GWP: Global Warming Potential.
4. HPD: Health Product Declaration.
5. VOC: Volatile Organic Compounds.

B. Reference Standards:

1. American Society for Testing and Materials (ASTM):

a. **ASTM C367** – Standard Test Methods for Strength Properties of Prefabricated Architectural Acoustical Tiles or Lay-In Ceiling Panels.
b. **ASTM C636** - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
c. **ASTM C1338** - Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings.
d. **ASTM D1308** - Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Coating Systems.
e. **ASTM D2486** – Standard Test Methods for Scrub Resistance of Wall Paints.
f. **ASTM D3273** - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
g. **ASTM D4828** - Standard Test Methods for Practical Washability of Organic Coatings.
h. **ASTM E84** - Standard Test Method for Surface Burning

Characteristics of Building Materials.

i. **ASTM E119** - Standard Test Methods for Fire Tests of Building Construction and Materials.

j. **ASTM E1264 -** Standard Classification for Acoustical Ceiling Products

2. California Department of Public Health (CDPH):

   a. **CDPH/EHLB Emission Standard Method Version 1.2 2017**.

3. Health Product Declaration Standard V2.0.

4. International Code Council – Evaluation Services (ICC-ES):

   a. **ESR 2631** – Rockfon Chicago Metallic Corporation Suspended Ceiling Framing Systems and Suspension Ceiling Systems.

5. Underwriters Laboratories (UL):

   a. **UL 723** – Test for Surface Burning Characteristics of Building Materials,

   b. **UL 2818** - GREENGUARD Certification Program For Chemical Emissions For Building Materials, Finishes And Furnishings.

   c. **UL 2821** - GREENGUARD Certification Program Method for Measuring and Evaluating Chemical Emissions From Building Materials, Finishes and Furnishings.

   d. **UL 2824** - GREENGUARD Certification Program Method For Measuring Microbial Resistance From Various Sources using Static Environmental Chambers.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Pre-installation Conference: Conduct conference at Project site . Agenda shall include Project conditions, coordination with work of other trades, and layout of items which penetrate ceilings.

1.5 SUBMITTALS

A. Product Data: Submit manufacturer's Product Data, including maintenance data.

B. Sustainable Design Submittals:

1. Product Data: For recycled content, indicating pre-consumer recycled content and cost.
2. Product Certificates: For indigenous materials, indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include distance to Project, means of transportation, and cost for each indigenous material.
3. Sourcing of Raw Materials: Corporate sustainability report for each manufacturer.
4. Third-Party Verified Environmental Product Declaration (3PV EPD) Certifications: For select products.
5. Third-Party Verified Health Product Declaration (3PV HPD) Certifications: For select products.

6. Laboratory Test Reports: For ceiling products, indicating compliance with requirements for low-emitting materials UL GREENGUARD GOLD in both school and office scenarios.
7. Mold and mildew resistance per ASTM D3273 Level 10 – No Mold Growth and ASTM C1338 Pass – No Fungal Growth.
8. Declare Label: The end use product has a published Declare label by the International Living Future Institute with disclosure of 100 ppm with a designation of Red List Approved (less than 1 percent proprietary ingredients) for select products.
9. Samples: For each exposed product, 6 by 6 inches (150 by 150 mm) in size.

C. Samples for Initial Selection: For components with factory-applied finishes.

D. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of sizes indicated below:

1. Acoustical Panels: Set of 6 by 6 inches (150 by 150 mm). Samples of each type, color, pattern, and texture.
2. Exposed Suspension-System Members, Moldings, and Trim: Set of 6-inch-(150-mm-) long Samples of each type, finish, and color.

1.6 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Ceiling suspension-system members.
2. Structural members to which suspension systems will be attached.
3. Method of attaching hangers to building structure.
4. Furnish layouts for cast-in-place anchors, clips, and other ceiling attachment devices whose installation is specified in other Sections.
5. Carrying channels or other supplemental support for hanger-wire attachment where conditions do not permit installation of hanger wires at required spacing.
6. Size and location of initial access modules for acoustical panels.
7. Items penetrating finished ceiling and ceiling-mounted items including the following:

a. Lighting fixtures.
b. Diffusers.
c. Grilles.
d. Speakers.
e. Sprinklers.
f. Access panels.
g. Perimeter moldings.
h. Other items as required

8. Show operation of hinged and sliding components covered by or adjacent to acoustical panels.
9. Minimum Drawing Scale: 1/8 inch = 1 foot (1:96), 1:50, 1:100.

B. Qualification Data: For testing agency.

C. Product Test Reports: For each acoustical panel ceiling, for tests performed by manufacturer and witnessed by a qualified testing agency.

D. Evaluation Reports: For each acoustical panel ceiling suspension system and anchor and fastener type, from ICC-ES.

E. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

A. Operational and Maintenance Data: Submit maintenance instructions to Owner for recommended cleaning materials and methods for panels and trim. Include precautions for use of and composition of cleaning materials detrimental to acoustic panels and trim.

1.8 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials from the same product run that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Acoustical Panels: Full-size panels equal to five percent (5%) of quantity installed.
2. Suspension-System Components: Quantity of each exposed component equal to five percent (5%) of quantity installed.

1.9 QUALITY ASSURANCE

A. Single-source responsibility: Provide acoustical panel units and grid components by a single manufacturer.

B. Mock-ups: Build mock-ups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Build mock-up of typical ceiling area as directed by Architect.

C. Approval of mock-ups does not constitute approval of deviations from the Contract Documents contained in mock-ups unless Architect specifically approves such deviations in writing.

D. Subject to compliance with requirements, approved mock-ups may become part of the completed Work if undisturbed at time of Substantial Completion

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical panels, suspension-system components, and accessories to Project site and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

1.11 WARRANTY

A. Warranty Period: Acoustical Panels Manufacturer Warranty: Submit a written warranty executed by manufacturer for a period of 30 years from date of Substantial Completion, agreeing to repair or replace acoustical tile that fails or is compromised within the specified warranty period. The warranty does not cover any damage or change to the Products resulting from improper material handling or storage, water, moisture, fire, chemical fumes, bacteria, mold, fungi, wind, accident, disaster, non-intended use, improper installation, abuse, or failure of other system components or modification.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Source Limitations for Ceiling System: Obtain each type of acoustical ceiling panel and its supporting suspension system from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Acoustical panels to comply with the requirements of UL GREENGUARD GOLD Certification for both school and office scenarios and the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

B. Surface-Burning Characteristics: Comply with UL 723, ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: Zero 0, Class A in accordance with ASTM E84.
2. Smoke-Developed Index: No higher than 5, Class A in accordance with ASTM E84.

C. 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 or from the listings of another qualified testing agency.

D. Humidity Resistance: Ensure that acoustical panels are dimensionally stable at up to 100 percent relative humidity at temperatures ranging from 32 to 104 deg. F (0 to 40 deg. C) without having to acclimatize panels and tested to ASTM C367.

2.3 ACOUSTICAL PANELS

A. Basis of Design Manufacturer: Rockfon 4849 South Austin Avenue, Chicago, IL 60638. 1-800-323-7164; www.rockfon.com.

B. Basis-of-Design Product: Subject to compliance with requirements, provide Rockfon® Alaska® Stone Wool ceiling tiles.

1. Drawing Designation: ACT-1.
2. Material: Stone Wool.

3. ASTM E1264 Classification: ASTM E1264 (2022) : Type IV, Form 3, Pattern G. ASTM E1264 (2023): Type A, Form A2.3, Pattern G
4. Panel Size: 24 by 24 inches (610 by 610 mm).
5. Item Number: 10290
6. Edge/Joint Detail: Square Narrow Tegular SLN.
7. Thickness: 1-1/2 inch (38 mm).
8. Color: White.
9. Light Reflectance (LR): Not less than 0.86
10. Noise Reduction Coefficient (NRC): 0.85.
11. Ceiling Attenuation Class (CAC): 35.
12. Articulation Class (AC): 170.
13. Fire Class: Class A in accordance with UL 723 ASTM E84; Flame Spread Index: 0. Smoke Developed Index: No higher than 5.
14. GWP (A1-A3): 1-1/2 inch (38 mm): 0.618 kg CO2-eq/ft2/ 6.65 kg CO2-eq/m2.
15. Recycled Content: 50%.
16. Sustainability Design Certification: Meeting UL GREENGUARD GOLD for classroom and office scenarios for VOC emissions. 3PV HPD, EPD, Declare Label for select products.
17. Provide acoustical panels without any added antimicrobial treatments; that are inherently resistant to fungus, mold, mildew, and gram-positive and gram-negative bacteria with a rating of 10; and that show no mold, mildew, or bacterial growth after 28-days of exposure when tested in accordance with ASTM D3273 Level 10 – No Mold Growth and ASTM C1338 Pass – No Fungal Growth.
18. Sag and warp resistant in 100% relative humidity and tested to ASTM C367.
19. Thermal Resistance: R 3.47 hr.ft².°F/Btu per 1 inch, R 0.61 m².K/W per 25.4 mm (SI).
20. Ceiling Grid: Rockfon® Chicago Metallic® 4000 Tempra^{tm} 9/16". Refer to Section 092226 – METAL SUSPENSION SYSTEMS.

C. Basis-of-Design Product: Subject to compliance with requirements, provide Rockfon® Hygienic Plus™ Stone Wool ceiling tiles.

1. Drawing Designation: ACT-2.
2. Material: Stone Wool.
3. ASTM E1264 Classification: ASTM E1264 (2022) : Type IV, Form 3, Pattern E, ASTM E1264 (2023): Type A, Form A2.3, Pattern E.
4. Panel Size: 24 by 24 inches (610 mm by 610 mm).
5. Thickness: 3/4 inch (19 mm).
6. Item Number: 31100.
7. Edge/Joint Detail: Square Lay-In SQ.
8. Noise Reduction Coefficient (NRC): Not less than 0.90.
9. Color: White,
10. Light Reflectance (LR): 0.83 for White.
11. Fire Class: Class A in accordance with UL 723, ASTM E84: Flame Spread Index: 0; Smoke Developed Index: No higher than 5.
12. GWP (A1-A3): 0.226 kg CO2-eq/ft2 / 2.43 kg CO2-eq/m2.
13. Recycled Content: 43% .
14. Sustainability Design Certification: Meeting UL GREENGUARD GOLD for classroom and office scenarios for VOC emissions, HDPs, EPDs, and Declare Labels for related products.

