Bus Transportation Facility

Mehlville R-IX School District
St. Louis, Missouri 63125

100% ISSUED FOR BIDDING CONSTRUCTION DOCUMENTS - PROJECT MANUAL
VOLUME I

September 1, 2026
BLDD Project # 257EX18.400

BLDD ARCHITECTS

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PROJECT MANUAL FOR: Bus Transportation Facility
Mehlville School District
257EX18.400

DATE: September 1, 2026

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All drawings are dated September 1, 2026.

END 00 0115

Owner: Mehlville R-IX School District
2900 Lemay Ferry Road
St. Louis, Missouri 63125

Architect: BLDD Architects, Inc.
103 West Lockwood Ave., Suite 218
St. Louis, MO 63119
(844) 784-4440

Qualified Contractors are invited to submit an offer for the Mehlville School District – Bus Transportation Facility Project. Sealed Bids will be received by Mr. Mike Gegg, at the District Central Office, 2900 Lemay Ferry Road, St. Louis, Missouri 63125 before 2:00 p.m. local prevailing time on September 29, 2026. Bids will be publicly opened and read aloud at that time.

The project consists of: A new transportation facility building, storage building & dumpster enclosure, demolition of the existing facilities and site work scope that includes bus and car parking, retaining walls, landscape, utility work, etc.

Contract Documents will be available on September 1, 2026. Contractors may obtain electronic documents and/or printed documents from County Blue Reprographics, www.countyblue.com, (314) 961-3800. A refundable deposit of $100.00 is required for printed documents. Checks to be made payable to the Mehlville School District.

For project related questions please contact BLDD Architects, Laura Wunderlich via email laura.wunderlich@bldd.com

A Bid Bond and Performance and Payment Bond will be required.

The Owner reserves the right to accept or reject any or all offers, or to waive any informalities in the bidding.

The successful bidder must agree to conform to the current rules and regulations of the Fair Employment Practices Commission.

Attention is called to the provisions of Equal Employment Opportunity.

Contractor shall comply with the Missouri Department of Labor and Industrial Relations, Prevailing Wage Rates and be enrolled in the E-Verify Federal Work Authorization Program.

A Pre-Bid Conference will be held at the project site, Mehlville School District Transportation Facility, 3100 Lemay Ferry Rd, St. Louis, MO 63125 at 2:00 p.m. on September 8, 2026.

All prospective bidders are encouraged to attend, but attendance, is not mandatory. Site inspections before or after this date shall be arranged through Mike Gegg at (314) 467-7870 a minimum of 24 hours in advance of the inspection. Contractors are responsible for field verifying all conditions and dimensions prior to bidding.

END 00 1116

INSTRUCTION TO BIDDERS

The Instructions to Bidders of this Contract is AIA A701 - 2018 “Instructions to Bidders”, hereinafter referred to as the "Instructions to Bidders", whether bound within or not.

SUPPLEMENTARY INSTRUCTION TO BIDDERS

The following supplements modify, change, delete or add to parts of the Instruction to Bidders. Where parts are changed, deleted from or added by the following Articles, the unaffected parts of that provision shall remain in effect.

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AMENDMENTS

ARTICLE 2 - BIDDERS REPRESENTATIONS

Paragraph 2.1.7 -- The following paragraph added:

2.1.7 Contractors will not be given extra payment for conditions which can be determined by examining the site and documents.

ARTICLE 3 - BIDDERS DOCUMENTS

Paragraph 3.1.2 -- The following paragraph amended:

3.1.2 Delete the word “Ten” and inserting the word “Fifteen” in its place.

Paragraph 3.2.2 -- Deleted and the following substituted:

3.2.2 Bidders and sub-bidders requiring clarification or interpretation of the bidding documents shall make a request in written format no later than 72 hours, (excluding weekends and / or holidays) prior to the official bid time.

Paragraph 3.4.3 -- The following paragraph amended:

3.4.3 In the first sentence replace “four days” with “48 hours”.

ARTICLE 4 - BIDDING PROCEDURES

Paragraph 4.1.1 -- Deleted and the following substituted:

4.1.1 Bids shall be submitted in Duplicate on Forms provided in specification.

Paragraph 4.2 -- Deleted and the following substituted:

4.2 BID SECURITY

Paragraph 4.2.1 through 4.2.4 -- Deleted and the following substituted:

4.2.1 Bid security shall be either a certified check, bank draft or bid bond made payable to the Owner in the amount of 5% of the bid.

4.2.2 Each bid must be accompanied by a bid security in the required form and amount pledging that the bidder will enter into a contract with the Owner on the terms stated in his bid and will cover that faithful performance of the Contract and the payment of all obligations arising thereunder. Should the bidder refuse to enter such Contract, the amount of the bid security shall be forfeited to the Owner as liquidated damages, not as a penalty.

4.2.3 Bid bonds shall be written in the form of AIA Document A310 Bid Bond duly executed by the bidder as principal and having as surety thereon a surety company approved by the Owner. The Attorney-in-fact who executes the bond on behalf of the surety shall affix to the bond a certified copy of his power-of attorney. Surety shall be licensed to conduct business in the State of Missouri and shall be acceptable to the Owner.

4.2.4 Owner will have the right to retain the bid security of bidders until: the contract has been executed; the specified time has elapsed so the bids may be withdrawn; or all bids have been rejected.

Paragraph 4.3 -- The following sub paragraph is modified:

4.3.1 A Bidder shall submit its Bid as indicated below.

4.3.1.1 Bids shall be delivered prior to bid date and time to:

Mehlville School District
2900 Lemay Ferry Road
St Louis, MO 63125

4.3.2.1 Bids shall be in a sealed opaque envelope plainly marked on the outside and delivered to:

Bus Transportation Facility
2900 Lemay Ferry Road
St. Louis, Missouri 63125
Attn: Mr. Mike Gegg

4.3.2.2 Each bid must be submitted on the prescribed form with all blank spaces for bid prices filled in, in ink or type written.

4.3.2.3 Proposal shall not contain any qualifications or recapitulation of the work to be done.

4.3.2.4 All erasures or corrections in Proposals must be initialed by the person signing the proposal.

Paragraph 4.5 -- The following new paragraphs are added:

4.5.1 The Owner is not subject to sales tax on materials and supplies ordered for and paid for in connection with the Work. The Bidder in preparing the bid shall not include normally applicable sales taxes on materials and supplies.

4.5.2 Each bidder agrees to pay, and must require each subcontractor to pay, not less than the general prevailing rate of hourly wages for work of a similar character in the locality in which the work is performed, and not less than the general prevailing rate of hourly wages for legal holidays and overtime work as determined by the Missouri Department of Labor, pursuant to the Missouri Division of Labor standards Annual Wage Order for St. Louis County.

4.5.3 The Bidder shall take into account in preparing the bid the Wage Rate Determination received from the State of Missouri Division of Labor Standards which is applicable to this Project and to which the successful Contractor must comply under the provisions of Section 290.220 RSMo.

4.5.4 Contractor shall comply with RSMo. 292.675 and provide a ten-hour OSHA construction safety program for on-site employees which includes a course in construction safety and health approved by OSHA or a similar program approved by the Missouri Department of Labor and Industrial Relations which is at least as stringent as an approved OSHA program. All employees are required to complete the program within 60 days of beginning work on such project. If RSMo. 292.675 applies, Contractor shall forfeit as a penalty to Owner, $2,500 plus $100 for each employee employed by Contractor or its subcontractors for each calendar day or portion thereof that any such employee is employed without the required training.

4.5.5 During periods of excessive unemployment (any month immediately following two consecutive calendar months during which the level of unemployment in the state has exceeded five percent as measured by the United States Bureau of Labor Statistics) only Missouri laborers (persons who are residents) and laborers from non-restrictive states (persons who are residents of a state which has not enacted state laws restricting Missouri laborers from working on public works projects in that state, as determined by the Labor and Industrial Relations Commission) (see Excessive Unemployment section), may be employed under the contract, except that other laborers may be used when Missouri laborers or laborers from nonrestrictive states are not available, or are incapable of performing the particular type of work involved, if so certified by the contractor and approved by the contracting officer.

4.5.6 Every transient employer, as defined in section 285.130, RSMo, enclosed in the laws section, must post in a prominent and easily accessible place at the work site a clearly legible copy of the following: (1) The notice of registration for employer withholding issued to such transient employer by the director of revenue; (2) Proof of coverage for workers' compensation insurance or self-insurance signed by the transient employer and verified by the department of revenue through the records of the division of workers' compensation; and (3) The notice of registration for unemployment insurance issued to such transient employer by the division of employment security. Any transient employer failing to comply with these requirements shall, under section 285.234, RSMo, enclosed in the laws section, be liable for a penalty of five hundred dollars per day until the notices required by this section are posted as required by that statute.

4.5.7 Any transient or out of state employers must file a financial assurance instrument and post in a prominent and easily accessible place at the work site: (1) The notice of registration for employer withholding issued to such transient employer by the director of revenue; (2) Proof of coverage of workers' compensation insurance verified by the department of revenue; and (3) The notice of registration for unemployment insurance issued to such transient employer by the division of employment security. Any transient employer failing to comply shall be liable for a penalty of five hundred dollars per day until the required notices are posted. Transient employers that fail to conclusively show that they have filed the required financial assurances must, before starting performance any contract with a political subdivision, provide an amount equal to a portion of its labor costs to be held in escrow by the political subdivision. Failure of a political subdivision to properly escrow these funds will make it ineligible to receive state funds for public works projects for a period of one year (285.230 through 285.234, RSMo).

4.5.8 A legible list of all prevailing wage rates must remain posted in a prominent and easily accessible place at the worksite by each contractor and subcontractor on the project. Require the notice to be posted during the full time that any worker is employed on the job.

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

4.5.10 If the successful bidder is or part of in any way a foreign corporation transacting business on this project, the vendor is responsible to obtain a "Certificate of Authority" form-Corp-42 from the Missouri Secretary of State. Every foreign corporation now doing business in or which may hereafter do business in the state of Missouri without a certificate of authority shall be subject to a fine of not less than one thousand dollars (Sections 351.572 and 351.574, RSMo).

4.5.11 In the event a wage subsidy, bid supplement, or rebate is lawfully provided or received under subsections 1 or 2 of section 290.095 RSMo, the entity receiving such subsidy, supplement, or rebate shall report the date and amount of such subsidy, supplement, or rebate to the owner within thirty days of receipt of payment. This disclosure report shall be a matter of public record under chapter 610, RSMo.

4.5.12 Upon award of this project pursuant to sections 290.216 through 290.840, RSMo, the contractor must submit Form PW-2 (05-16) AI to the Missouri State Division of Labor Standards.

ARTICLE 5 - CONSIDERATION OF BIDS

Paragraph 5.2.1 -- The following new paragraph added:

5.2.1 The Owner reserves the right to disqualify bids, before and after opening upon evidence of collusion with intent to defraud or other illegal practices upon the part of the Bidder.

Paragraph 5.3.3 -- The following paragraph added:

5.3.3. All bids shall be in effect for a minimum of 60 days. Bidder may not withdraw or alter their bid during that time period.

ARTICLE 6 - POST-BID INFORMATION

Paragraph 6.1 -- Deleted and the following substituted:

6.1.1 Contractor shall submit with the Bid Proposal an executed copy of the "Contractor's Qualifications Statement" (AIA form A305). All blank spaces shall be completed with information requested, and form must be notarized. Failure to submit this form with Contractor's bid proposal may be cause for rejection of Contractor's bid.

6.1.2 Contractor shall submit with the Bid Proposal an executed copy of the Federal Work Authorization Program (“E-Verify”) Addendum and Federal Work Authorization Program affidavit found in the body of this document (at end of this section).

ARTICLE 7 - PERFORMANCE BOND AND PAYMENT BOND

Paragraph 7.1 (Except 7.1.4) -- Deleted and the following substituted:

7.1 Amount of bond provided.

7.1.1 The contractor shall furnish a Performance Bond in an amount equal to one hundred percent (100%) of the Contract Sum as security for the faithful performance of this contract and also a Labor and Material Payment bond in an amount not less than one hundred percent (100%) of the Contract Sum or in penal sum not less than that prescribed by state, or local law, as security for the payment of all persons performing labor on the project under this Contract and furnishing materials in connection with this Contract.

7.1.2 The performance Bond and the Labor and Material Payment Bond may be in one or in separate instruments in accordance with local law.

7.1.3 Surety shall be a company with an A+ Best rating and licensed to do business in the State of Missouri and shall be acceptable to the Owner.

Paragraph 7.2 -- The following new paragraph is added:

7.2.5 As set forth in 107.170 RSMo, the Bidder shall deliver with the bonds a letter which certifies that the "bonding company is solvent and that the representations made in the purported bond are true and correct." The quoted phrase was taken directly from the statute.

ARTICLE 8 – ENUMERATION OF THE PROPOSED CONTRACT DOCUMENTS

Paragraph 8.1 – Deleted and the following substituted:

8.1 The accepted bidder shall execute the formal Contract Agreement, and within five (5) days following its presentation to the owner shall be returned to the Contractor.

Paragraph 8.1.5 – Drawings dated September 1, 2026.

Paragraph 8.1.6 – Specifications dated September 1, 2026.

Paragraph 8.2 -- The following new paragraph added:

8.2 Commencement of work.

8.2.1 Notwithstanding any delay in the preparation and execution of the formal Contract Agreement, each Bidder shall be prepared, upon notice of bid acceptance, to commence work within 7 days following notice from the Owner to proceed.

ARTICLE 9 -- TAX EXEMPTIONS

Add the following:

9.1 TAX EXEMPT POLITICAL SUBDIVISION

9.1.1 The Owner requests that it is exempt from sales tax.

END 00 2100

1. GENERAL

1.1. WORK INCLUDES

A. This contract calls for the construction of a "public work" within the meaning of the Missouri Prevailing Wage Act, Law, 290.210-290.340 RSMo. The Law requires contractors and subcontractors to pay all workers performing services on public works projects no less than the "prevailing rate of wages" (hourly cash wages plus fringe benefits) in the county where the work is performed. Each contractor and subcontractor rendering services under this contract must comply with all requirements of this Law. Each contractor and subcontractor shall keep records of the prevailing wages paid to their employees, submit a monthly certified payroll to the Owner.

B. The current Prevailing Hourly Rate of Wages are defined in the Annual Wage Order attached to and made part of the specifications for Work under the Contract.

1. Prevailing wage rates change periodically. Contractor shall verify and revise the prevailing wages on a regular basis.

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

D. The contractor and all subcontractor to the contract must require all on-site employees to complete the ten-hour construction safety training program required under Section 292.675, RSMo, unless they have previously completed the program and have documentation of having done so.

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

2. PRODUCTS

Not Used

3. EXECUTION

Not Used

END 00 3101

Missouri
Division of Labor Standards
WAGE AND HOUR SECTION

MIKE KEHOE, Governor

Annual Wage Order No. 33

Section 100
ST. LOUIS COUNTY

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

Original Signed by
Logan Hobbs, Director
Division of Labor Standards

Filed With Secretary of State: **March 10, 2026**

Last Date Objections May Be Filed: **April 9, 2026**

Prepared by Missouri Department of Labor and Industrial Relations

ST. LOUIS COUNTY

OCCUPATIONAL TITLE	**Prevailing Hourly Rate
Asbestos Worker	$72.26
Boilermaker	$44.93*
Bricklayer - Stone Mason	$65.89
Carpenter	$69.38
Lather	
Linoleum Layers & Cutter	
Millwright	
Pile Driver	
Cement Mason	$61.40
Plasterer	
Communication Technician	$67.84
Electrician (Inside Wireman)	$79.41
Electrician (Outside Lineman)	$44.93*
Outside - Groundman	
Outside - Groundman Tree Trimmer	
Outside - Lineman Operator	
Outside - Lineman Tree Trimmer	
Elevator Constructor	$106.30
Glazier	$71.63
Iron Worker	$75.80
Laborer	$58.92
Laborer - First Semi-Skilled	
Laborer - General	
Laborer - Second Semi-Skilled	
Laborer - Skilled	
Mason	$57.31
Marble Finisher	
Marble Mason	
Terrazzo Finisher	
Terrazzo Worker	
Tile Finisher	
Tile Setter	
Operating Engineer	$76.62
Operating Engineer - Group I	
Operating Engineer - Group II	
Operating Engineer - Group III	
Operating Engineer - Group III - A	
Operating Engineer - Group IV	
Operating Engineer - Group V	
Painter	$57.67
Plumber	$83.99
Pipe Fitter	
Roofer/WaterProofer	$62.13
Sheet Metal Worker	$78.63
Sprinkler Fitter - Fire Protection	$88.12
Truck Driver	$44.93*
Truck Control Service Driver	
Truck Driver, Teamsters Group I	
Truck Driver, Teamsters Group II	
Truck Driver, Teamsters Group III	
Truck Driver, Teamsters Group IV	

*** The Division of Labor Standards received fewer than 1,000 reportable hours for this occupational title. The public works contracting minimum wage is established for this occupational title using data provided by Missouri Economic Research and Information Center.**

****The Prevailing Hourly Rate includes any applicable fringe benefit amounts for each occupational title as defined in RSMo Section 290.210.**

ST. LOUIS COUNTY

OCCUPATIONAL TITLE	**Prevailing Hourly Rate
Carpenter	$70.28
Millwright	
Pile Driver	
Electrician (Outside Lineman)	$77.51
Outside - Groundman	
Outside - Groundman Tree Trimmer	
Outside - Lineman Operator	
Outside - Lineman Tree Trimmer	
Laborer	$59.45
Laborer - General	
Laborer - Skilled	
Operating Engineer	$76.52
Operating Engineer - Group I	
Operating Engineer - Group II	
Operating Engineer - Group III	
Operating Engineer - Group IV	
Truck Driver	$40.45
Truck Control Service Driver	
Truck Driver, Teamsters Group I	
Truck Driver, Teamsters Group II	
Truck Driver, Teamsters Group III	
Truck Driver, Teamsters Group IV	

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

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

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

***The Division of Labor Standards received fewer than 1,000 reportable hours for this occupational title. Public works contracting minimum wage is established for this occupational title using data provided by Missouri Economic Research and Information Center.**

****The Prevailing Hourly Rate includes any applicable fringe benefit amounts for each occupational title.**

OVERTIME
and
HOLIDAYS

OVERTIME

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

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

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

HOLIDAYS

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

If any holiday falls on a Sunday, the following Monday shall be considered a holiday.

WAGE DETERMINATION

The undersigned understands and agrees to pay and to ensure that each contractor employed on the project pays not less than the prevailing hourly rate of wages for work of a similar character in the locality in which the work is performed, as more particularly determined by the Missouri Department of Labor and Industrial Relations in its wage determination dated March 10, 2025 (Wage Order #32) or as the same may be amended from time to time by the department.

The undersigned further agrees to pay as a penalty to The Mehlville School District the sum of $100.00 for each workman employed by the contractor and by any subcontractor employed on the project for each calendar day or portion thereof that such workmen is paid less than the stipulated rates for any work done under said contract.

BIDDERS CERTIFICATE

The undersigned hereby certifies:

That this proposal is genuine and is not made in the interest of or on behalf of any undisclosed person, firm or corporation, and is not submitted in conformity with any agreement or rules of any group, association or corporation.

That he has not directly or indirectly induced or solicited any other bidder to put in a false or sham proposal.

That he has not solicited or induced any person, firm or corporation to refrain from bidding; and

That he has not sought by collusion or otherwise to obtain for himself any advantage over any other bidder or over the Owner.

The undersigned will not discriminate against any employee or applicant for employment because of race, creed, color or national origin in connection with the performance of the work.

Respectfully Submitted,

_____

(Bidder sign here)

Section 00 0122 – Federal Work Authorization Program ("E-Verify") Addendum

Pursuant to Missouri Revised Statute 285.530, all business entities awarded any contract in excess of five thousand dollars ($5,000) with a Missouri public school district must, as a condition to the award of any such contract, be enrolled and participate in a federal work authorization program with respect to the employees working in connection with the contracted services being provided, or to be provided, to the District (to the extent allowed by E-Verify). In addition, the business entity must affirm the same through sworn affidavit and provision of documentation. In addition, the business entity must sign an affidavit that it does not knowingly employ any person who is an unauthorized alien in connection with the services being provided, or to be provided, to the District.

Accordingly, your company:

a) agrees to have an authorized person execute the attached "Federal Work Authorization Program Affidavit" attached hereto as Exhibit A and deliver the same to the District prior to or contemporaneously with the execution of its contract with the District;

b) affirms it is enrolled in the "E-Verify" (formerly known as "Basic Pilot") work authorization program of the United States, and are participating in E-Verify with respect to your employees working in connection with the services being provided (to the extent allowed by E-Verify), or to be provided, by your company to the District;

c) affirms that it is not knowingly employing any person who is an unauthorized alien in connection with the services being provided, or to be provided, by your company to the District;

d) affirms you will notify the District if you cease participation in E-Verify, or if there is any action, claim or complaint made against you alleging any violation of Missouri Revised Statute 285.530, or any regulations issued thereto;

e) agrees to provide documentation of your participation in E-Verify to the District prior to or contemporaneously with the execution of its contract with the District (or at any time thereafter upon request by the District), by providing to the District an E-Verify screen print-out (or equivalent documentation) confirming your participation in E-Verify;

f) agrees to comply with any state or federal regulations or rules that may be issued subsequent to this addendum that relate to Missouri Revised Statute 285.530; and

g) agrees that any failure by your company to abide by the requirements a) through f) above will be considered a material breach of your contract with the District.