15. Provide acoustical panels without any added antimicrobial treatments; that are inherently resistant to fungus, mold, mildew, and gram-positive and gram-negative bacteria with a rating of 10; and that show no mold, mildew, or bacterial growth after 28-days of exposure when tested in accordance with ASTM D3273: Level 10 – No Mold Growth and ASTM C1338: Pass – No Fungal Growth.
16. Provide acoustical panels capable of withstanding up to 200 scrub cycles using the prescribed scrubber and force in accordance with ASTM D2486.
17. Provide acoustical panels capable of withstanding through 100 wash cycles of the standard washability tester and cleaner prescribed in ASTM D4828.
18. Provide acoustical tiles resistant to diluted solutions of ammonia, chlorine, quaternary ammonium, and hydrogen peroxide as described in ASTM D1308.
19. Sag and warp resistant in 100% relative humidity and tested to ASTM C367.
20. Thermal Resistance: R 2.60 hr.ft².°F/Btu (I-P), R 0.46 m².K/W (SI).
21. Ceiling Grid: Rockfon® Chicago Metallic® 1260 Aluminum Cap 15/16." Refer to Section 092226 – METAL SUSPENSION SYSTEMS.

D. Basis of Design Product: Subject to compliance with requirements, provide Rockfon® Cinema Black™-DC Stone Wool Ceiling Tiles.

1. Drawing Designation: ACT-3.
2. Material: Stone Wool with factory painted glass scrim surface.
3. ASTM E1264 Classification: Type XX – Stone wool base with membrane-faced overlay.
4. Panel Size: 24 by 24 inches (nominal) (610 by 610 mm nominal).
5. Item Number: 1270.
6. Edge/Joint Detail: Square SQDC.
7. Thickness: 5/8-inch (15.8 mm).
8. Color: #08 Black.
9. Light Reflectance (LR): 0.04.
10. Noise Reduction Coefficient (NRC): 0.85.
11. Articulation Class (AC): 180.
12. Fire Class: Class A in accordance with UL723 (ASTM E84).
13. Surface Burning Characteristics (UL723/ASTM E84):

    a. Flame Spread Index: 5.
    b. Smoke Developed Index: 0.

14. GWP (A1-A3): 2.43 kg CO2-eq (per $1m^2$)/ 0.226 kg CO2-eq (per 1 ft^2).
15. Recycled Content: 51%.
16. Sustainability Design Certification: UL GREENGUARD Gold low VOC certified and meeting State of California Department of Public Health Services (DPHS) Standard Practice for Specification Section 01350 (California Section 01350) for testing chemical emissions.
17. Mold & Mildew Resistance: Tested to comply with requirements of ASTM D3273 and ASTM C1338.
18. Sag Resistance (ASTM C367): No sag or warp up to 100% relative humidity.
19. Thermal Resistance: 5/8-inch thickness R-value: 2.17h.ft^2.deg F/Btu (I-P).
20. Ceiling Grid: Rockfon® Chicago Metallic® 1200 15/15". Refer to Section 092226 – METAL SUSPENSION SYSTEMS.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders unless otherwise indicated, and comply with layout shown on reflected ceiling plans.

B. Layout openings for penetrations centered on the penetrating items.

3.3 INSTALLATION OF ACOUSTICAL PANEL CEILINGS

A. Install acoustical panel ceilings in accordance with ASTM C636/C636M [seismic design requirements] manufacturer's written instructions and CISCA’s “Ceiling System Handbook”

3.4 CLEANING

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touch up of minor finish damage.

B. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 095113

SECTION 096513 - RESILIENT WALL BASE

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.

B. REFERENCE STANDARDS

1. American Society for Testing and Materials (ASTM):

a. **ASTM E84** – Standard Test Method for Surface Burning Characteristics of Building Materials.
b. **ASTM E648** – Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
c. **ASTM F137** – Standard Test Method for Flexibility of Resilient Flooring Materials with Cylindrical Mandrel Apparatus.
d. **ASTM F925** – Standard Test Method for Resistance to Chemicals of Resilient Flooring.
e. **ASTM F1515** - Standard Test Method for Measuring Light Stability of Resilient Flooring by Color Change.
f. **ASTM F1861** – Standard Specification for Resilient Wall Base.

2. National Fire Protection Association (NFPA):

a. **NFPA 253** – Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source.
b. **NFPA 255** – Standard Method of Test of Surface Burning Characteristics of Building Materials.

1.2 SUMMARY

A. This Section includes the following:

1. Resilient wall base (RB-1, RB-2).

B. Related Sections: The following Sections contain materials that interface with this Section:

1. Section 092910 – GYPSUM BOARD.
2. Section 096813 – CARPET TILE.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Sections 013300 – SUBMITTAL PROCEDURES:

1. Product data for each type of product specified.
2. Samples for verification purposes in manufacturer's standard sizes, but not less

than 12 inches long, of each different color and pattern of product specified.

3. Project Schedule: For resilient products, use same designations indicated on Drawings.

1.4 QUALITY ASSURANCE

A. Installation Qualifications: Contractors for resilient floor coverings and accessories installation shall be experienced in managing commercial flooring projects and provide professional installers, qualified to install the various flooring materials specified. An Installer is “qualified” if trained, or a certified by Tarkett or a certified INSTALL International Standards and Training Alliance) resilient floor covering installer.

B. Single-Source Responsibility for Products: Obtain each type and color of product specified from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.

C. Fire Performance Characteristics: Provide products with the following fire performance characteristics as determined by testing identical products per ASTM test method indicated below, by Underwriters Laboratory (UL) or another testing and inspecting agency acceptable to Authorities Having Jurisdiction (AHJ).

1. Critical Radiant Flux: Class 1, not less than 0.45 W/Sq.CM., ASTM E 648 or NFPA 253.
2. Smoke Density: Class B, less than 450 per ASTM E 84/NFPA 255.

D. Flooring products shall comply with the requirements of the California Department of Public Health (CDPH) “Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers.”

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to Project site in original manufacturer's unopened cartons and containers, each bearing names of product and manufacturer, Project identification, and shipping and handling instructions.

B. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by Tarkett, but not less 55 deg. F (13 de. C) or more than 85 deg. F (29 deg. C).

1.6 PROJECT CONDITIONS

A. Install resilient products after other finishing operations, including painting, have been completed.

B. Maintain ambient temperatures within range as recommended by Tarkett, but not less than 65 deg. F (18 deg. C) or more than 85 deg. F (29 deg. C) in spaces to receive resilient products during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

C. Maintain the ambient relative humidity between 40% and 60% during installation.

D. Until Substantial Completion, maintain ambient temperature within range recommended by Tarkett, but not less than 55 deg. F (13 deg. C) or more than 85 deg. F (29 deg. C).

1.7 SEQUENCING AND SCHEDULING

A. Sequence installing products specified in this Section with other construction to minimize possibility of damage and soiling during remainder of construction period.

1.8 EXTRA MATERIALS

A. Deliver extra materials to Owner. Furnish extra materials matching products installed as described below, packaged with protective covering for storage, and identified with labels clearly describing contents.

1. Furnish 5% of total installed length of each different type and color of resilient wall base installed, but not less than one full roll (120 feet).

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design Manufacturer:

1. Tarkett North America, 3000 Aurora Road, Solon, OH 44139; Phone: (800) 899-8916 / Web: www.tarkettna.com; Email: info@tarkett.com.

2.2 RUBBER WALL BASE (RB-1)

A. Basis of Design Product: Subject to compliance with requirements of this section, furnish and install Tarkett Millwork® Wall Finishing System Thermoplastic Rubber Wall Base, with profile replicating the look of finely milled wood, in locations as shown and scheduled on the Drawings.

B. Performance Requirements: Shall meet ASTM F-1861, Type TP (Thermoplastic Rubber), Group 1 (solid).

C. Profile: Mandalay (Straight).

D. Thickness: 3/8-inch (0.375-inch, 9.53 mm).

E. Height: 6-inches (15.24 cm).

F. Length: 8-feet (2.44 m).

G. Corners: Field fabricated. See paragraph 3.3.E.

H. Color/Locations: Color to be selected. Refer to Drawings, Sheet A601 – ROOM FINISH SCHEDULE & MATERIALS SELECTION for installation locations.

I. Test Data:

1. Flexibility (ASTM F137): Passes ¼-inch diameter cylinder.
2. Resistance to Light (ASTM F1515): Delta E < 8.
3. Resistance to Chemicals (ASTM F925): Passes.
4. Fire Resistance: (ASTM E648) Critical Radiant Flux (NFPA 253): Class 1.

2.2 RUBBER WALL BASE (RB-2)

A. Basis of Design Product: Subject to compliance with requirements of this section, furnish and install Tarkett BaseWorks™ Thermoset Rubber Wall Base in locations as shown and scheduled on the Drawings.

B. Performance Requirements: Shall meet ASTM F1861, Type TS (Thermoset), Group 1 (Solid).

C. Thickness: 1/8-inch (0.0125-inch, 3.17 mm).

D. Type: Coved.

E. Height: 4-inch (10.16 cm).

F. Length: 120 ft. roll.

G. Corners: Field fabricated. See paragraph 3.3.E.

H. Locations/Colors: Refer to Drawings, Sheets A601 – ROOM FINISH SCHEDULE & MATERIALS SELECTION for installation locations. Color to be selected.

I. Test Data:

1. Flexibility (ASTM F137): Passes ¼-inch mandrel.
2. Resistance to Light (ASTM F1515): Passes.
3. Resistance to Chemicals (ASTM F925): Passes.
4. Fire Performance: Refer to paragraph 1.4.C.

2.3 INSTALLATION MATERIALS

A. Adhesives: As recommended by Tarkett to meet site conditions.

1. Tarkett 960 Cove Base Adhesive (Porous applications).
2. Tarkett 946 Premium Contact Bond Adhesive (Non-porous applications).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the work.

B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to Tarkett's written instructions to ensure adhesion of resilient wall base.

B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

C. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

D. Vacuum clean substrates to be covered by resilient products immediately before installation.

3.3 RESILIENT BASE INSTALLATION

A. Comply with Tarkett's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework, and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Corners: Job formed/field fabricated cove base inside and outside corners shall be made with cove base grooving tool with sufficient adhesive to the outside corner in order to install flush with the corner bead with no gaps.

F. Do not stretch resilient base during installation.

3.4 CLEANING AND PROTECTION

A. Comply with Tarkett's written instructions for cleaning and protection of resilient products.

B. Perform the following operations immediately after completing resilient product installation:

1. Remove adhesive and other blemishes from exposed surfaces.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

END OF SECTION 096513

SECTION 096726 – FLOOR COATING SYSTEM

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Provisions established within the Contract, Division 1 – General Requirements, and the Drawings are collectively applicable to this Section.

1.2 RELATED SECTIONS

A. Section 033000 – CAST-IN-PLACE CONCRETE: Poured-in-place concrete slab on grade.

B. Section 079200 – JOINT SEALANTS: Sealants for control joints, expansion joints, and door frames.

C. Section 092900 – GYPSUM BOARD: Gypsum board for partition construction.

D. Division 22 – PLUMBING: Floor drains.

1.3 SYSTEM DESCRIPTION

A. The Sikafloor® Pronto RB-1853 CG Methyl-Methacrylate (MMA) based floor topping system shall be nominal 3/16-inch (0.1875-inch) thick, including 1/8-inch (0.125-inch) Sikafloor® - 61 BC Pronto Self-Leveling basecoat with appropriate Primers and Topcoat. Color and texture as selected by Architect.