By: _____
(Signature)

Printed Name and Title: _____

For and on behalf of: _____
(Company Name)

EXHIBIT A

FEDERAL WORK AUTHORIZATION PROGRAM AFFIDAVIT

I, _____, being of legal age and having been duly sworn upon my oath, state the following facts are true:

1. I am more than twenty-one years of age; and have first-hand knowledge of the matters set forth herein.

2. I am employed by _____ (hereinafter "Company") and have authority to issue this affidavit on its behalf.

3. Company is enrolled in and participating in the United States E-Verify (formerly known as "Basic Pilot") federal work authorization program with respect to Company's employees working in connection with the services Company is providing to, or will provide to, the District, to the extent allowed by E-Verify.

4. Company does not knowingly employ any person who is an unauthorized alien in connection with the services Company is providing to, or will provide to, the District. FURTHER AFFIANT SAYETH NOT.

By: _____ (individual signature) For

_____ (company name) Title:

_____

Subscribed and sworn to before me on this _____ day of _____ 202__

NOTARY PUBLIC

My commission expires:

1. GENERAL

1.1. REQUIREMENTS INCLUDE

A. General Contractor:

1. Verify data and existing conditions.
2. At Contractor's option, perform additional subsurface investigation at own expense.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 1000 - Project Summary
2. Section 01 4500 - Quality Control
3. Section 31 2000 - Earthwork

B. By others: The Owner has caused borings to be made at the site by SCI Engineering, Inc., 130 Point West Blvd., St. Charles, MO 63301. (636) 949-8200.

1. Soil boring location diagram and log are included in this Section.
2. Soil boring data is included for information only. The Owner and the Architect do not guarantee the accuracy or validity of the data, nor do they assume any responsibility for the Contractor's interpretation of the data.

1.3. SOIL BORING DATA

A. See attached.

END 00 3132

SCI ENGINEERING, INC.
130 Point West Boulevard
St. Charles, Missouri 63301
636-949-8200
www.sciengineering.com

Geotechnical Report

MEHLVILLE SCHOOL DISTRICT BUS TRANSPORTATION FACILITY
ST. LOUIS COUNTY, MISSOURI

July 2026

MEHLVILLE SCHOOL DISTRICT
Owner

BLDD ARCHITECTS
Architect

EXCELSIOR ENGINEERING, LLC
Civil Engineer

DocuSigned by:
B8C4CBAF1BE9491...

SCI No. 2026-1010.10

7/28/2026



SCI ENGINEERING, INC.
EARTH • SCIENCE • SOLUTIONS
GEOTECHNICAL
ENVIRONMENTAL
NATURAL RESOURCES
CULTURAL RESOURCES
CONSTRUCTION SERVICES

July 28, 2026

Mike Gregg
Mehlville School District
69 Randolf Road
St. Louis, Missouri 63125

c/o BLDD Architects
Attn: Laura Wunderlich
103 West Lockwood, Suite 218
St. Louis, Missouri 63119

RE: Geotechnical Report
Mehlville School District Bus Transportation Facility
St. Louis County, Missouri
SCI No. 2026-1010.10

Dear Mike Gregg:

Attached is SCI Engineering, Inc.'s *Geotechnical Report*, dated July 2026. It should be read in its entirety, and our recommendations applied to the design and construction of the project. Selected excerpts from the report are highlighted below:

- Undocumented existing clay fill with varying amounts of sand and gravel was encountered in eleven of the fourteen borings to depths ranging between 2 and 6 feet. There is some risk of settlement or other performance problems if the foundations, floor slab, retaining wall, or pavements are supported on the fill material. To eliminate this risk, all of the existing fill would have to be removed and recompacted or placed. However, based on the results of the field and laboratory testing, the fill appears to have been placed with some level of compactive effort and is generally as stiff as the underlying native soils. Additionally, portions of the existing fill will be concurrently treated during expansive clay remediation as discussed in Section 4.2. Based on the estimated time the fill has been in place, the consistency of the fill, the recommended expansive clay remediation, and the planned fills, the risk of supporting the proposed improvements on the fill is judged to be low, with proper proofrolling and treatment. SCI personnel should check the fill during construction to identify any soft or otherwise unsuitable fill requiring selective undercuts and replacement with engineered fill, prior to the placement of additional fill or construction of the building or retaining wall.

- Existing fill and native clays with a liquid limit of 45 or higher, or plasticity index (PI) values of 25 or higher, were encountered throughout the site. These clays are susceptible to excessive volume change with variation in moisture content. Expansive clay remediation will likely be recommended for the building foundations, floor slab, and retaining wall as discussed in Section 4.2.

- Shallow spread footing foundations bearing in native lean clay, remediated fat clay, or newly placed, low plastic structural fill, are appropriate for support of the proposed building and can be sized for maximum net allowable bearing pressures of 2,000 pounds per square foot (psf) for continuous wall footings and 2,400 psf for isolated spread footings.

- Based on the planned grading, we anticipate that the retaining wall will bear on undocumented existing fill and native expansive clays. We recommend that expansive clay be remediated in accordance with Section 4.2. A net allowable bearing pressure of 2,000 psf may be used for the retaining wall provided it bears on a minimum of 2 feet of native lean clay, suitable existing fill, or newly placed structural fill. **Global stability analyses is recommended for the retaining wall with an exposed height of 5 feet or more.** SCI can provide a proposal for global stability analyses, if requested.

- The site is classified as Seismic Site Class C with the following seismic design parameters: F_a = 1.20, F_v = 1.62, S_{DS} = 0.38, and S_{D1} = 0.19. The Seismic Design Category is C.

We appreciate the opportunity to be of service and look forward to working with you during the construction phase of the project. If you have any questions or comments, please do not hesitate to contact me.

Respectfully,

SCI ENGINEERING, INC.

Michael J. Newbanks, E.I.T.
Staff Engineer

Shari A. Cunningham, P.E.
Senior Engineer

MJN/SAC/tkh/snp

Enclosure
Geotechnical Report

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Appendix A - Boring Log Legend and Nomenclature, Boring Logs
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Geotechnical Report

MEHLVILLE SCHOOL DISTRICT BUS TRANSPORTATION FACILITY
ST. LOUIS COUNTY, MISSOURI

1.0 INTRODUCTION

At the request of Laura Wunderlich of BLDD Architects, SCI Engineering, Inc. (SCI) conducted a geotechnical study for the Mehlville School District transportation facility. The purpose of our exploration was to characterize and evaluate the subsurface conditions, provide recommendations for foundations, and address other geotechnical aspects. Our services were provided in general accordance with our Geotechnical Services Proposal, dated June 3, 2026, and authorized on the same day by Mike Gegg of Mehlville School District.

2.0 SITE AND PROJECT DESCRIPTION

Improvements are planned for the existing Mehlville School District transportation facility, located at 3120 Lemay Ferry Road in St. Louis County, Missouri. The location of the site is shown on the *Vicinity and Topographic Map*, Figure 1. The site features existing asphalt bus and car parking throughout, with three bus maintenance buildings in the southern portion of the site. The site is grass-covered between Lemay Ferry and the parking area and south of the existing bus maintenance buildings and the Mehlville High School stadium. Topography at the site generally slopes from the north downwards towards the southeast and southwest with approximately 10 and 12 feet of relief, respectively. Based on available historical aerial imagery, the original maintenance building was constructed sometime between 1958 and 1968, with the other maintenance buildings constructed between 1986 and 1996 and pavement additions made through the early 2000's. The existing site conditions are shown on the *Aerial Photograph*, Figure 2.

Based on the *MSD Transportation Building + Office - Sheet C2.0* prepared by Excelsior Engineering, LLC, dated July 13, 2026, the planned improvements include demolition of the existing maintenance buildings and construction of a new maintenance building in the northern portion of the site. The maintenance building will be a single-story, slab-on-grade structure, with new parking and drives surrounding the building. A cast-in-place retaining wall, approximately 300 feet in length, is planned in the eastern portion of the site. The wall will have a maximum height of approximately 8 feet. Grading at the site will consist of cuts and fills on the order of 6 and 3 feet or less, respectively, throughout the site. Structural loads were

not available at the time of this report; however, we anticipate that the building will have column loads of less than 150 kips and wall loads of less than 4 kips per lineal foot. The proposed construction is shown on the *Site Plan*, Figure 3.

SCI previously completed a geotechnical investigation at the site and issued a Geotechnical Report titled *Mehlville School District Transportation Project, St. Louis County, Missouri*, dated November 12, 2021.

We have not reviewed, nor are we aware of, any additional previous studies on this specific site, by others, that would affect the preparation of this report.

3.0 SUBSURFACE CONDITIONS

Nine borings (B-1 through B-9) were drilled and two Refraction Micro-tremor (REMI) traverses (T-1 and T-2) were conducted during our October 2021 exploration and five borings (designated B-101 through B-105) were drilled during our current exploration. The approximate locations of the current and previous borings and REMI traverses are shown on Figures 2 and 3.

The boring locations were staked in the field by SCI personnel using a handheld global positioning system (GPS). Approximate ground surface elevations at the boring locations from our October 2021 exploration were interpolated from the existing topography as shown on the *Site Development Plans* prepared by Dickinson Hussman Architects, dated November 1, 2021, while ground surface elevations at the boring locations from our current exploration were interpolated from the existing topography as shown on the *MSD Transportation Building + Office - Sheet C2.0* prepared by Excelsior Engineering, LLC, dated July 13, 2026. Detailed information regarding the nature and thickness of the soils and rock encountered, as well as the results of the field sampling and laboratory testing, are shown on the *Boring Logs* contained in Appendix A.

3.1 Surficial Materials and Pavement

Existing pavements were encountered in the majority of our October 2021 and July 2026 borings and consisted of approximately 2 to 10 inches of asphaltic concrete, underlain by approximately 4 to 10 inches of crushed rock. Boring B-6 was drilled in greenspace and did not encounter any surficial materials, while the surficial materials in B-105 consisted of approximately 10 inches of crushed rock.

3.2 Existing Fill

Existing fill, consisting of lean and fat clay with varying amounts of sand and gravel, was encountered in eleven of the fourteen borings to depths ranging between 2 and 6 feet (approximate elevations (Els) 540 to 547), as summarized in Table 3.1.

Table 3.1 – Existing Fill Summary

Boring	Approximate Ground Surface Elevation (feet)	Approximate Existing Fill Depth (feet)	Approximate Bottom of Existing Fill Elevation (feet)
B-1	548	5	543
B-2	548	5	543
B-3	549	2	547
B-4	548	2	546
B-5	543	3	540
B-6	543	2.5	540.5
B-7	544	2	542
B-8	535	NE	--
B-9	535	NE	--
B-101	547	NE	--
B-102	548	3	545
B-103	548	6	542
B-104	548	3.5	544.5
B-105	549	5.5	543.5

NE - Not Encountered

Standard Penetration Tests (SPTs) within the fill resulted in N-values ranging from 6 to 11 blows per foot (bpf), averaging 9 bpf, indicating the consistency ranged from medium stiff to stiff, with moisture contents ranging from 16 to 26 percent, averaging 22 percent.

The existing fill was likely placed during construction of the existing parking lot; however, documentation regarding the placement and compaction of the fill was not available at the time of this report.

3.3 Native Soil Profile

The native soils consisted of lean clay (CL in accordance with the Unified Soil Classification System and ASTM D 2488-06) that generally extended to depths ranging from 7 to 16 feet, underlain by fat clay (CH) that extended to the maximum boring termination depth of 20 feet or to the top of weathered limestone,

encountered in B-8 and B-9, at depths of 19 feet each. In a few of the borings, the lean clay extended to the boring termination depths of 10 or 20 feet. SPTs within the clays resulted in N-values ranging from 4 to 13 bpf, averaging 8 bpf, indicating the consistency ranged from soft to stiff and was medium stiff on average. Moisture contents ranged from 21 to 44 percent, averaging 24 percent.

3.4 Site Geology

Documented geology, including the *Geologic Map of St. Louis City and County, Missouri,* indicates that bedrock at the site consists of the St. Louis Limestone, which is typically dark gray, thin to medium-bedded to massive limestone. Thin beds of bluish-gray shale are found throughout the formation. This highly variable unit consists of dolomite, cherty limestone fossiliferous limestone, and evaporates.

Weathered limestone was encountered in B-8 and B-9 at depths of 19 feet each (approximate El 516) and extended to the depth of auger refusal, encountered at 20 and 19.5 feet (approximate Els 515 and 516.5), respectively. Auger refusal is a designation applied to any material that cannot be further penetrated by the power auger without extraordinary effort and is indicative of a very hard or very dense material, usually boulders or bedrock.

3.5 Groundwater

Groundwater was not observed in any of the borings during our October 2021 or July 2026 explorations. The groundwater level depends on seasonal and climatic variations and may be present in the future. In addition, without extended periods of observation, accurate groundwater level measurements may not be possible, particularly in low permeability soils.

4.0 DESIGN RECOMMENDATIONS

4.1 Existing Fill

Undocumented existing clay fill with varying amounts of sand and gravel was encountered in eleven of the fourteen borings to depths ranging between 2 and 6 feet (approximate Els 540 to 547), as previously discussed. Documentation regarding the placement and compaction of the existing fill was not available at the time of this report; however, we anticipate that it was likely placed during construction of the existing parking lot. There is some risk of settlement or other performance problems if the foundations, floor slab, retaining wall, or pavements are supported on the fill material. To eliminate this risk, all of the existing fill would have to be removed and recompacted or placed.

However, based on the results of the field and laboratory testing, the fill appears to have been placed with some level of compactive effort and is generally as stiff as the underlying native soils. Additionally, portions of the existing fill will be concurrently treated during expansive clay remediation as discussed in Section 4.2. Based on the estimated time the fill has been in place, the consistency of the fill, the recommended expansive clay remediation, and the planned fills, the risk of supporting the proposed improvements on the fill is judged to be low, with proper proofrolling and treatment. SCI personnel should check the fill during construction to identify any soft or otherwise unsuitable fill requiring selective undercuts and replacement with engineered fill, prior to the placement of additional fill or construction of the building or retaining wall.

Existing fill may be re-used as structural fill provided it is properly moisture conditioned to achieve compaction. Fill consisting of expansive clay (clay with a liquid limit (LL) of 45 or higher, or plasticity index (PI) of 25 or higher) should not be placed within 2 feet of the bearing level of shallow foundations or the retaining wall, or within 3 feet of the bottom of the floor slab, unless lime stabilized. Any deleterious materials (wood, organics, trash, etc.) in the fill, although not encountered, should be removed from the site.

4.2 Expansive Clay

Existing fill and native clays with LL of 45 or higher, or PI values of 25 or higher, were encountered throughout the site. These soils are susceptible to excessive volume change with variations in moisture content, which can lead to movement of concrete slabs and foundations of lightly loaded structures, retaining walls, and pavements. **Remediation will likely be recommended below the floor slab and foundations of the maintenance building, and the foundation of the retaining wall.** The actual need for, and extents of, remediation should be determined by SCI personnel in the field during construction.

Where bearing soil consists of existing fill or native clays with LL of 45 or higher, or PI of 25 or greater, we recommend they be removed to a minimum depth of 2 feet beneath the bearing level of the foundations and 3 feet beneath the bearing level of the slabs. The overexcavation should be backfilled with engineered fill in accordance with Section 5.2. Where expansive clay is remediated 3 feet below the floor slab, additional remediation is not required for interior footings. Expansive clay fill placed within 2 feet of the bearing elevation of footings and 3 feet below the slabs during general site grading will also require remediation.

The overexcavation should extend at least 2 feet beyond the outside edge of the building or retaining wall footprints to facilitate uniform compaction of the replacement materials and may require additional widening at the corners to allow equipment access for proper compaction. The overexcavation should be backfilled with properly compacted, structural fill or 1-inch minus crushed limestone. As an alternate, the footing overexcavations may be backfilled with lean concrete. With this option, widening of the footing excavation is not required.

Expansive clay also poses a concern for the retaining wall. We recommend removal of expansive clay to a depth of 2 feet below the bottom of the retaining wall. Backfill should consist of properly compacted low plastic structural fill or 1-inch minus crushed limestone. We should be provided with retaining wall plans when available to assess the extent of expansive clay recommendations for the retaining wall.

As an alternative to overexcavation and replacement, the expansive soils may be remediated by the addition of lime in combination with a recompaction operation or during fill placement for general site grading. If lime stabilization is performed, we recommend thoroughly mixing in "Code L" (a locally available calcium oxide by-product also known as lime kiln dust) at a rate of 7 percent, or approximately 8 pounds of Code L per cubic foot of soil, to the depths and lateral limits described in the preceding paragraph. Water may need to be added during mixing to allow for proper hydration of the lime. Pulverizing and tilling equipment, such as “gators,” are preferred for mixing the lime into the soil. The treated soil should be placed in compacted lifts as discussed in Section 5.2.

The methods of treatment described above are based on generally accepted standards in the local engineering community; however, swell pressures and volume change potential greater than can be mitigated by these methods may exist. Consequently, the owner should recognize that there is an inherent, but reduced risk that foundation and floor slab damage may occur, even after remedial treatment of the subgrade soil.

4.3 Shallow Foundations

Shallow spread footing foundations bearing in native lean clay, remediated fat clay, or newly placed, low plastic structural fill, are appropriate for support of the proposed building. Shallow foundations can be sized for maximum net allowable bearing pressures of 2,000 or 2,400 pounds per square foot (psf) for continuous wall and isolated spread footings, respectively.

We anticipate that some localized areas of inadequate bearing materials may be encountered during construction and, subsequently, require remediation to achieve these capacities. These areas may consist of but are not limited to isolated zones of soft soils, unsuitable existing fill, or areas of untreated expansive clay. Therefore, we recommend that an allowance be made in the construction budget for selected footing overexcavations. If encountered, inadequate bearing materials should be undercut and replaced with properly compacted structural fill following the methods provided in Sections 5.1 and 5.2 of this report.

Groundwater is not anticipated to significantly influence construction of shallow foundations. In most situations, small amounts of groundwater seepage into the excavations can be handled by means of gravity ditching and a sump pump. If greater flows are experienced, SCI should be retained to provide additional consultation.

Exterior footings and foundations in unheated areas of the buildings should be provided with at least 30 inches of soil cover for frost protection. Interior footings in heated areas can be located at nominal depths below the finished floor. For footings designed and constructed in accordance with our recommendations, total settlement should be less than 1 inch, and differential settlement between adjacent footings should be less than ¾ inch, **provided expansive clay is remediated in accordance with Section 4.2.**

4.4 Seismic Considerations

Ground shaking at the foundation of structures and liquefaction of the soil under the foundation are the principle seismic hazards to be considered in design of earthquake-resistant structures. Liquefaction occurs when a rapid buildup in water pressure, caused by the ground motion, pushes sand particles apart, resulting in a loss of strength and later densification as the water pressure dissipates. This loss of strength can cause bearing capacity failure, while the densification can cause excessive settlement. Potential earthquake damage can be mitigated by structural and/or geotechnical measures or procedures common to earthquake resistant design.

4.4.1 Design Earthquake

According to the International Building Code (2015 edition) (IBC 2015), as adopted by St. Louis County, structures such as those proposed for this project are required to be designed to a design earthquake with a 2 percent Probability of Exceedance over a 50-year exposure period (i.e. a 2,475-year design earthquake).

4.4.2 International Building Code Site Classification

Refraction Micro-tremor data was acquired along Traverses T-1 and T-2 during our October 2021 exploration to measure the shear wave velocity in the subsurface soils with respect to depth, at the locations shown on the *Site Plan*, Figure 3. The interpreted profiles of shear wave velocities with respect to depth are contained in Appendix B.

Our analysis indicates that the weighted average shear wave velocity in the upper 100 feet of the subsurface profile at the subject site is approximately 1,647 feet per second (ft/sec) in T-1 and 1,855 ft/sec in T-2, indicating a Site Class C. Seismic design parameters, as determined from data provided by the IBC 2015 and the United States Geological Survey National Seismic Hazard Mapping Project, as well as St. Louis County ordinances, are shown in Table 4.1.