B. The Sikafloor® Pronto RB-1853 CG floor topping system shall cure and be available to normal traffic in no more than 60 minutes at 68° F. after application of last coat. It shall have a maximum water absorption value of 0.04 weight percent in accordance with ASTM D570.It shall be chemically resistant to a wide range of acids, alkalis, salts, fats, oils, and other chemicals.

C. The finished floor coating system shall be uniform in color, texture, and appearance. All edges that terminate at walls, floor discontinuities, and other embedded items shall be sharp, uniform, and cosmetically acceptable with no thick or ragged edge. The Flooring Installer shall work out an acceptable masking technique to ensure the acceptable finish of all edges.

D. See Paragraph 3.13 for number and thicknesses of each coat/layer in each system.

1.4 REFERENCE STANDARDS

A. American Concrete Institute (ACI):

1. **ACI 302.1R-80** – Guide for Concrete Floor and Slab Construction.
2. **ACI 308** – Standard Practice for Curing Concrete.

B. American Society for Testing and Materials (ASTM):

1. **ASTM C39** – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
2. **ASTM C109** – Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens).
3. **ASTM D257** – Standard Test Methods for DC Resistance or Conductance of Insulating Materials.
4. **ASTM D543** – Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents.
5. **ASTM D570** – Standard Test Method for Water Absorption of Plastics.
6. **ASTM D638** – Standard Test Method for Tensile Properties of Plastics.
7. **ASTM D695** – Standard Test Method for Compressive Properties of Rigid Plastics.
8. **ASTM D696** – Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30-degrees C and 30-degrees C with a Vitreous Silica Dilatometer.
9. **ASTM D790** – Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
10. **ASTM F2659** – Standard Guide for Preliminary Evaluation of Comparative Moisture Condition of Concrete, Gypsum Cement and Other Floor Slabs and Screeds Using a Non-Destructive Electronic Moisture Meter.

C. European Standards (EN) – Deutsches Institut fur Normung (DIN):

1. **DIN 53122** – Determination of the Water Vapour Transmission Rate of Plastic Film, Rubber Sheeting, Paper, Board and Other Sheet Materials by Gravimetry.

D. International Concrete Repair Institute (ICRI):

1. **ICRI CSP** – Concrete Surface Preparation Profiles.

E. National Association of Corrosion Engineers (NACE)/The Society for Protective Coatings (SSPC):

1. **NACE No. 6/SSPC-SP 13** – Surface Preparation of Concrete.

1.5 SUBMITTALS:

A. Prior to commencing work, submit manufacturer's technical information and installation details to describe materials to be used. The same manufacturer shall supply all polymer underlayments wall and floor finishes.

B. Submit manufacturer's certificate of compliance that materials meet specification requirements.

C. Before beginning work, samples of the flooring system shall be provided for Architect's review and approval.

1.6 QUALITY ASSURANCE:

A. Manufacturer Qualifications:

1. Basis of Design Manufacturer: Sika Corporation • Flooring 201 Polito Avenue, Lyndhurst, NJ 07071; Tel: 800 933 7452 www.SikaFloorUSA.com Contact: Christopher Bauer bauer.christopher@us.sika.com
2. No request for substitution shall be considered that would change the generic type of coating system specified (i.e., 100% reactive, Methyl Methacrylate based acrylic liquid (NMA)). Equivalent materials of other manufacturer's may be substituted only on approval of the Architect. Requests shall include the respective manufacturer's technical literature for each product giving the name, generic type, descriptive information, recommended dry film thickness (DFT), Material Safety Data Sheet (MSDS), and certified test reports showing results to equal performance criteria of products specified herein. Refer to Section 012500 – SUBSTITUTION PROCEDURES for detailed substitution requirements.
3. Manufacturer must show a minimum 10-year history of manufacturing MMA products for the specified application. Manufacturer must show a minimum of 10 projects of equal size and magnitude as this project.

B. Flooring Installer Qualifications:

1. Basis of Design Local Supplier/Installer: Eagle Grip Coatings Systems – Paint Corporation, 2635 Blaney Hill Road, Conway, Arkansas 72032; (501) 664-3083.
2. Pre-qualification requirements: Each bidder for this project shall be pre-qualified and approved by the material manufacturer at the time of bid submittal. Acceptability will include judgment on equipment, history, and financial strength. In no case will Sika Corporation permit the application of any of its materials by untrained, non-approved Flooring Installer or personnel. This is a hospital grade decorative floor and wall system that requires expert installation techniques. Contact Eagle Grip Coating Systems-Paint Corp, Troy Hudson at 501-664-3083.
3. Each approved Flooring Installer shall have been trained by the Manufacturer in all phases of surface preparation and application of the specified flooring system(s). The approved Flooring Installer must possess proper surface preparation equipment as recommended by manufacturer.
4. Each approved Flooring Installer must have five years' experience of installing the specified flooring system and submit a list of five projects/references as a prequalification requirement. At least one of the five projects/references must be of equal size, quantity, and magnitude to this project as a prequalification requirement. Architect has the option to personally inspect the projects/references to accept or reject any of the Flooring Installers prior to bid time as a prequalification requirement.

C. Acceptance Sample:

1. A minimum one-foot square representative sample of the specified flooring system shall be prepared by the Manufacturer's representative and submitted to the Architect prior to the bidding phase of the project. All bidders shall inspect the "acceptance sample" before submitting their bids.

2. The installed flooring system shall be similar to the acceptance sample in thicknesses of respective film layers, color, texture, overall appearance and finish.

D. Bond Testing:

1. Surface preparation efforts shall be evaluated by conducting Bond Tests at the site prior to application of the flooring system(s).
2. See paragraph 3.3B ofthis section or consult with Material Manufacturer for specific procedure.

E. Pre-Job Meeting

1. A Pre-Job Meeting is required with representatives of Owner, Architect, General Contractor, Flooring Installer, and Material Manufacturer in attendance. The agenda shall include a review and clarification of this specification, application procedures, quality control, inspection and acceptance criteria, and production schedules. Flooring installer is not authorized to proceed until this meeting is held or waived by Architect.

1.7 DELIVERY AND STORAGE:

A. Material shall be delivered to project site in manufacturer's original unopened containers bearing manufacturer's name, product and color.

B. Materials shall be stored indoors, protected from damage, moisture, direct sunlight and temperatures below 50 degrees F or above 80 degrees F.

1.8 PROJECT AND ENVIRONMENTAL CONDITIONS

A. Evaluate the substrate condition, including moisture content and extent of substrate leveling and repairs required, if any.

B. Coordinate flooring work with other trades to ensure adequate illumination, ventilation, and dust free environment during application and curing of flooring.

C. Comply with material manufacturer's recommended temperature limitations for flooring application.

D. Do not apply materials if relative humidity is above 85% (percent) or within 5º (3º) of dew point at time of application.

E. Utilities, including electric, water, heat and finished lighting to be supplied by General Contractor

F. Erect suitable barriers and post legible signs at points of entry to prevent traffic and trades from entering the work area during application and cure period of the floor.

G. Protection of finished floor from damage by subsequent trades shall be the responsibility of the General Contractor.

1.9 WARRANTY:

A. Flooring Installer shall furnish a written warranty covering both material and workmanship for a period of (1) year from date of installation.

PART 2 - PRODUCTS

2.1 BASIS OF DESIGN MANUFACTURER:

A. Sika Corporation, 201 Polito Avenue, Lyndhurst, New Jersey 07071; United States; Representative Christopher Bauer, Market Development Manager – MMA FLOORING, Mobile: +1 952-334-4661; bauer.christopher@us.sika.com; Flooring Systems (sika.com)

2.2 MATERIALS:

A. Basis of Design: Sikafloor® Pronto RB-1853 CG Methyl Methacrylate (MMA) Acrylic Resin System:

1. Saturating Primer/Sealer Coat: Sikafloor®-41 P Pronto with Sikafloor®-103IN Pronto additive. Sikafloor®-51 P Pronto may be a suitable substitute for priming and must be approved by Manufacturer and Architect prior to beginning installation.
2. Coving (if required): Sikafloor®-100 PAS Pronto.
3. Patching/Sloping (if required): Sikafloor® Pronto 1817 PC Polymer Concrete.
4. Topping: Sikafloor®-61 BC Pronto Self-Leveling, consisting of Sikafloor® -61 BC Pronto Self-Leveling resin and Sikafloor®-100SL Pronto with multicolored recycled glass manufactured by Designer Glass by Eagle Grip, LLC..
5. Topcoat: Sikafloor®-71 TC Pronto Colorless Topcoat Resin.
6. Pigment: Color to compliment Recycled Colored Glass.
7. Multicolored recycled glass manufactured by Designer Glass by Eagle Grip, LLC for broadcasting: Color/s to be chosen by Architect.

2.3 PRODUCT PERFORMANCE CRITERIA

A. **Sikafloor®-41 P Pronto Primer/Sealer:**

1.	Percentage Reactive Resin:	100%
	Percentage Solids	100%
2.	Water Absorption, Wt. % (ASTM D570):	less than 0.6
3.	Tensile Strength, psi (ASTM D638)	3550
4.	Tensile Modulus, psi X 10 to the 5th (ASTM D638):	2.1
5.	Coefficient of Thermal Expansion, in./in./deg. F (ASTM D696):	.000035
6.	Electrical Resistivity (ASTM D257):	
	Volume Resistance, ohm-cm:	10^{15}
	Surface Resistance, ohm:	10^{12}

7.	Water Vapor Transmission (DIN 53122), g/cm-hr-mm Hg X 10^{-9}:	1.4

B. **Sikafloor® Pronto 1817 PC Polymer Concrete**

1.	Percentage of reactive resin	100%
2.	Water Absorption, Wt. % (ASTM D570):	0.02
3.	Tensile Strength, psi (ASTM D638)	1200
4.	Tensile Modulus, psi X 10 to the 5th (ASTM D638):	1.2
5.	Coefficient of Thermal Expansion, in./in./deg. F (ASTM D696) psi x10^{-6}:	18
6.	Compressive Strength, psi (ASTM C39)	7,000
	(ASTM C109)	9,200

C. **Sikafloor®-61 BC Pronto Self-Leveling Topping**

1.	Percentage of reactive resin:	100%
	Percentage of solids:	100%
2.	Water Absorption, Wt. % (ASTM D570):	0.04
3.	Compressive Strength, psi (ASTM C109):	6,000-8,000
	(ASTM D695):	6,000
4.	Tensile Strength, psi (ASTM D638):	1,050
5.	Tensile Modulus, psi (ASTM D638):	720,000
6.	Flexural Strength, psi (ASTM D790):	3,500
7.	Coefficient of Thermal Expansion, in./in./deg. F (ASTM D696):	.000019
8.	Electrical Resistivity, (ASTM D257) Volume Resistance, ohm-cm:	10^{14}

D. **Sikafloor®-71 TC Pronto Colorless Topcoat Resin**

1.	Percentage Reactive Resin:	100%
	Percentage Solids:	100%
2.	Water Absorption, Wt. % (ASTM D570):	0.04
3.	Tensile Strength, psi (ASTM D638):	3555
4.	Tensile Modulus, psi (ASTM D638):	210,000
5.	Coefficient of Thermal Expansion (ASTM D696)	.000035 in./in. Deg. F

6.	Electrical Resistivity (ASTM D257):	
	Volume Resistance, ohm-cm:	10^{15}
	Surface Resistance, ohm:	10^{12}
7.	Water Vapor Transmission (DIN 53122) g/cm-hr-mm Hg X 10^{-9}:	1.43
8.	Chemical Resistance, ASTM D543:	
	Effect of weak acids: Effect of strong acids: Effect of alkalis: Effect of salt solutions: Effect of oil, grease: Effect of sunlight (UV radiation):	None slight none none none none

E. Multicolored Recycled Glass:

A. Manufactured by Designer Glass by Eagle Grip, LLC:

1. The colored glass to be used as a design element in the flooring system shall be produced from recycled glass by designer glass by Eagle Grip, LLC.
2. The blend will be selected and approved by the Architect and included as part of the submittal process.