Table 4.1 - Seismic Design Parameters

Site Class	C
M_w	7.7
S_S (Specified by St. Louis County)	0.48
S_1 (Specified by St. Louis County)	0.18
F_{PGA}	1.16
F_a	1.20
F_v	1.62
Site Modified PGA_M	0.27
S_{DS} (Design Spectral Acceleration at 0.2 sec)	0.38
S_{D1} (Design Spectral Acceleration at 1.0 sec)	0.19
Seismic Design Category (Risk Category I, II, and III)	C

4.4.3 Liquefaction Potential Analysis

The liquefaction potential analysis for the site was conducted using data from the field exploration and laboratory test results and the techniques outlined in the National Center for Earthquake Engineering (NCEER) Technical Report NCEER-97-0022. Based on our analyses, the soils at the project site have sufficient strength values to resist liquefaction and/or fines content that make the threat of liquefaction minimal during the design earthquake. While the amount of the seismically induced settlement is dependent on the magnitude and distance from the seismic event, we estimate that the settlements from the design earthquake will be negligible and relatively uniform in nature, so liquefaction mitigation techniques are not required.

4.5 Floor Slab

The following recommendations assume the floor slab will have an average uniform floor load of 250 psf or less. We recommend that the floor slab be designed using a modulus of subgrade reaction, *k* value, of 150 pounds per cubic inch based on values typically obtained from 1-foot-by-1-foot plate load tests. This value assumes the slabs will bear on native lean clay, suitable existing fill, remediated fat clay, or newly placed, low plastic structural fill. Depending on how the slab load is applied, the value will have to be geometrically modified. The value should be adjusted for larger areas using the following expression for cohesive and cohesionless soil:

$$\text{Modulus of Subgrade Reaction, } k_s = \left(\frac{k}{B}\right) \text{ for cohesive soil; and}$$
$$k_s = k\left(\frac{B+1}{2B}\right)^2 \text{ for cohesionless soil.}$$

Where: k_s = coefficient of vertical subgrade reaction for loaded area;
k = coefficient of vertical subgrade reaction for 1x1 square foot area; and
B = width of area loaded, in feet.

The floor slab should be supported on a minimum 4-inch-thick layer of crushed stone. This will help to distribute concentrated loads and equalize moisture conditions beneath the slab.

It is generally preferable to maintain structural separation between the floor slab and the foundation walls and column pads using isolation joints. We also suggest that joints be placed in the floor slab with spacing (in feet) equal to approximately three times the thickness of the slab (in inches) in both directions. Such joints permit slight movements of the independent elements and help reduce random cracking that might otherwise be caused by restraint of shrinkage, slight rotations, heave, or settlement.

Where occupied space or moisture sensitive floor coverings are planned, we recommend a 6-mil-thick polyethylene sheeting be placed immediately beneath the floor slab and above the crushed rock or gravel to reduce the transfer of capillary moisture to the slab. However, without careful attention to curing of the floor slab, the polyethylene sheeting can cause excessive shrinkage cracking and "curling".

The precautions listed below should be followed for construction of slab-on-grade pads. These details will not reduce the amount of movement, but are intended to reduce potential damage, should some settlement of the supporting subgrade take place. Some increase in moisture content is inevitable as a result of development and associated landscaping. However, extreme moisture content increases can be largely controlled by proper and responsible site drainage, building maintenance and irrigation practices.

- Cracking of slab-on-grade concrete is normal and should be expected. Cracking can occur not only as a result of heaving of the supporting soil, but also as a result of concrete curing stresses. The occurrence of concrete shrinkage cracking, and problems associated with concrete curing may be reduced and/or controlled by limiting the slump of the concrete, proper concrete placement, finishing, curing, and by the placement of crack control joints at frequent intervals, particularly where re-entrant slab corners occur.

- Areas supporting slabs should be properly moisture conditioned and compacted. Backfill in all interior and exterior water and sewer line trenches should be carefully compacted to reduce the shear stress in the concrete extending over these areas. Exterior slabs should be isolated from the proposed structure. These slabs should be reinforced to function as independent units. Movement of these slabs should not be transmitted to the building foundations or superstructure.

Exterior slabs should be isolated from the structure. These slabs should be reinforced to function as independent units. Movement of these slabs should not be transmitted to the building foundation or superstructure.

4.6 Pavements

Selection of the pavement section is dependent on the design life, traffic loads, subgrade strength, drainage characteristics, and the desired level of maintenance. We assume the majority of the traffic at the maintenance facility will consist of school busses and support passenger vehicles. Neither California Bearing Ratio testing nor formal pavement design was a part of our scope for this project. However, for planning purposes, the following recommendations typically result in pavements that perform satisfactorily on similar subgrades. They are intended to roughly provide a pavement requiring routine maintenance for a 5-year period, minor repair and maintenance during the 5- to 10-year life of the pavement, and possibly major repairs and restoration after a 10-year service life.

The recommended minimum pavement sections for flexible pavement are listed in Table 4.2.

Table 4.2 – Flexible Pavement Sections

Pavement Layer	Thickness (inches)	
	Automobile and Light Truck Parking Stalls	Drives (Automobile and Bus) and School Bus Parking
Asphaltic Concrete Surface Course (BP-1)	3	2
Asphaltic Concrete Base Course (Base)	--	3
Aggregate Base Course (Type 5)	6	10

Alternatively, a rigid concrete pavement section may be used with less anticipated long-term maintenance. Rigid concrete pavement is recommended at more heavily trafficked areas, such as the parking lot entrance/exits, drive lanes, and the dumpster pads and approach. The recommended minimum rigid pavement sections are listed in Table 4.3.

Table 4.3 – Rigid Pavement Sections

Pavement Layer	Thickness (inches)			
	Automobile and Light Truck Parking Stalls		Drives for Automobiles and Light Trucks	Bus Drive Lanes, Parking, and Dumpster Pads
Non-Reinforced Portland Cement Concrete	5	6	6	8
Aggregate Base Course (Type 5)	4	--	4	4

To provide resistance against salt and freeze-thaw cycles, we recommend the concrete have a minimum 28-day compressive strength of 4,000 pounds per square inch and air entrainment of 5 to 7 percent by volume. We also recommend that the maximum joint spacing be approximately 15 feet.

Care should be taken to provide drains or drainable transition at locations where pavement sections of varying thickness abut, so as not to trap water within the crushed stone base, which could saturate and soften the subgrade.

The expansive clay and undocumented existing fill could cause some distress in the pavement. To reduce long-term maintenance, consideration could be given to remediating the upper 12 inches of subgrade. Alternatives include removal and replacement with crushed stone or low plastic soil, lime treatment, or geogrid reinforcement. However, proper construction, along with periodic patching and overlaying, may be more economical than remediation of expansive clay or undocumented existing fill. At a minimum, the pavement subgrade should be proofrolled and any soft areas repaired prior to the placement of the crushed rock base and pavement. Any soft areas identified during the proofroll should be removed to firmer soils and backfilled with engineered fill material in accordance with Sections 5.1 and 5.2.

4.7 Retaining Wall

A cast-in-place retaining wall with fencing, approximately 300 feet in length, is planned in the eastern portion of the site. The wall will have a maximum height of approximately 8 feet. Based on the planned grading, we anticipate that the retaining wall will bear on undocumented existing fill and native expansive

clays. The undocumented existing fill and expansive clay soils are prone to excessive settlement and movement, as discussed in Section 4.2. Therefore, we recommend that the expansive clay be remediated in accordance with Section 4.2. A net allowable bearing pressure of 2,000 psf may be used for the retaining wall provided it bears on a minimum of 2 feet of native lean clay, suitable existing fill, remediated fat clay, or newly placed structural fill. Below-grade walls may be designed with an ultimate coefficient of friction of 0.3 between the base of the concrete footing and the soil subgrade.

Retaining wall plans were not provided at the time of this report. Global stability analyses is recommended for retaining walls with an exposed height of 5 feet or more. Furthermore, fat clays are often associated with global stability concerns. SCI can provide a proposal for global stability analyses, if requested.

The retaining wall should embed a minimum depth of 30 inches (frost depth) below finished grades. If crushed rock is used to backfill the overexcavation, it may be counted as part of the frost protection and the retaining wall may bear at a minimum depth required to satisfy stability concerns.

The retaining wall should also be designed to withstand lateral earth pressures caused by the weight of the backfill, including slopes behind the walls; and any surcharge, such as adjacent structure. We recommend the equivalent fluid unit weights tabulated below for lateral earth pressures, in pounds per cubic foot (pcf), be used in the design of the retaining wall. The indicated values assume that positive drainage is provided to prevent buildup of hydrostatic pressure. Expansive clay soils should not be used to backfill the wall excavations. Values for granular material should only be used if the granular backfill extends upwards and outwards the full height of the wall at a slope of 45 degrees or flatter from its base. In this case, exterior granular backfill should be capped with approximately 2 feet of cohesive soil to reduce the potential for surface water infiltration into the granular backfill. With clean granular backfill, filter fabric, such as Mirafi 140N, should be placed along the interface between the soil and granular backfill to reduce the potential for infiltration of the soil into the granular material.

Table 4.4 – Lateral Earth Pressures

Backfill Type	Equivalent Fluid Unit Weights	
	At-Rest Earth Pressures (pcf)	Active Earth Pressures (pcf)
Cohesive Soil	70	50
Granular Material (1-inch minus)	60	40

At-rest earth pressures should be used for restrained or fixed-head walls that are restricted from rotation, such as loading dock or basement walls connected to floor joists or beams, or a wing wall attached to a basement wall. Active earth pressures should be used for free-head walls where the base remains fixed and deflection at the top of the wall of approximately 1 inch for each 10 feet of wall height is allowed, such as a retaining wall.

The above values are applicable when the surface of the backfill behind the wall is horizontal. Upward sloped or loaded backfill will result in increased values. In addition to lateral earth pressures, below-grade and retaining walls should be designed to resist any surcharge loads, including adjacent shallow building foundations and traffic. These surface loads can be modeled as uniform lateral loads, equivalent to one-half of the surface load, acting at the halfway point on the wall.

A passive soil resistance modeled by an equivalent fluid unit weight of 250 pcf may be used for native soil against the face of the exterior base or a key below the base of the wall. The upper 2 feet of soil backfilled against the exterior face of the walls and uncontrolled backfill soils should be ignored when calculating the lateral resistance. Lower passive pressure should be used if the ground surface slopes downward away from the face of the wall.