2.4 PRODUCT INSTALLATION & APPLICATION CRITERIA

A. All Sikafloor® Pronto MMA Material Systems:

1. Pot Life at 68° F.: 10-15 minutes
2. Cure Time at 68° F.: 60 minutes
3. Recoat Time at 68° F.: 60-90 minutes

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS:

A. Concrete must have a curing period of 28 days minimum at 70° F, and meet requirements of ACI 302 and ACI 308. The surface must be clean and dry, physically sound and free of contamination. Surfaces must be free of holes, voids or defects. Cracks and abrupt changes in surface profile must be corrected. Fins and projections must be removed. All curing compounds and sealers must be removed.

B. Conduct quantitative moisture testing in accordance with ASTM-F2659-10 utilizing Tramex type impedance moisture meter. Maximum acceptable test result is 5%. If in excess of stated value, contact Sika Technical Flooring Specialist for Sikafloor and Sika Ucrete moisture tolerant primer/basecoat options

C. Flooring Installer must report, in writing, surfaces left in improper condition by other trades. Application will constitute acceptance of surfaces by the Flooring Installer.

3.2 PREWORK INSPECTION

A. Examine all surfaces to be coated with MMA material systems and report to the Architect any conditions that will adversely affect the appearance or performance of these coating systems and that cannot be put into acceptable condition by the preparatory work specified in Paragraph 3.3 below.

B. Do not proceed with application until the surface is acceptable or authorization to proceed is given by the Architect.

C. In the event the Flooring Installer has employed all acceptable methods of surface preparation and cannot remedy adverse conditions that would lead to failure of the installation, Flooring Installer shall withdraw from the contract and Owner will be financially responsible only for preparation efforts.

3.3 PREPARATION:

A. Surface Preparation - General

1. Concrete substrate must be clean and dry. Dislodge dirt, mortar spatter, paint overspray, and other dry surface accumulations and contamination by scraping, brushing, sweeping, vacuuming, and/or compressed air blow-down.
2. New concrete: See paragraph 3.3.C below for requirements.
3. Surfaces that are heavily contaminated shall be cleaned with the appropriate degreaser, detergent, or other appropriate cleaner/surfactant followed by thoroughly rinsing with fresh water to remove the accumulation prior to mechanical cleaning efforts. Mechanical cleaning will not remove such deposits, but only drive them deeper.
4. Conduct quantitative moisture testing in accordance with ASTM-F2659-10 utilizing Tramex type impedance moisture meter. Maximum acceptable test result is 5%. If in excess of stated value, contact Sika Technical Flooring Specialist for Sikafloor or Sika Ucrete moisture tolerant primer/basecoat options.

B. Bond Testing

1. The Flooring Installer shall evaluate all surface preparation by conducting bond tests at strategic locations.
2. Mix six (32) ounces of the Sikafloor®-41 P Pronto primer & Sikafloor®-103 IN Pronto additive to be used in the application with #10-#12 mesh, dry quartz sand until an easily trowelable mixture is obtained. Add Sikafloor®-100 HD Pronto per manufactures instructions (based on temperature) and mix well. Apply palm-sized patties 1/4" to 1/2" thick.
3. After one (1) hour at (68° F.), patties must be cured tack-free and cooled to ambient temperature of concrete. Remove patties with hammer and chisel and examine fracture/delamination plane. Concrete with fractured aggregate must be attached to the entire underside of the patty.
4. If only laitance or a small amount of concrete is attached or if interface between patty and substrate is tacky, further substrate preparation is required.

5. If further surface preparation is required, bond tests shall be conducted again when this has been completed.
6. If no amount or kind of surface preparation produces satisfactory bond tests, the Flooring Installer shall report that to the Architect, General Contractor, Owner, and Manufacturer.

C. Mechanical Surface Preparation and Cleaning

1. The Sikafloor® Pronto MMA system requires a CSP 4-5 in accordance with ICRI CSP Surface Preparation Standards and NACE No. 6/SSPC-SP13. All accessible concrete floor surfaces shall be mechanically blast cleaned using a mobile steelshot, dust recycling machine such as BLASTRAC, as manufactured by Wheelabrator Corp., or approved equivalent. All surface and embedded accumulations of paint, toppings, hardened concrete layers, laitance, power trowel finishes, and other similar surface characteristics shall be completely removed leaving a bare concrete surface having a profile similar to 40 grit sandpaper and exposing the upper fascia of concrete aggregate.
2. Floor areas inaccessible to the mobile blast cleaning machines shall be mechanically abraded to the same degree of cleanliness, soundness, and profile using vertical disc scarifiers, starwheel scarifiers, needle guns, scabblers, or other suitably effective equipment.
3. After blasting, traces or accumulations of spent abrasive, laitance, removed toppings, and other debris shall be removed with brush or vacuum.
4. Conduct Bond Tests to check adequacy of surface preparation. See Paragraph 3.3B (Bond Testing).
5. Application of the respective specified material system(s) must be completed before any water or other contamination of the surface occurs.

3.4 INSTALLATION:

A. Application of Sikafloor® Pronto RB-1853 Recycled Colored Glass Flooring System consists of:

1. Applying the primer/sealer,
2. Applying coving (if required),
3. performing patching and sloping with Sikafloor® Pronto 1817 PC system (if required),
4. Re-priming Sikafloor® Pronto 1817 PC areas,
5. Applying the topping, broadcasting the Recycled Colored Glass,
6. Applying the topcoats.
7. Time for curing (45 - 60 minutes) shall be allowed between each coat.
8. Thicknesses are specified below and in Paragraph 3.13.

B. Open only the containers of component materials to be use in each specific application as needed. Refer to Manufacturer's data sheets for pot-life/temperature relationship to determine size of batches to mix and mix ratios for each respective coat of the system.

C. Measure, add, and mix the initiator (Sikafloor®-100 HD Pronto) into the respective resin components in the proportions recommended by the Material Manufacturer. Pot life is short, so mix only as much material at a time as can be easily and efficiently applied.

3.5 PRIME COAT

A. Measure, add, and mix the Sikafloor®-41 P Pronto with Sikafloor®-103 IN Pronto additive. Add initiator (Sikafloor®-100 HD Pronto) into the respective resin components in the proportions recommended by the Material Manufacturer based on temperature.

B. Pour the mixture batches onto the floor surface and use a 9" or 18" wide, 3/8 thick-napped, solvent-resistant paint roller to roll out the material at a rate of 100 sq. ft./ gal. to form a uniform, continuous film, ensuring that all crevices, cracks, other surface discontinuities have been saturated and coated. Use a paint brush to reach areas inaccessible to the roller. Work quickly and deliberately; the pot life is short (10 -15 minutes). Do not leave any "puddles"; roll out any such accumulations.

C. Allow the primer/sealer coat to cure.

D. If any of the concrete has absorbed all of the primer or if the concrete still has a dry look, re-prime these areas before applying the subsequent coats.

3.6 COVING (If Required)

A. Surface Preparation

1. If concrete walls are to be painted prior to installation of cove base, the bottom portion of the walls shall remain un-coated to the height of the cove base to insure a proper bond to the concrete wall.
2. If walls are constructed of a non-compatible material or if a coating exists, a backer board of ¼” plexiglass or ½” cement board cut to the desired height of the cove base needs to be installed. The top of the backer board should be cut at a 45-degree angle to create a “beveled” edge.
3. If a backer board needs to be installed it shall be fastened using a high-grade construction adhesive as well as counter sunk screws or concrete masonry anchors.

B. System Description

1. Cove base shall be installed according to manufacturer’s recommendations and shall be one of two systems:

    a. Sikafloor®-100 PAS Pronto or Sikafloor® Pronto 1815 RG cove base consisting of “spooned in” radius and brush on body coat or cant cove as specified.
    b. Trowel-On Cove Base consisting of a trowel applied radius/base mix with a termination strip or suitable transition installed at the top of the base.

2. Cove base will receive a broadcast and topcoat consistent with flooring system.

3.7 PATCHING/SLOPING (If Required)

A. Measure, add, and mix the Sikafloor® Pronto 1817 PC (Sikafloor®-17 RS Pronto Part A resin and Sikafloor®-17 RS Pronto Part B powder component), and necessary aggregate (if required) in the proportions recommended by the Material Manufacturer.

B. Use mixture to repair any damaged concrete, or to slope any areas as needed.

C. Once cured, material must be re-primed before topping system is applied.

3.8 TOPPING

A. Size the batches, and mix according to Manufacturer's instructions. The entire batch should be poured and spread at once, i.e., do not let material set in pail.

B. Spread the topping material with a pin/gauge rake set to a depth of 1/8”. Lightly trowel to a uniform thickness of 1/8” as necessary.

C. Immediately after application, roll with a porcupine roller available from the Manufacturer to release any trapped air from the topping.

D. Broadcast Recycled Colored Glass into the fresh material before it begins to cure. It is important that the Glass "rains" down, and not be thrown into the surface.

E. Allow the topping to cure.

F. Remove excess Glass by sweeping and vacuuming.

3.9 TOPCOAT

A. Apply with clean rollers at a rate of 90 - 100 sq. ft./gal. in the same way as the Primer/Sealer was applied as described in Paragraph 3.5. Apply light singular backroll for uniform application.

B. Allow topcoat to cure.

3.10 SECOND TOPCOAT

A. Address any areas with abrasive sanding prior to next topcoat. Apply second topcoat with clean rollers at a rate of 100 - 125 sq. ft./gal. in the same way as described in Paragraph 3.5.

B. Allow topcoat to cure.

3.11 FIELD QUALITY CONTROL/INSPECTION

A. Flooring Installer shall request acceptance of surface preparation from the Architect before application of the prime/seal coat.

B. Flooring Installer shall request acceptance of the prime/seal coat from the Architect before application of subsequent specified materials.