We recommend that the retaining wall be provided with a drainage system. A minimum 4-inch-diameter drainpipe (perforated around its full perimeter) should be used and placed at foundation level. Granular drainage material, consisting of 1-inch clean crushed rock, classified as GP by ASTM D 2487, with less than 5 percent of the rock passing the No. 200 sieve, should be placed a minimum of 6 inches to each side and above the drainage pipe. Synthetic filter fabric, such as Mirafi 140N or equivalent, should encapsulate the drainpipe and granular drainage material. The pipe should be sloped to drain by gravity or through weepholes located on approximately 10-foot centers for above-grade retaining walls, or to a sump with a pump for walls where positive drainage by gravity cannot be achieved. Alternately, drainage can be provided directly through the weepholes without a drainpipe, provided that filter fabric is used, or other measures are taken to prevent the granular backfill from migrating out through the weepholes. Any interior sumps must be isolated “watertight” from the interior subgrade to prevent the movement of moisture from the sump into the underlying soils.

4.8 Site Grading and Drainage

Positive site drainage should be provided to reduce surface water infiltration around the perimeter of the building and beneath the floor slab. All grades should be sloped away from the new construction. Roof and surface drainage should be collected and discharged such that water is not permitted to infiltrate the backfill of the structures.

Large trees and shrubs should be planted away from exterior footings as they may cause drying and shrinkage of the foundation soils and, with the passage of time, potentially detrimental settlement of the building floor slab and foundations. A minimum distance of 20 feet or the mature tree's dripline, whichever is greater, is suggested.

We recommend that all final slopes have a maximum inclination of 3 horizontal to 1 vertical (3H:1V), and that a crest of at least 10 feet in width or a distance equivalent to the total height of the slope, whichever is less, be provided around the building before the surface slopes down and away.

4.9 Underground Utilities

Underground utilities can provide a pathway for water to migrate below the floor slab. Drain and utility pipes beneath the floor should have tight joints to prevent leakage. If utility excavations are backfilled with free-draining granular materials, then cutoffs should be provided at the exterior walls to reduce the potential for water to migrate beneath the building. Impermeable cutoffs may consist of a 3-foot-long "plug" of cohesive soil or bentonite soil mix, or a 1-foot-long plug of lean concrete. Soil may be used for the balance of the backfill.

Groundwater is not anticipated to significantly influence utility installation. In most situations, small amounts of groundwater seepage into the excavations can be handled by means of gravity ditching and a sump pump. If greater flows are experienced, SCI should be retained to provide additional consultation.

Except for individual service lines to the building that intersect foundations perpendicularly, below-grade utilities should not be located within the stress influence zone of the building foundations. Accordingly, below-grade utilities should be located outside a zone extending 45 degrees downward and outward from the edge of the footings.

5.0 SITE DEVELOPMENT AND CONSTRUCTION CONSIDERATIONS

5.1 Site Preparation

Within the construction area, any below-grade components to be abandoned must be properly demolished and the debris removed from the site. Existing foundation walls and footings, floor slabs, pavements, and utilities, as well as their associated backfill, should be removed from below and at least 10 feet beyond the proposed structure's footprint. As an exception, deep utilities, such as existing sewers, may be grouted in place rather than being removed. However, the existing backfill associated with deep utilities should be removed. Outside of the proposed building footprint, existing foundation walls and footings (if present) deeper than 3 feet below the proposed subgrade may be left in place. Excavations resulting from the removal of existing improvements should be backfilled with engineered fill in accordance with Section 5.2.

Areas to be cut or to receive fill should be stripped of any topsoil or vegetation and removed from the site or placed in non-load bearing (greenspace) areas. After removal of the existing site features, the building footprint should be checked for expansive clay and unsuitable existing fill and remediated in accordance with Section 4.2. The site should then be proofrolled by systematically passing over the subgrade to achieve complete coverage with proper compaction or loaded construction equipment, and observing the subgrade for pockets of excessively soft, wet, or disturbed soil, or otherwise unacceptable materials. **In particular, any soft areas within the existing fill to remain in place, should be identified during this process.**

Soft areas or otherwise unacceptable materials, if encountered, should be removed and replaced with structural fill or otherwise stabilized as approved by SCI prior to placing additional fill. If removal of soft or unacceptable soils is impractical due to their excessive depth, they should be stabilized in a manner approved by SCI. Stabilization of the soft soils can often be accomplished by placing a geofabric or geogrid supplied by Mirafi or Tensar, respectively, topped with minus crushed limestone. The appropriate geofabric or grid as well as the thickness and gradation of the crushed rock should be determined by SCI personnel on a case-specific basis depending on the allowable rut depth, the measured subgrade strength, and material availability; however, sections thicknesses of 1 to 2 feet are common.

5.2 Fill Materials and Compaction

Prior to fill placement and compaction, the upper 8 inches of the exposed subgrade should be scarified, moisture conditioned and recompacted. Structural fill should be placed in maximum 8-inch-thick loose lifts and mechanically compacted in accordance with Table 5.1. We recommend that any fill placed in building and retaining wall footprints have a LL less than 45 and a PI less than 25. If higher plasticity soils

are placed within 3 feet of the floor slab subgrade, or 2 feet of the bottom of the footings, then remediation will be required. Acceptable non-organic fill soils include materials designated CL, ML, CL-ML, GC, GM, and GC-GM by ASTM D 2487-11. The existing fill is suitable for recompaction provided that any trash or debris (if encountered) is sorted out and disposed of, and expansive clay is not placed within 2 feet below footings or 3 feet below floor slabs.

Table 5.1 - Typical Compaction Requirements for Fill

Material Tested	Proctor Type	Minimum Percentage Dry Density
Structural Fill (Cohesive)	Modified (ASTM D 1557)	90
	Standard (ASTM D 698)	95
Structural Fill (Granular)	Modified	95
	Standard	98
Landscaped Areas (Non-load Bearing)	Modified	88
	Standard	92
Utility Trench Backfill	Modified	90
	Standard	95

Prior to compaction, the soil may require moisture adjustment. During warm weather, moisture reduction can generally be accomplished by disking or otherwise aerating the soil. When air drying is not feasible, a moisture reducing chemical additive, such as hydrated lime, could be incorporated into the soil. During dry weather, some addition of moisture may be required to facilitate compaction. This should also be done in a controlled manner using a tank truck with a spray bar. The moistened soil should be thoroughly blended with a disk or pulverizer to produce a uniform moisture content. If construction is performed during the winter season, fill materials should be carefully observed to see that no frozen soil is placed as fill or remains in the base materials upon which fill is placed.

Broken pavement or concrete rubble may be used as fill material; however, to the maximum extent practicable, any reinforcing steel should be removed. Rubble fill placed within 3 feet from the proposed finished grades, or within 3 feet of the bottom of the floor slab, footings, and utilities should be broken down to a 4-inch minus gradation. If a 4-inch minus rubble is used as fill, it should be placed in horizontal lifts not exceeding 12 inches in loose lift thickness, with compaction and testing procedures as detailed below.

Backfill for foundation walls may consist of low plastic lean clay, 1-inch minus crushed limestone, or controlled low strength material (CLSM). We advise performing field density tests on at least every other lift to monitor compaction. As an alternate, 1-inch clean crushed limestone could be used as backfill to provide improved drainage and to reduce lateral pressures on the walls. However, drainage to daylight or a sump is critical to avoid wetting the expansive soils, which could result in excessive lateral pressures. Additionally, due to a slight risk of migration of soil fines into the clean rock, a synthetic filter fabric, such as Mirafi 140N or equivalent, should be placed between the soil face of the excavation and the crushed limestone. If clean rock is used, it may be placed in 2-foot-thick lifts and tamped or tracked to achieve adequate densification. Exterior clean rock backfill should be capped with cohesive soil to reduce the potential for surface water infiltration.

Backfill placed next to walls should be compacted with hand operated equipment and not large, self-propelled or machine operated equipment, which could result in potential overcompaction and higher lateral pressures. Compaction should be reduced within approximately 1 foot of the walls, and the walls should be observed periodically for signs of movement. If movement is detected, it may be necessary to provide bracing and/or change backfill procedures.

In addition to the minimum density requirements listed above, the soil must be stable, i.e., not “pumping” or rutting excessively under construction traffic, prior to placing additional fill or constructing foundations, floor slabs, or pavements. Field density tests should be performed on each lift of fill to document that proper compaction is achieved.

5.3 Foundation and Floor Slab Excavations

SCI should observe all footing and floor slab excavations for problem areas, such as soft zones, expansive clay, unsuitable existing fill, or otherwise unsuitable material, prior to placing new fill or concrete. Evaluation of the soil subgrade present at the bearing elevation of the foundations should be performed by geotechnical personnel utilizing a hand auger, shear vane, or dynamic cone penetrometer (DCP) to verify soil conditions. Excessive disturbance of siltier soils in footing excavations should be avoided and could complicate construction. The potential for such disturbance will increase during wetter times of the year. Footing excavations that have been excessively disturbed should be overdeepened to approved undisturbed soils. Overexcavation and replacement with structural fill should be performed where inadequate bearing materials are present in footing excavations.

The base of all excavations should be clean, free of loose soil or uncompacted fill, relatively dry, and maintained near their optimum moisture content. Excavations should be protected from extreme temperatures, precipitation, and construction disturbances. To reduce the possibility of desiccation or saturation of the foundation soils, we recommend that the concrete be placed as soon as possible after excavations are made.

Groundwater is not anticipated to significantly influence construction. However, in most situations, small amounts of groundwater seepage into the excavations can be handled by means of gravity ditching and a sump pump. If greater flows are experienced, SCI should be retained to provide additional consultation.

5.4 Subgrade Considerations

The floor slab and pavement subgrades may be subjected to construction traffic and exposure to weather for an extended period and significant problems may be incurred. It may be necessary to proofroll the subgrade, in both cut and fill areas, and recompact the subgrade immediately prior to placing base rock for the floor slab or pavement. In addition, subgrades covered with base rock may be very slow to dry if precipitation occurs after placing the base rock. Therefore, we recommend that proofrolling and placement of the base rock be done as close to the time of pouring the floor slab or paving as is practical. Proofroll passes should be limited, particularly on silty subgrades, to reduce the potential for pumping of moisture from deeper within the soil profile.

Special measures may be required to facilitate construction during wet or cold weather, or where excessive areas of soft soils are identified. These measures may include, but are not limited to, the addition of lime to the subgrade soils for drying purposes, or the removal of soft spongy soils and their replacement with crushed limestone. Soft areas should be selectively undercut and backfilled with properly compacted cohesive soil. A geotechnical stabilization fabric or geogrid, may be used in combination with crushed rock to help stabilize particularly soft areas, as described in Section 5.1. Where possible, the subgrade should be sloped to provide drainage.

5.5 Excavation Bracing Requirements

In the *Federal Register*, Volume 54, No. 209 (October 1989), the United States Department of Labor, Occupational Safety and Health Administration (OSHA) amended its "Construction Standards for Excavations, 29 CFR, Part 1926, Subpart P". This document was issued to provide for the safety of workers entering excavations, including utility trenches, basements, footings, and others. All operations should be performed under the supervision of qualified site personnel in accordance with OSHA regulations.