C. All work not acceptable to the Architect must be corrected before consideration of final acceptance.

3.12 CLEANING

A. Flooring Installer shall remove any material spatters and other material that is not where it should be. Remove masking and covers taking care not to contaminate surrounding area.

B. Flooring Installer shall repair any damage that should arise from either the application or clean-up effort.

3.13 COATING SCHEDULE

A. Primer shall be Sikafloor®-41 P Pronto with Sikafloor®-103 IN Pronto additive. Application rate shall be approx.100 sq.ft. per gallon (approx. 12-15 mils).

B. Coving (if required) shall be Sikafloor®-61 BC Pronto Self-Leveling resin with appropriate Sikafloor®-100 SL Pronto filler installed per manufacturers recommendations

C. Patching/Sloping material, if required, shall be Sikafloor® Pronto 1817 PC.

D. Body coat shall be Sikafloor®-61 BC Pronto Self-Leveling applied with a gauge rake set at 1/8" for a rate of 40 sq. ft. per batch. Recycled Colored Glass to be broadcast into the uncured topping at the rate of .5/lb per sq. ft.

E. Clear topcoat shall be Sikafloor®-71 TC Pronto; apply at the rate of 90 - 100 sq. ft. per gallon for the first coat and 100 - 125 sq. ft. per gallon for the second application.

3.14 MANUFACTURERS RECOMMENDATIONS

A. For more specific information concerning maintaining Methyl Methacrylate floors please consult the manufacturer as listed in paragraph 1.6A of this Section.

END OF SECTION 096726

SECTION 096813 – CARPET TILE

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Division 01 Specification Sections.

B. Section 096513 – RESILIENT WALL BASE.

1.2 REFERENCES

A. American Association of Textile Chemists and Colorists (AATCC):

1. **AATCC 134** – Electrostatic Propensity of Carpets.

B. American Society for Testing and Materials (ASTM):

1. **ASTM D2047** – Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine.
2. **ASTM E648** – Standard Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source.
3. **ASTM E662** – Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.
4. **ASTM F1869** – Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
5. **ASTM F2170** – Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in-situ Probes.

C. International Organization for Standardization (ISO):

1. **ISO 9001** – Quality Management Systems – Requirements.
2. **ISO 14001** – Environmental Management Systems – Requirements and Guidance for Use.

D. Occupational Safety and Health Administration (OSHA):

1. **OSHA 29 CFR 1910** – Occupational Safety and Health Standards.

E. Consumer Product Safety Commission (CPSC):

1. **CPSC Federal Flammability Standard FF-1-70** – Standard for the Surface Flammability of Carpets and Rugs.

F. The Carpet and Rug Institute (CRI).

G. Americans with Disabilities Act (ADA).

H. National Bureau of Standards (NBS).

I. National Fire Protection Association (NFPA):

1. **NFPA 253** – Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source.

1.3 SUMMARY

A. This section relates to carpet tile and accessories.

B. Refer to Drawings, Sheet A601- ROOM FINISH SCHEDULE AND MATERIALS SELECTION and Sheet A701 – FINISH FLOOR PLAN for carpet tile information, colors, locations, and patterns.

1.4 PRE-INSTALLATION MEETING

A. Convene a pre-installation meeting one week prior to installation of carpet tile. Suggested attendees: Architect, General Contractor, Carpet Tile installer, and Carpet Tile manufacturer representative to discuss the installation in detail.

1.5 SUBMITTALS

A. Product Specification.

B. Specification for Adhesive.

C. Shop Drawings.

D. Samples.

E. Schedule.

F. Qualifications for Installer.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Instructions.

B. Warranty Documents.

1.7 QUALITY ASSURANCE

A. Environmental:

1. Green Label Plus Certified.
2. Cradle to Cradle Certified Silver.
3. NSF 140 Gold.
4. Health Product Declaration.
5. Declare Label, red list compliant.
6. No PVC components.

B. Installer Qualifications: Installer who has been trained in the installation of carpet tile.

C. Manufacturer Qualifications

1. ISO 1400l.
2. ISO 9001.

D. Mockups at designated location for Architect review and approval.

1.8 MATERIAL STORAGE AND HANDLING

A. Store carpet tile on a flat surface, away from vents and direct sunlight.

B. Store in protected dry conditions between 65 and 85 degrees F.

1.9 SITE CONDITIONS

A. The following conditions must be maintained for 24 hours prior to, during and permanently after installation:

1. HVAC System must be operational.
2. The installation site, carpet and adhesive must be between 50°F and 95°F.
3. The installation site's ambient relative humidity must not fall below 40%.
4. Conduct relative humidity or Anhydrous Calcium Chloride testing. Results must be within the proper range for manufacturer's recommended adhesive:

a. Calcium Chloride ASTM F-1869 5.0 lbs per 1000 SF /24 hours.
b. Relative Humidity ASTM F-2170 85%.
c. Conduct pH testing on the floor in several locations. A reading below 5.0 or above 9.0 requires corrective measures.

PART 2 – PRODUCTS

2.1 MODULAR CARPET TILE CPT – 2

A. Product Information:

1. Manufacturer: Shaw Contract® Flat Weave Tile.
2. Collection: Community. Color: To be determined.
3. Style Number: 5T321.
4. Construction: Multi-Level Pattern Cut/Loop.
5. Fiber: Ecosolution Q100™ Nylon.
6. Dye Method: 100% Solution Dyed.
7. Primary Backing: Synthetic.
8. Secondary Backing: EcoWorx® Tile.
9. Protective Treatments: SSP® Shaw Soil Protection.
10. Recommended Adhesives: Shaw 5100, Shaw 4151, LokDots Adhesive Tabs, LoxWorx, Shaw 3800, or LoxWorx Carpet Tile Adhesive, as recommended by manufacturer for new substrate conditions.
11. Size: 9"x 36".
12. Gauge: 1/12 inch (47.2 per 10 cm).

13. Stitches: 8.5 per inch (34.0 per 10 cm).
14. Average Density: 6792 oz./cu. yd.
15. Total Thickness: 0.245 inch (6.22 mm).
16. Tufted Weight: 20 oz./sq. yd.
17. Installation Method: Ashlar.

B. Performance and Testing:

1. Pill Test (CPSC FF 1-70): Pass.
2. Radiant Panel (ASTM E648): Class I.
3. NBS Smoke (ASTM E662): Less than 450.
4. Electrostatic Propensity (AATCC-134): Less than 3.5 Kv.
5. CRI Green Label Plus (GLP): GLP9968.
6. ADA Compliance: Static Coefficient of Friction >0.6. Meets recommended value for ADA walking surfaces and accessible routes.

C. Attributes & Certifications:

1. Living Building Challenge (LBC): Free of Red List Chemicals.
2. Declare: LBC Compliant.
3. NSF 140: Gold.
4. Total Recycled Content: 57% (Pre-Consumer 57% Post-Consumer 0%).

D. Warranty:

1. Lifetime Commercial Limited Warranty.

2.2 INSTALLATION MATERIALS

A. Adhesives:

1. For EcoWorx (fiberglass reinforced):

a.	Shaw 5100 pressure sensitive:	8 lbs. 95% RH pH 5-11.
b.	Shaw 3800 indoor/outdoor:	8 lbs. 90% RH pH 5-9.
c.	LokDots dry adhesive:	No visible moisture pH 12.
d.	LokWorx tabs:	10 lbs. 85 RH pH 12.

B. Primer (if needed): 9050 is an acrylic solution made to neutralize excess alkali that is also recommend as a primer coat to prevent over absorption of adhesive and to ensure a better bond. Formulated with an antimicrobial agent, it provides protection against bacteria, fungi, and mildew in the wet or dry state. Contains no solvent, alcohol, or other hazardous materials per OSHA 29 CFR 1910.1200. Non-photo chemically reactive per rule #102. Available in 4-gallon pails.

C. Leveling and Patching Compounds: Use a cementitious patching/leveling compound that meets or exceeds the required moisture level and pH requirements. Use of gypsum-based patching and/or leveling compounds which contain Portland or high alumina cement and meet or exceed the compressive strength of 3,000 psi are acceptable.

D. Floor Transition Strip (FTS)

1. Basis of Design: Slim Line Transition Moulding as manufactured by Tarkett North America, Solon, OH 44139, (800) 899-8916, www.tarkettna.com .
2. Style: SLT-XX-A for transition of ¼-inch (6.35 mm) carpet to 1/8-inch (3.18 mm) resilient materials in locations as shown on the Drawings.
3. Performance:

   a. Slip Resistance (ASTM D2047): Exceeds Federal Standards and ADA recommendations of 0.5 for flat surfaces.
   b. Fire Resistance (ASTM E648/NFPA 253): Critical Radiant Flux – Class 1.

4. Installation:

   a. Install as per manufacturer's written instructions using Tarkett 946 Premium Contact Adhesive for non-porous surfaces.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content, pH, smoothness and level.

B. If dusting or powdering exists, seal the floor with a latex primer such as Shaw 9050.

3.2 PREPARATION

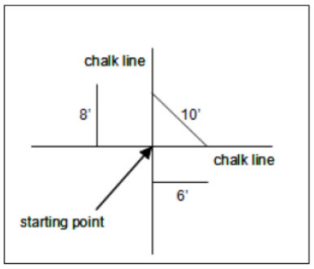
A. Substrates shall be smooth, structurally sound, permanently dry, clean and free of all foreign material such as dust, wax, solvents, paint, grease, oils, old adhesive residue, curing and hardening/ curing compounds, sealers and other foreign material that might prevent adhesive bond.

B. Fill depressions or cracks with a cementitious patching/leveling compound that meets or exceeds the required moisture level and pH requirements. Use of gypsum-based patching and/or leveling compounds which contain Portland or high alumina cement and meet or exceed the compressive strength of 3,000 psi are acceptable.

3.3 LAYOUT AND INSTALLATION

A. Install all carpet tile in compliance with manufacturer's recommendations and using manufacturer's recommended products.

B. Start the tile installation as near to the center of the room as possible and position it to use the largest perimeter cut tile size.



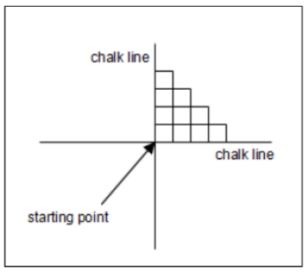
C. Snap a chalk line parallel to one major wall bisecting the starting point. It may be necessary to offset the center chalk line to assure perimeter tiles will be at least half size.

D. Snap a second chalk line from the starting point at 90° to the first line. Use a 3-4-5, 6-8-10, or larger triangle depending on the room size. Meters or feet may be used to lay out the triangle in these proportions.

E. Use a full spread of adhesive applied with a 3/8" foam paint roller or 1/16 x 1/32 x 5/64 u-notch trowel. The adhesive must be allowed to dry completely before installing the carpet. Installing into wet adhesive will result into a permanent bond and may cause the carpet to bubble. Trowel application of adhesive is recommended for EcoLogix. EcoWorx ES / EcoLogix ES no adhesive required. Approximate coverage rates are 35-40 yards per gallon when applied with a roller, and 28 -33* yards per gallon when applied with a trowel.

F. Install each full carton and complete an entire pallet before starting another pallet to minimize product variation. Each tile has directional arrows on the back. These arrows allow for one-directional or multi-directional installation. Some styles may be large scale or linear in design and require quarter turning. If you are unsure about whether or not your product requires a quarter turned installation, please contact 1.877.502.7429. Numbers within the arrows are for manufacturing purposes and are not related to installation.

G. Begin installation at the intersection of two chalk lines. Continue until you complete one quadrant. Proceed to an adjoining quadrant until all four quadrants are completed. Larger areas may require chalk lines bisecting the original four quadrants.



H. Install tiles using the pyramid technique. This gives you multiple alignment checks. If the edges do not align and the misalignment increases with progression of the installation, find and correct the source of the problem.

I. Carpet tiles come in various sizes. All Shaw tiles have directional arrows on the back of the tile. Slide tiles into position to prevent yarn from being trapped between the tiles. Trapped yarn will adversely affect the appearance of the installation and will cause alignment problems.

J. EcoWorx ES /EcoLogix ES are manufactured with the adhesive already applied. Once the tile is ready to install, simply peel the liner from the back and position snugly to the adjacent tile.

K. Tiles must fit snugly, but not be compressed. Press the entire surface of the tile to ensure adhesion. Check for fit by measuring the length of ten full tiles after installation. The measurement must not be less than, or exceed by more than 1/4 inch, the length of the tiles being multiplied by ten. For example: if 24" X 24" tiles are being installed, the measurement should be between 240 and 240 1/4 inches.

L. Measure and cut tiles from the back using a straight edge. Be sure the arrows are pointing in the correct direction.

M. Roll the entire installation with a 75 lb. or greater roller to assure the proper adhesion to the substrate.

3.4 MAINTENANCE

A. Post-installation Care

1. Place plywood over the carpet when heavy objects will be moved within 24 hours after installation.

B. Preventative Floor Care

1. Use protective chair mats under chairs with casters.
2. Use soil removal mats at exterior entrances.
3. Use absorbent mats in areas where moisture, oil and grease are present.

C. Routine Maintenance

1. Set a schedule depending on traffic and vacuum regularly.
2. Remove spots with spot removers as soon as they occur.
3. Use encapsulation agents periodically.
4. Clean with hot water extraction periodically.

Traffic Level	Vacuum	Spot Removal	Interim Cleaning	Hot Water Extraction
Light	2/week	As needed	As needed	1/year
Moderate	1/day	As needed	As needed	1/year
Heavy	1/day	As needed	Monthly	4/year
Extra Heavy	1/day	As needed	Weekly	Monthly

END OF SECTION 096813

SECTION 097720 – DECORATIVE FIBERGLASS REINFORCED WALL PANELS (FRP)

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Prefinished polyester fiberglass reinforced plastic sheets and PVC trim, adhered to unfinished gypsum wallboard in locations as scheduled on the Drawings.

B. Products Not Furnished or Installed under This Section:

1. Gypsum substrate board.

1.2 RELATED SECTIONS

A. Section 092900 – GYPSUM BOARD: Gypsum substrate board and metal stud framing.

1.3 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM):

1. **ASTM D256** – Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics: Izod Impact Strength (ft. lb. / inch).
2. **ASTM D570** – Standard Test Method for Water Absorption of Plastics: Water Absorption (%).
3. **ASTM D638** - Standard Test Method for Tensile Properties of Plastics: Tensile strength (psi) & Tensile Modulus (psi).
4. **ASTM D790** - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials: Flexural Strength (psi) & Flexural Modulus (psi).
5. **ASTM D2583** - Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor: Barcol hardness.
6. **ASTM D5319** – Standard Specification for Glass-Fiber Reinforced Polyester Wall and Ceiling Panels.
7. **ASTM E84** - Standard Test Method for Surface Burning Characteristics of Building Materials.

1.4 SUBMITTALS

A. Product Data: Submit sufficient manufacturer's data to indicate compliance with these specifications, including:

1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

B. Shop Drawings: Submit elevations of each wall showing location of paneling and trim members with respect to all discontinuities in the wall elevation.

C. Selection Samples: Submit manufacturer’s standard color pattern selection samples representing manufacturer's full range of available colors and patterns.

D. Samples for Verification: Submit appropriate section of panel for each finish selected indicating the color, texture, and pattern required.

1. Submit complete with specified applied finish.
2. For selected patterns show complete pattern repeat.
3. Exposed Molding and Trim: Provide samples of each type, finish, and color.

E. Manufacturers Material Safety Data Sheets (MSDS) for adhesives, sealants and other pertinent materials prior to their delivery to the site.

1.5 QUALITY ASSURANCE

A. Conform to building code requirements for interior finish for smoke and flame spread requirements as tested in accordance with:

1. ASTM E 84 (Standard Test Method for Surface Burning Characteristics of Building Materials):

a. Wall Required Rating – Class A.

B. Sanitary Standards: System components and finishes to comply with:

1. United States Department of Agriculture (USDA) requirements for food preparation facilities, incidental contact.
2. Food and Drug Administration (FDA) 1999 Food Code 6-101.11.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver materials factory packaged on strong pallets.

B. Store panels and trim lying flat, under cover and protected from the elements. Allow panels to acclimate to room temperature (range of 60 to 75°F) for 48 hours prior to installation.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Building is to be fully enclosed prior to installation with sufficient heat (70° F) and ventilation consistent with good working conditions for finish work

B. During installation and for not less than 48 hours before, maintain an ambient temperature and relative humidity within limits required by type of adhesive used and recommendation of adhesive manufacturer.

1. Provide ventilation to disperse fumes during application of adhesive as recommended by the adhesive manufacturer.

1.8 WARRANTY

A. Furnish one year guarantee against defects in material and workmanship.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURER

A. Basis of Design: Marlite; 1 Marlite Drive, Dover, OH 44622. 800-377-1221 FAX (330) 343-4668 Email: info@marlite.com www.marlite.com.

B. Basis of Design Product:

1. Marlite Standard FRP.

2.2 PANELS

A. Fiberglass reinforced thermosetting polyester resin panel sheets complying with ASTM D 5319.

1. Coating: Multi-layer print, primer and finish coats or applied over-layer.
2. Dimensions:

a. Thickness – 0.090 “ (2.29mm) nominal.
b. Width - 4'-0” (1.22m) nominal.
c. Length – 10’-0” (3.0m) nominal.

3. Tolerance:

a. Length and Width: +/-1/8 “ (3.175mm).
b. Square - Not to exceed 1/8 “ for 8 foot (2.4m) panels or 5/32 “ (3.96mm) for 10 foot (2.4m) panels.

B. Properties: Resistant to rot, corrosion, staining, denting, peeling, and splintering.

1. Flexural Strength - 1.0 x 10^4 psi per ASTM D 790. (7.0 kilogram-force/square millimeter).
2. Flexural Modulus - 3.1 x 10^5 psi per ASTM D 790. (217.9 kilogram-force/square millimeter).
3. Tensile Strength - 7.0 x 10^3 psi per ASTM D 638. (4.9 kilogram-force/square millimeter).
4. Tensile Modulus - 1.6 x 10^5 psi per ASTM D 638. (112.5 kilogram-force/square millimeter).
5. Water Absorption - 0.72% per ASTM D 570.
6. Barcol Hardness (scratch resistance) of 35 55 as per ASTM D 2583.
7. Izod Impact Strength of 72 ft. lbs./in as per ASTM D 256.

C. Back Surface: Smooth. Imperfections which do not affect functional properties are not cause for rejection.

D. Front Finish: In accordance with preapproved sample.

1. Color: No. 100 - White.
2. Surface Pebbled.

3. Fire Rating Class A.
4. Size:

a. Marlite FRP

1) 48” x 108” x 0.090” nom.
2) 48” X 120” BY 0.090 nom.
3) Coordinate length (height) with ceiling height of rooms scheduled to receive FRP.

2.3 MOLDINGS

A. SaniSeal Trim: Co-extruded, dual-durometer polypropylene/monprene profiles with Dual-Seal Technology and high-performance pressure sensitive adhesive.

1. S650 Inside Corner, 10’ length.
2. S660 Outside Corner, 10’ length.
3. S665 Division, 8’ length.
4. S670 Edge, 10’ length.
5. Color: as selected by Architect from Manufacturer’s available standard colors.

2.4 ACCESSORIES

A. Fasteners: Non-staining nylon drive rivets.

1. Match panel colors.
2. Length to suit project conditions.

B. Adhesive: Either of the following construction adhesives complying with ASTM C 557.

1. Marlite C-551 FRP Adhesive - Water- resistant, non-flammable adhesive.
2. Marlite C-915 Construction Adhesive - Flexible, water-resistant, solvent based adhesive, formulated for fast, easy application.
3. Titebond Advanced Polymer Panel Adhesive – VOC compliant, non-flammable, environmentally safe adhesive.

C. Sealant:

1. Marlite Brand MS-250 Clear Silicone Sealant.
2. Marlite Brand MS-251 White Silicone Sealant.
3. Marlite Brand - Color Match Sealant.

PART 3 - EXECUTION

3.1 PREPARATION

A. Examine backup surfaces to determine that corners are plumb and straight, surfaces are smooth, uniform, clean and free from foreign matter, nails countersunk, joints and cracks filled flush and smooth with the adjoining surface.

1. Verify that stud spacing does not exceed 24” (61cm) on-center.

B. Repair defects prior to installation.

1. Level wall surfaces to panel manufacturer’s requirements. Remove protrusions and fill indentations.

3.2 INSTALLATION

A. Comply with manufacturer's recommended procedures and installation sequence.

B. Cut sheets to meet supports allowing 1/8” (3 mm) clearance for every 8 foot (2.4m) of panel.

1. Cut and drill with carbide tipped saw blades or drill bits, or cut with shears.
2. Pre-drill fastener holes 1/8” (3mm) oversize with high speed drill bit.

a. Space at 8” (200mm) maximum on center at perimeter, approximately 1” from panel edge.
b. Space at in field in rows 16’ (40.64cm) on center, with fasteners spaced at 12” (30.48 cm) maximum on center.

C. Apply panels to board substrate, above base, vertically oriented with seams plumb and pattern aligned with adjoining panels.

1. Install panels with manufacturer's recommended gap for panel field and corner joints.

a. Adhesive trowel and application method to conform to adhesive manufacturer’s recommendations.
b. Drive fasteners for snug fit. Do not over-tighten.

D. Apply panel moldings to all panel edges using silicone sealant providing for required clearances.

1. All moldings must provide for a minimum 1/8 “ (3mm) of panel expansion at joints and edges, to insure proper installation.
2. Apply sealant to all moldings, channels and joints between the system and different materials to assure watertight installation.