The contractor is solely responsible for designing and constructing stable, temporary excavations and should shore, slope, or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottom. The contractor's "responsible person", as defined in 29 CFR Part 1926, should evaluate the soil exposed in the excavations as part of the contractor's safety procedures. In no case should slope height, sloped inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations.

SCI does not assume responsibility for construction site safety or the contractor's or other party's compliance with local, state, and federal safety or other regulations.

5.6 Erosion Control and Land Disturbance Monitoring Program

Appropriate erosion and sediment control measures, such as proper contouring during site grading activities, the installation of siltation fences and/or inlet protection, should be used during construction to keep eroded materials from being carried onto adjacent properties or waterbodies. Depending on the length of time the subgrade is exposed and the amount of siltation that occurs, it may be necessary to periodically remove materials collected by the sediment control systems. Timely sodding and/or seeding of sloped surfaces will help reduce this potential problem.

SCI recommends following the procedures detailed in the Stormwater Pollution Prevention Plan (SWPPP). Any site disturbing more than one acre of ground must obtain a Land Disturbance Permit from the Missouri Department of Natural Resources. As part of the permit compliance procedures, weekly and rain-event site observations must be performed to document the changing site conditions and maintenance of control measures.

6.0 CONSTRUCTION MONITORING PROGRAM

The following list summarizes SCI's recommendations for a construction monitoring program. These services are recommended to provide quality assurance in assessing design assumptions and to document earth-related construction procedures for compliance with plans, specifications, and good engineering practice. SCI should be retained to:

- Review the final development and grading plans to assess the need for additional or revised recommendations or additional exploration;
- Participate in a formal preconstruction meeting with the Owner's Representative, Civil Engineer, and Contractor, prior to construction at the site;
- Observe site preparation activities prior to construction, including demolition of the existing site features, stripping, and proofrolling;
- Conduct and document weekly and rain-event observations at the site, maintain and update on-site paperwork, and provide submittals required by the SWPPP and Land Disturbance Permit;
- Assess the suitability of potential fill materials, including both on-site and off-site sources;
- Monitor placement and compaction of structural fill and backfill;
- Observe foundation excavations and the floor slab subgrade to assess the impact of soft zones, expansive clay, and unsuitable existing fill, and to recommend the extent of remedial measures;
- Observe footing excavations for adequacy of bearing materials;
- Observe the floor slab subgrade prior to placing base rock;
- Monitor placement and compaction of backfill for below-grade utilities;
- Observe pavement subgrade preparation and provide observation and testing services for the base course and pavement section;
- Check the thickness of pavement sections and, for asphaltic concrete, its density; and
- Provide quality assurance testing of structural concrete and pavement materials.

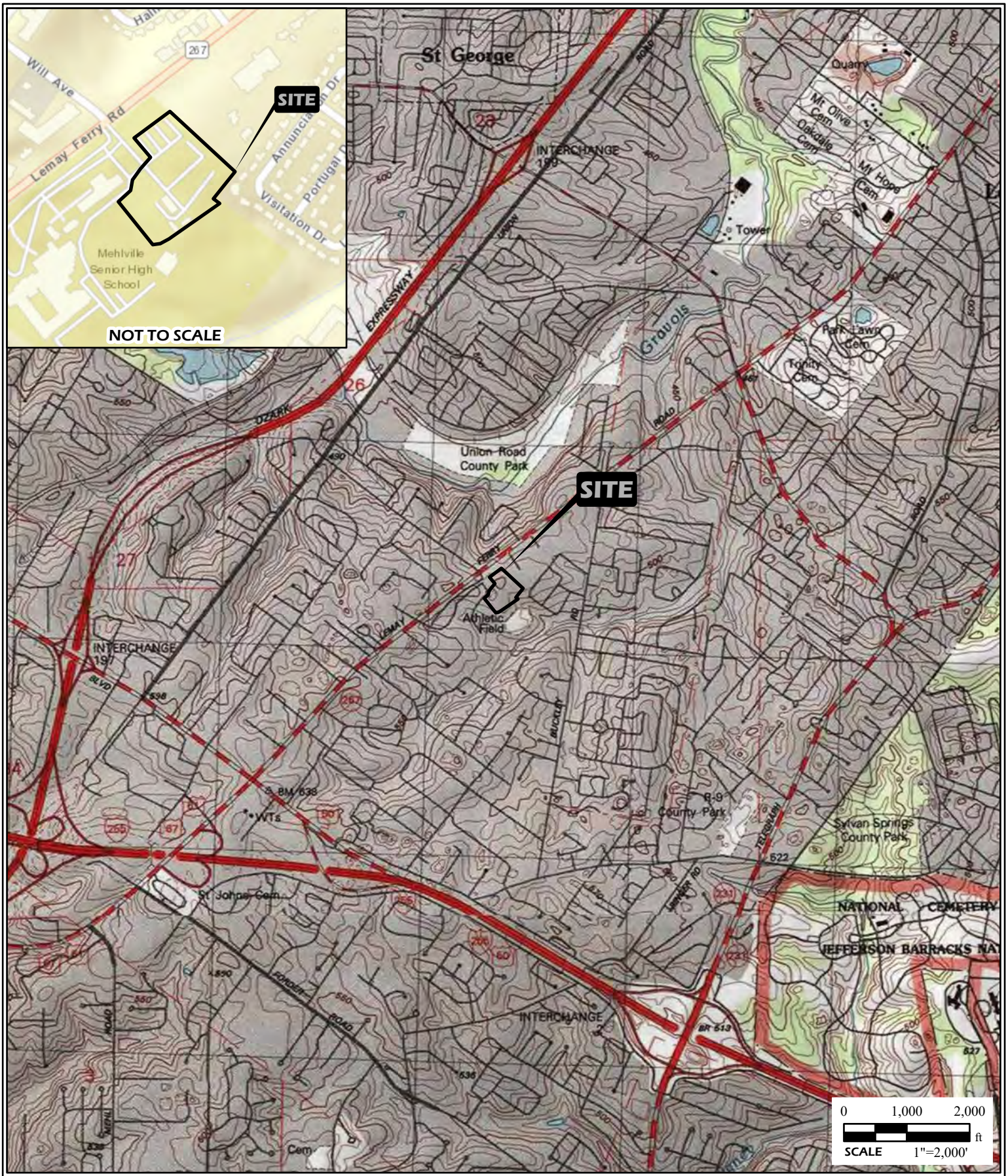
7.0 LIMITATIONS

The recommendations provided herein are for the exclusive use of BLDD Architects and Mehlville School District. It is imperative that SCI be contacted by any third-party interests to evaluate the applicability of this report relative to use by anyone other than BLDD Architects and Mehlville School District. Our recommendations are specific only to the project described and are not meant to supersede more

stringent requirements of local ordinances. They are based on subsurface information obtained at fourteen specific, widely spaced boring locations within the project area; and our understanding of the project as presented in Section 2.0, “Site and Project Description”; and geotechnical engineering practice consistent with the standard of care. No other warranty is expressed or implied. SCI should be contacted if conditions encountered are not consistent with those described.

We should also be provided with a set of final development plans, once they are available, to review whether our recommendations have been understood and applied correctly, and to assess the need for additional exploration or analysis. Failure to provide these documents to SCI may nullify some or all the recommendations provided herein. In addition, any changes in the planned project or changed site conditions may require revised or additional recommendations on our part.

The final part of our geotechnical service should consist of direct observation during construction, to observe that conditions actually encountered are consistent with those described in this report, and to assess the appropriateness of the analyses and recommendations contained herein. SCI cannot assume responsibility or liability for the adequacy of its recommendations without being retained to observe construction.



	PROJECT NAME MEHLVILLE SCHOOL DISTRICT BUS TRANSPORTATION FACILITY ST. LOUIS COUNTY, MISSOURI			**GENERAL NOTES** USGS TOPOGRAPHIC MAP WEBSTER GROVES, MISSOURI QUADRANGLE DATED 1998 10' CONTOURS OAKVILLE, MISSOURI QUADRANGLE DATED 1998 10' CONTOURS STREET MAP HTTP://GOTO.ARCGISONLINE.COM/MAPS/WORLD_STREET_MAP
	VICINITY AND TOPOGRAPHIC MAP			
	DRAWN BY EML **CHECKED BY** MJN	**FIGURE DATE** 07/27/2026	**JOB NUMBER** 2026-1010.10	**FIGURE** 1



GENERAL NOTES

AERIAL PHOTOGRAPH OBTAINED FROM ARCGIS ONLINE, WORLD IMAGERY.

DIMENSIONS AND LOCATIONS ARE APPROXIMATE; ACTUAL MAY VARY. DRAWING SHALL NOT BE USED OUTSIDE THE CONTEXT OF THE REPORT FOR WHICH IT WAS GENERATED.