3.3 CLEANING

A. Remove excess sealant from panels and moldings. Wipe panel down using a damp cloth and mild soap solution or cleaner.

B. Refer to manufacturer's specific cleaning recommendations Do not use abrasive cleaners.

END OF SECTION 097720

SECTION 099110 - PAINTING

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 surface preparation, painting, and finishing of exposed interior and exterior items and surfaces.

1. Surface preparation, priming, and finish coats specified in this Section are in addition to shop-priming and surface treatment specified under other Sections.

B. Paint exposed surfaces whether or not colors are designated in schedules, except where a surface or material is specifically indicated not to be painted or is to remain natural. Where an item or surface is not specifically mentioned, paint the same as similar adjacent materials or surfaces. If color or finish is not designated, the Architect will select from standard colors or finishes available.

C. Painting is not required on prefinished items, finished metal surfaces, concealed surfaces, operating parts, and labels.

1. Labels: Do not paint over Underwriters Laboratories, Factory Mutual or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

1.3 SUBMITTALS

A. General: Submit the following according to Conditions of the Contract and Specification Section 013300 – SUBMITTAL PROCEDURES.

B. Product data for each paint system specified, including block fillers and primers.

1. Provide the manufacturer's technical information including label analysis and instructions for handling, storage, and application of each material proposed for use.
2. List each material and cross-reference the specific coating, finish system, and application. Identify each material by the manufacturer's catalog number and general classification.

C. Samples for initial color selection in the form of manufacturer's color charts.

1. After color selection, the Architect will furnish color chips for surfaces to be coated.

D. Samples for Verification Purposes: Provide samples of each color and material to be applied, with texture to simulate actual conditions, on representative samples of the actual substrate in 12" squares.

1. Provide a list of material and application for each coat of each sample. Label each sample as to location and application.
2. Submit samples on the following substrates for the Architect's review of color and texture only:

a. Painted Wood: Provide two 12-inch-square samples of each color and material on hardboard.
b. Stained or Natural Wood: Provide two 4-by-8-inch samples of natural and stained wood finish on actual wood surfaces.

1.4 QUALITY ASSURANCE

A. Applicator Qualifications: Engage an experienced applicator who has completed painting system applications similar in material and extent to those indicated for the Project that have resulted in a construction record of successful in-service performance.

B. Single-Source Responsibility: Provide primers and undercoat paint produced by the same manufacturer as the finish coats.

C. Field Samples: On wall surfaces and other exterior and interior components, duplicate finishes of prepared samples. Provide full-coat finish samples on at least 100 sq. ft. of surface until required sheen, color, and texture are obtained; simulate finished lighting conditions for review of in-place work.

1. Final acceptance of colors will be from job-applied samples.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the job site in the manufacturer's original, unopened packages and containers bearing manufacturer's name and label, and the following information:

1. Product name or title of material.
2. Product description (generic classification or binder type).
3. Manufacturer's stock number and date of manufacture.
4. Contents by volume, for pigment and vehicle constituents.
5. Thinning instructions.
6. Application instructions.
7. Color name and number.

B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F (7 deg C). Maintain containers used in storage in a clean condition, free of foreign materials and residue.

1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

1.6 JOB CONDITIONS

A. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 deg F (10 deg C) and 90 deg F (32 deg C).

B. Apply solvent-thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45 deg F (7 deg C) and 95 deg F (35 deg C).

C. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85 percent; or at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by the manufacturer during application and drying periods.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Basis of Design: Benjamin Moore and Company.
2. Acceptable Alternate: Sherwin Williams Company (S-W).

2.2 PAINT MATERIALS, GENERAL

A. Material Compatibility: Provide block fillers, primers, finish coat materials, and related materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by the manufacturer based on testing and field experience.

B. Material Quality: Provide the manufacturer's best-quality trade sale paint material of the various coating types specified. Paint material containers not displaying manufacturer's product identification will not be acceptable.

1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish the manufacturer's material data and certificates of performance for proposed substitutions.

C. Colors: Provide color selections made by the Architect from the manufacturer's full range of standard colors.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions under which painting will be performed for compliance with paint application requirements. Surfaces receiving paint must be thoroughly dry before paint is applied.

1. Do not begin to apply paint until unsatisfactory conditions have been corrected.
2. Start of painting will be construed as the Applicator's acceptance of surfaces and conditions within a particular area.

B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.

1. Notify the Architect about anticipated problems using the materials specified over substrates primed by others.

3.2 PREPARATION

A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted, or provide surface-applied protection prior to surface preparation and painting. Remove these items, if necessary, to completely paint the items and adjacent surfaces. Following completion of painting operations in each space or area, have items reinstalled by workers skilled in the trades involved.

B. Cleaning: Before applying paint or other surface treatments, clean the substrates of substances that could impair the bond of the various coatings. Remove oil and grease prior to cleaning. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

C. Surface Preparation: Clean and prepare surfaces to be painted according to the manufacturer's instructions for each particular substrate condition and as specified.

1. Provide barrier coats over incompatible primers or remove and reprime. Notify Architect in writing about anticipated problems using the specified finish-coat material with substrates primed by others.
2. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.

a. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.

b. Prime, stain, or seal wood to be painted immediately upon delivery. Prime edges, ends, faces, undersides, and backsides of wood, including cabinets, counters, cases, and paneling.
c. When transparent finish is required, backprime with spar varnish.
d. Backprime paneling on interior partitions where masonry, plaster, or other wet wall construction occurs on backside.
e. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately upon delivery.

3. Ferrous Metals: (***Note: Paint <u>all</u> exposed ferrous metals on the exterior of the building***) Clean ungalvanized ferrous metal surfaces that have not been shop-coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with recommendations of the Steel Structures Painting Council (SSPC).

a. Blast steel surfaces clean as recommended by the paint system manufacturer.
b. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by the paint manufacturer, and touch up with the same primer as the shop coat.

4. Galvanized Surfaces: Clean galvanized surfaces with nonpetroleum-based solvents so that the surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.

D. Materials Preparation: Carefully mix and prepare paint materials according to manufacturer's directions.

1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
2. Stir material before application to produce a mixture of uniform density; stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain material before using.
3. Use only thinners approved by the paint manufacturer and only within recommended limits.

3.3 APPLICATION

A. General: Apply paint according to manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied.

B. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.

1. Paint colors, surface treatments, and finishes are indicated in the schedules.
2. Provide finish coats that are compatible with primers used.

3. The number of coats and the film thickness required are the same regardless of the application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. Sand between applications where sanding is required to produce a smooth even surface according to the manufacturer's directions.
4. Apply additional coats if undercoats, stains, or other conditions show through final coat of paint until paint film is of uniform finish, color, and appearance. Give special attention to ensure that surfaces, including edges, corners, crevices, welds, and exposed fasteners, receive a dry film thickness equivalent to that of flat surfaces.
5. The term exposed surfaces includes areas visible when permanent or built-in fixtures, convector covers, covers for finned tube radiation, grilles, and similar components are in place. Extend coatings in these areas, as required, to maintain the system integrity and provide desired protection.
6. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before the final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
7. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, nonspecular black paint.
8. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
9. Finish interior of wall and base cabinets and similar field-finished casework to match exterior.
10. Finish exterior doors on tops, bottoms, and side edges same as exterior faces.
11. Sand lightly between each succeeding enamel or varnish coat.
12. Omit primer on metal surfaces that have been shop-primed and touch-up painted.

C. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

1. Allow sufficient time between successive coats to permit proper drying. Do not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where application of another coat of paint does not cause the undercoat to lift or lose adhesion.

D. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to the manufacturer's directions.

1. Brushes: Use brushes best suited for the material applied.
2. Rollers: Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by the manufacturer for the material and texture required.
3. Spray Equipment: Use airless spray equipment with orifice size as recommended by the manufacturer for the material and texture required.
4. Spray Application:

    a. Confine spray application to metal framework and similar surfaces where hand brush work would be inferior.

b. Wherever spray application is used, apply each coat to provide the equivalent hiding of brush-applied coats. Do not double back with spray equipment for the purpose of building up film thickness of two coats in one pass.

E. Minimum Coating Thickness: Apply materials no thinner than the manufacturer's recommended spreading rate. Provide the total dry film thickness of the entire system as recommended by the manufacturer.

F. Prime Coats: Before applying finish coats, apply a prime coat of material, as recommended by the manufacturer, to material that is required to be painted or finished and that has not been prime-coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.

G. Pigmented (Opaque) Finishes: Completely cover to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

H. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, cloudiness, color irregularity, runs, brush marks, orange peel, nail holes, or other surface imperfections.

1. Provide satin finish for final coats.

I. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with specified requirements.

3.4 FIELD QUALITY CONTROL

A. The Owner reserves the right at his expense to invoke the following test procedure at any time and as often as the Owner deems necessary during the period when paint is being applied:

1. Quantitative materials analysis.
2. Abrasion resistance.
3. Apparent reflectivity.
4. Flexibility.
5. Washability.
6. Absorption.
7. Accelerated weathering.
8. Dry opacity.
9. Accelerated yellowness.
10. Recoating.
11. Skinning.
12. Color retention.
13 Alkali and mildew resistance.

B. If test results show material being used does not comply with specified requirements, the Contractor may be directed to stop painting, remove noncomplying paint, pay for testing, repaint surfaces coated with rejected paint, and remove rejected paint from previously painted surfaces if, upon repainting with specified paint, the two coatings are incompatible.

3.5 CLEANING

A. Cleanup: At the end of each work day, remove empty cans, rags, rubbish, and other discarded paint materials from the site.

1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping. Be careful not to scratch or damage adjacent finished surfaces.

3.6 PROTECTION

A. Protect work of other trades, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect.

B. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.

1. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.7 EXTERIOR PAINT SCHEDULE

A. General: Provide the following paint systems for the various substrates indicated. Paint products listed are based on Sherwin Williams Company (S-W), however other equivalent painting systems from other paint manufacturers may be submitted for review and approval. Refer to paragraph 2.1.

B. Ferrous Metal: (Metal Doors and Frames, Railings, and Miscellaneous Metals) Note: a separate primer is not required on shop-primed items.

1. Semi-Gloss Alkyd Urethane Enamel: Two finish coats over primer.

a. Touch up shop primer with SW B66-1300 Series, Pro-Cryl® Universal Water Based Primer.
b. First and Second Coats: SW B53-1150 Series, WB Alkyd Urethane Enamel, Semi-Gloss.

C. Zinc-Coated Metal: (Exposed Galvanized Metal)

1. Semi-Gloss Acrylic Enamel: Two finish coats.

a. First and Second Coats: Semi-Gloss Acrylic Enamel.

1) S-W: Pro Industrial™ DTM Acrylic Semi-Gloss Enamel B66W01153 Series – Deep Base (Tint).

D. Concrete:

1. Primer: Acrylic latex primer/sealer. S-W Loxon® Concrete & Masonry Primer/Sealer Interior/Exterior Latex A24W08300 Series – White.
2. First and Second Coats: S-W ConFlex XL Smooth Elastomeric High Build Coating, A5-400 Series.

E. Concrete Block:

1. Primer: Acrylic resin surfacer. S-W Loxon® Block Surfacer, A24W00200 Series.
2. First and Second Coats: S-W ConFlex XL Smooth Elastomeric High Build Coating, A5-400 Series.

F. Concrete & Asphalt Pavements: (Parking lot striping, hazardous area striping, HC parking symbols, concrete curb painting). Coordinate with Division 32 – EXTERIOR IMPROVEMENTS,

1. Traffic Paint, White color: S-W ProMar® Alkyd Fast Dry Zone Marking Paint, TM5494 White.
2. Traffic Paint, Yellow color: S-W ProMar® Alkyd Fast Dry Zone Marking Paint, TM5495 Lead Free Yellow.
3. Traffic Paint, Red color: S-W Setfast® Premium Alkyd Zone Marking Paint, A302 Red.

3.8 INTERIOR PAINT SCHEDULE

A. General: Provide the following paint systems for the various substrates indicated. Paint products listed are based on Sherwin Williams Company (S-W), however other equivalent painting systems from other paint manufacturers may be submitted for review and approval. Refer to paragraph 2.1.

B. Gypsum Drywall Systems: (Gypsum board walls scheduled for paint)

1. Acrylic Latex Eg-Shel (Satin): Three coat system, primer + 2 finish coats.

a. Primer: S-W PVA Interior Latex Primer & Sealer, B28W08000 White.
b. First and Second Coats: S-W ProMar® 200 Zero VOC Interior Latex Eg-Shel, B20W12651 Extra White.

C. Exposed Open Ceilings (Floor/roof deck, exposed structural framing, ductwork, conduit) and Gypsum Board ceilings scheduled for paint:

1. Flat Acrylic Dryfall: Two finish coats over primer (if required.)

a. Primer: Furnish and install as recommended by paint manufacturer for specific substrate receiving paint.
b. Exposed Open Ceilings: First and Second Coats: S-W Pro Industrial™ Waterborne Acrylic Dryfall, B42W02181 Flat White + Custom Color tint to match Sherwin Williams 7069 "Iron Ore" (P-5 on Room Finish Schedule, Sheet A601).
c. Gypsum Board Ceilings: First and Second Coats: S-W Pro Industrial™ Waterborne Acrylic Dryfall, B42W02181 Flat White.
d. Refer to Drawings for specific exposed open ceiling locations and gypsum board ceilings receiving dryfall paint.

D. Painted Woodwork: (Millwork, Doors, and miscellaneous wood where indicated on Drawings to be painted.)

1. Semi-Gloss: Three coat system, primer + 2 finish coats.

a. Primer: S-W Prep Rite® Problock® Interior/Exterior Latex Primer/Sealer, B51W00620 White.
b. First and Second Coats: Interior Semi-Gloss water-based epoxy:

1) S-W Pro Industrial™ Pre-Catalyzed Waterbased Epoxy, K46-150 Series Semi-Gloss, Extra White.

E. Stained Woodwork: (Millwork and miscellaneous trim where indicated on Drawings to be stained).

1. Stained, Varnish Rubbed Finish: Two finish coats over stain.

a. First Stain Coat: Oil-type interior wood stain.

1) S-W Wood Classics® 250 VOC Interior Oil Stain, A49T00804 Clear Base.

b. Second and Third Coats: Waterborne polyurethane varnish.

1) S-W Wood Classics® Waterborne Polyurethane Varnish, A68F00090 Satin Clear.

F. Ferrous Metal: (Metal Doors and Frames)

1. Semi-Gloss Epoxy Finish: Two finish coats over primer.

a. Primer: Synthetic acrylic quick-drying, rust-inhibiting primer.

1) S-W Pro Industrial™ Pro-Cryl Universal Primer, B66W00310 Off White.

b. First and Second Coats: S-W Pro Industrial™ Pre-Catalyzed Waterbased Epoxy, K46-150 Series Semi-Gloss.

END OF SECTION 099110

SECTION 102800 - TOILET ACCESSORIES

PART 1 - GENERAL

1.1 SUBMITTALS

A. Submittals: Manufacturer's product data for each toilet accessory item specified, including details of construction relative to materials, dimensions, gages, profiles, mounting methods, specified options, and finishes.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Basis of Design: Subject to compliance with requirements, provide toilet accessories by:

1. Global Industries.
2. Koala Kare.
3. Bobrick.
4. Bradley.
5. Or approved equivalent.

B. Provide toilet accessories as scheduled on the Drawings. Refer to Drawing Sheet 401 – ENLARGED PLANS & INTERIOR ELEVATIONS.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation: Install toilet accessory units according to manufacturers' printed installation instructions, using fasteners appropriate to substrate as recommended by unit manufacturer. Install units plumb and level, firmly anchored in locations and at heights indicated.

1. Secure mirrors to walls in concealed, tamperproof manner with special hangers, toggle bolts, or screws. Set units plumb, level, and square at locations indicated, in accordance with manufacturer's instructions for type of substrate involved.
2. Adjust toilet accessories for proper operation and verify that mechanisms function smoothly. Replace damaged or defective items.
3. Clean and polish all exposed surfaces strictly according to manufacturer's recommendations after removing temporary labels and protective coatings.

END OF SECTION 102800

SECTION 104116 – EMERGENCY KEY CABINETS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Secure exterior key storage cabinet for use by fire & police departments to obtain rapid building entry. Install in location as shown on the Drawings.

B. Related Sections:

1. Section 042000 – UNIT MASONRY.
2. Section 072413.23 – ALUMINUM COMPOSITE MATERIAL (ACM) PANELS.

C. Reference Standards:

1. National Fire Protection Association (NFPA).

2. Underwriters Laboratories (UL):

a. **UL 437** – Standard for Key Locks.
b. **UL 1037** – Standard for Anti-Theft Alarms and Devices.
c. **UL 1332** – Standard for Organic Coatings for Steel Enclosures for Outdoor Use Electrical Equipment.
d. **UL 1610** – Standard for Central-Station Burglar-Alarm Units.

1.2 SUBMITTALS

A. Submit the following under provisions of Section 013300 – SUBMITTAL PROCEDURES:

1. Product Data and manufacturer's standard installation methods and details.
2. Shop Drawings: Include methods of installation differing from manufacturer's standard details. Indicate dimensions, clearances, depth of recess, anchors, and accessories.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Store product in manufacturer's unopened packaging until ready for installation.

1.4 COORDINATION

A. Coordinate Work with other operations and installation of adjacent finish materials to avoid damage to installed materials.

PART 2 – PRODUCTS

2.1 MANUFACTURER

A. Basis of Design: Knox Company, 1601 W. Deer Valley Road, Phoenix, AZ 85027, (800) 552-5669; Fax: (623) 687-2290; www.knoxbox.com.

2.2 HIGH-SECURITY KEY LOCK BOX

A. Basis of Design: Knox Box 3200, surface mount key lock box with the following features:

1. ¼" plate steel housing.
2. ½" thick steel door with stainless steel hinge and interior weather-resistant gasket seal.
3. Box assembly shall be UL listed and meet requirements of UL 437, UL 1037, UL 1332, and UL 1610, and NFPA Fire Code.
4. Exterior Dimensions:

    a. Surface Mount Body: 4" high x 5" wide x 3-7/8" deep.

5. Mounting: Surface mount..
6. Lock: UL listed. Double-acting rotating tumblers and hardened steel pins accessed by a biased cut key. 1/8" thick stainless steel dust cover with tamper seal mounting capability.
7. Finish: Knox-Coat proprietary finishing process.
8. Color: Aluminum.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine conditions of substrates and other adjacent conditions under which this Work is to be performed.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using methods recommended by manufacturer for achieving the best result for the substrate under project conditions.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Use anchorage devices to securely fasten assembly to wall construction without distortion or stress.

C. Install and align unit, level and plumb, and at recommended mounting height.

3.4 CLEANING

A. Clean unit using non-abrasive materials and methods recommended by manufacturer.

B. Touch-up, repair, or replace damaged components before Substantial Completion.

3.5 PROTECTION

A. Protect installed unit until Substantial Completion and acceptance by Owner.

END OF SECTION 104116

SECTION 104416 - FIRE EXTINGUISHERS, CABINETS, AND ACCESSORIES

PART 1 - GENERAL

1.1 SUBMITTALS

A. Submittals: Submit the following:

1. Product Data: Include rough-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type and materials, trim style, door construction, panel style, and materials.

B. Coordination: Verify that cabinets are sized to accommodate type and capacity of extinguishers indicated.

1.2 PRODUCT REQUIREMENTS

A. UL-Listed Products: Fire extinguishers shall be Underwriters Laboratories (UL) listed with UL listing mark for type, rating, and classification of extinguisher.

B. FM-Listed Products: Fire extinguishers approved by Factory Mutual (FM) Research Corporation for type, rating, and classification of extinguisher with FM marking.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Basis of Design: J.L. Industries / ACTIVAR Construction Products Group, Inc. Bloomington, MS 55431, (800) 554-6077, www.activarcpg.com.

2.1 PRODUCTS

A. Fire Extinguisher Cabinet (F.E.C.)

1. Basis of Design: Fire Extinguisher Cabinet shall be Ambassador Series 1013V10 with painted white door & trim, vertical duo gray acrylic glazing, with recessed pull, fully or semi recessed (as wall depth will allow), or approved equivalent. Refer to the Drawings for locations.

B. Fire Extinguisher Bracket (F.E.B.)

1. Basis of Design: Fire Extinguisher Bracket shall be #MB-846, or approved equivalent. Refer to the Drawings for locations requiring wall brackets.

C. Fire Extinguishers

1. Fire Extinguisher No. 1: Basis of Design: Cosmic Multi-Purpose Dry Chemical, Model 10E, 10 pound, UL Rated 4A-80BC, or approved equivalent. Install in each fire extinguisher cabinet and at each fire extinguisher bracket in locations as shown on the Drawings

2. Fire Extinguisher No. 2: Basis of Design: Saturn Class K Wet Chemical, Model 15, 1.8 gal., UL Rated 1-A:K or 2-A:K, , or approved equivalent. Install in Kitchen 129 location as indicated on the Drawings using wall bracket #MB810C, or approved equivalent.
3. Fire Extinguisher No. 3: Basis of Design: Sentinel Carbon Dioxide, Model 10, 10 pounds, UL Rated 10BC, or approved equivalent. Install in locations as indicated on the Drawings using wall bracket #MB810C, or approved equivalent.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation: Follow manufacturer's printed instructions.

B. Install at heights indicated (not to exceed 4'-0" to top of extinguisher) or if not indicated, at heights to comply with applicable regulations of governing authorities.

1. Prepare wall recesses for cabinets as required by type and size of cabinet and style of trim and to comply with manufacturer's instructions.
2. Fasten mounting brackets and fire extinguisher cabinets to structure, square and plumb.

END OF SECTION 104416