PROJECT NAME

MEHLVILLE SCHOOL DISTRICT
BUS TRANSPORTATION FACILITY
ST. LOUIS COUNTY, MISSOURI

AERIAL PHOTOGRAPH

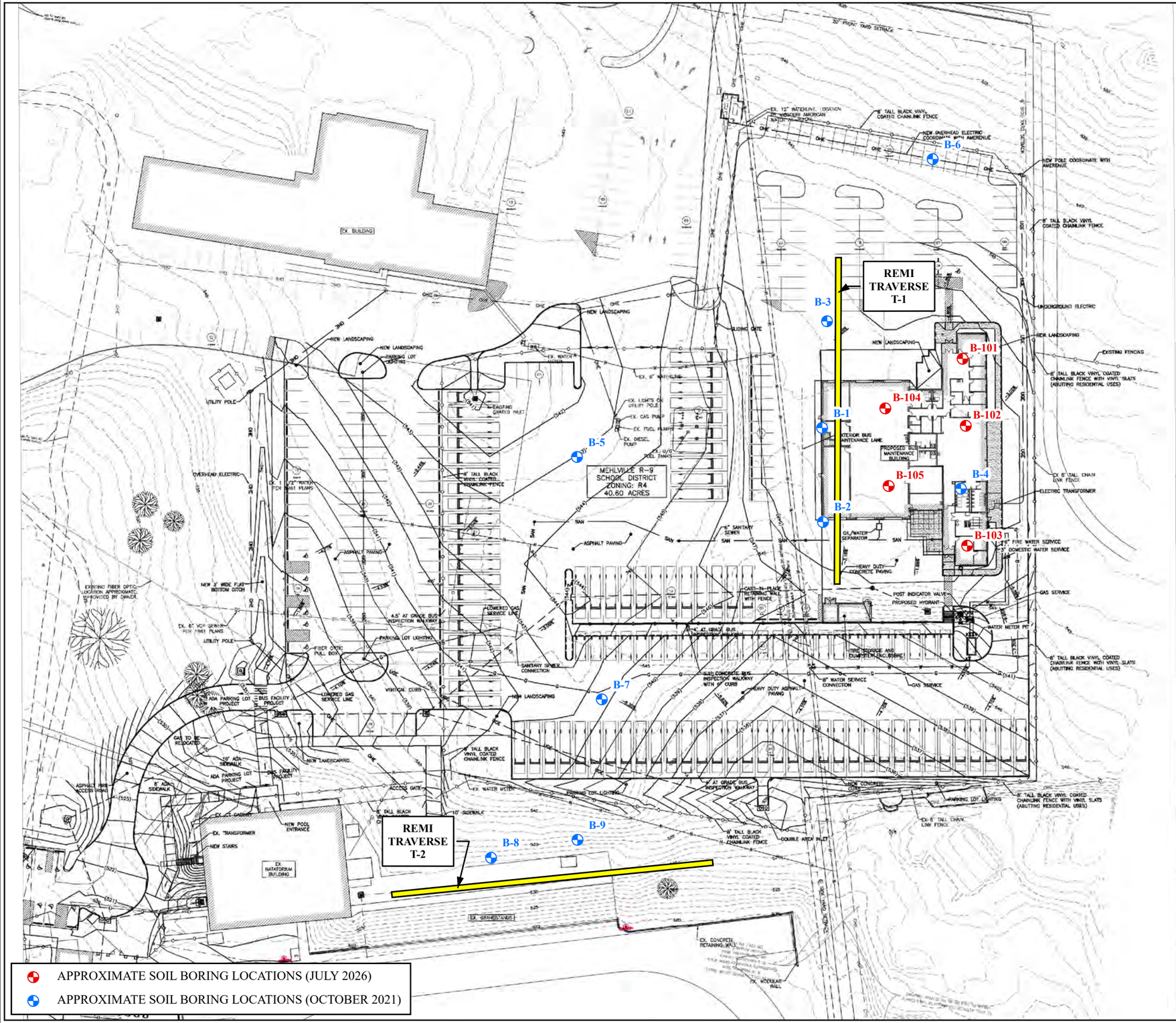
JOB NUMBER 2026-1010.10

FIGURE DATE 07/27/2026

DRAWN BY EML

CHECKED BY MJN

FIGURE 2



0 40 80 ft

SCALE 1"=80'

GENERAL NOTES

PLAN DATED 07/13/2026 BY BLDD ARCHITECTS

DIMENSIONS AND LOCATIONS ARE APPROXIMATE; ACTUAL MAY VARY. DRAWING SHALL NOT BE USED OUTSIDE THE CONTEXT OF THE REPORT FOR WHICH IT WAS GENERATED.

PROJECT NAME

MEHLVILLE SCHOOL DISTRICT
BUS TRANSPORTATION FACILITY
ST. LOUIS COUNTY, MISSOURI

SITE PLAN

JOB NUMBER 2026-1010.10

FIGURE DATE 07/27/2026

DRAWN BY EML

CHECKED BY MJN

FIGURE 3

Appendix A

SCI ENGINEERING, INC.
130 Point West Boulevard
St. Charles, Missouri 63301
636-949-8200
www.sciengineering.com

BORING LOG LEGEND AND NOMENCLATURE

Depth is in feet below ground surface. **Elevation** is in feet in reference to sea level, site datum, or as otherwise noted.

Sample Type

- **SS** Split-spoon sample, disturbed, obtained by driving a 2-inch-O.D. split-spoon sampler (ASTM D 1586).
- **NX** Diamond core bit, nominal 2-inch-diameter rock sample (ASTM D 2113).
- **NQ** Diamond core bit, nominal 1 7/8-inch diameter rock sample
- **ST** Thin-walled (Shelby) tube sample, relatively undisturbed, obtained by pushing a 3-inch-diameter, tube (ASTM D 1587).
- **CS** Continuous sample tube system, relatively undisturbed, obtained by split-barrel sampler in conjunction with auger advancement.
- **SV** Shear vane, field test to determine strength of cohesive soil by pushing or driving a 2-inch-diameter vane, and then shearing by torquing soil in existing and remolded states (ASTM D 2573).
- **BS** Bag sample, disturbed, obtained from cuttings.
- **MC** Modified California Sampler, disturbed, obtained by driving a 2.5-inch O.D. ring-lined split-barrel sampler (ASTM D 3550).

Recovery is expressed as the sample length recovered / the total length pushed, driven, or cored.

Blows Numbers indicate blows per 6 inches of split-spoon sampler penetration when driven with a 140-pound hammer falling freely 30 inches. The number of total blows obtained for the second and third 6-inch increments is the N value (Standard Penetration Test or SPT) in blows per foot (ASTM D 1586). Practical refusal is considered to be 50 or more blows without achieving 6 inches of penetration and is expressed as a ratio of 50 to actual penetration, e.g., 50/2 (50 blows for 2 inches).

For analysis, the N value is used when obtained by a cathead and rope system. When obtained by an automatic hammer, the N value may be increased by a factor of 1.3.

Vane Shear Strength is expressed as the peak strength (existing state) / the residual strength (remolded state).

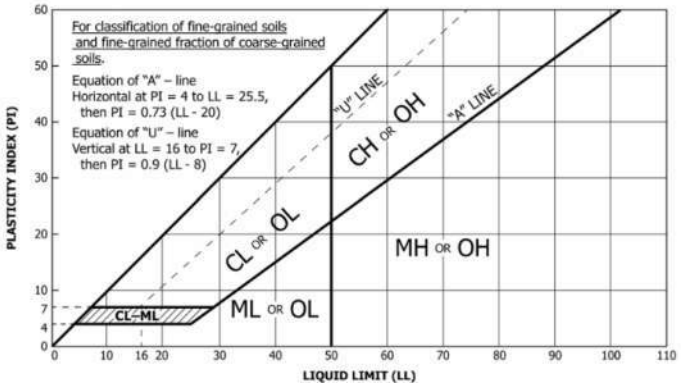
Description indicates soil constituents and other classification characteristics (ASTM D 2488) and the Unified Soil Classification (ASTM D 2487).

SOIL GRAIN SIZE

Soil Component	Particle Size Range
Boulders	> 12 in.
Cobbles	12 in. -3 in.
Gravel	3 in. - #4 sieve (4.75 mm)
Coarse Gravel	3 in. - ¾ in.
Fine Gravel	¾ in. - #4 sieve (4.75 mm)
Sand	#4 sieve (4.75 mm) - #200 sieve (0.075 mm)
Coarse Sand	#4 sieve (4.75 mm) - #10 sieve (2 mm)
Medium Sand	#10 sieve (2 mm) - #40 sieve (0.425 mm)
Fine Sand	#40 sieve (0.425 mm) - #200 sieve (0.075 mm)
Fines (Silt & Clay)	< #200 sieve (0.075 mm)

in – inches
mm – millimeters

PLASTICITY CHART



BORING LOG LEGEND AND NOMENCLATURE

Strength of Cohesive Soils			Density of Granular Soils	
Consistency	*N-Value*	*Unconfined Comp. Strength (ksf)*	*Descriptive Term*	*N-Value*
Very Soft	0 – 2	< 0.50	Very Loose	0 – 4
Soft	3 – 4	0.50 – 1.00	Loose	5 – 10
Medium Stiff	5 – 8	1.0 – 2.0	Medium Dense	11 – 29
Stiff	9 – 15	2.0 – 4.0	Dense	30 – 49
Very Stiff	16 – 30	4.0 – 6.0	Very Dense	Over 50
Hard	Over 30	> 8.0		

ksf – kips per square foot

USCS SOIL CLASSIFICATION

		Major Divisions		Group Symbol	Typical Names
Coarse-Grained Soils (Less than 50% Passing the #200 Sieve)	Gravels	Clean Gravels		GW	Well graded gavels, gravel-sand mixture
				GP	Poorly graded gravels, gravel-sand mixture
		Gravels with fines	Limits plot below "A" line on plasticity chart	GM	Silty gravels, gravel-sand-silt mixture
			Limits plot above "A" line on plasticity chart	GC	Clayey gravels, gravel-sand-clay mixture
	Sands	Clean Sands		SW	Well graded sands, gravelly sands
				SP	Poorly graded sands, gravelly sands
		Sands with fines	Limits plot below "A" line on plasticity chart	SM	Silty sands, sand-silt mixture
			Limits plot above "A" line on plasticity chart	SC	Clayey sands, sand-clay mixture
Fine-Grained Soils (50% or More Passing #200 Sieve)	Silts	Silts of low plasticity (LL<50)		ML	Inorganic silts, clayey silts
		Silts of high plasticity (LL≥50)		MH	Inorganic silts, elastic silts
	Clays	Clays of low plasticity (LL<50)		CL	Inorganic lean clays, sandy and silty clays
		Clays of high plasticity (LL≥50)		CH	Inorganic fat clays, sandy clays
	Organic Silts and Clays	Organic silts and clays of low plasticity (LL<50)		OL	Organic silts and lean clays
		Organic silts and clays of high plasticity (LL≥50)		OH	Organic silts and fat clays
Organic Soils		Primarily organic matter		PT	Peat

*Table per Unified Soil Classification System (USCS)

BORING LOG LEGEND AND NOMENCLATURE

SECONDARY SOIL CONSTITUENT RELATIVE COMPOSITION

If Primary Soil Constituent is	Clay or Silt		Sand or Gravel	
	Trace	0-5%	Trace	0-5%
	Few	6-15%	With	6-12%
	With Sandy/Gravelly	>15% >30%	Silty/Clayey/Gravelly/Sandy	>12%

Stratigraphic Breaks may be observed or interpreted and are indicated by a dashed line (inferred) or solid line (observed). Transition between described materials may be gradual.

Laboratory Test Results

- Natural moisture content (ASTM D 2216) in percent.
- Dry density in pounds per cubic foot (pcf).
- Hand penetrometer value of apparently intact cohesive sample in kips per square foot (ksf).
- Unconfined compressive strength (ASTM D 2166) in ksf.
- Liquid and Plastic Limits (ASTM D 4318) in percent.

Rock Quality Designation (RQD) is the ratio between the total length of core segments 4 inches or more and the total length of core drilled. RQD indicates in-situ rock quality as follows:

Excellent	90 - 100%
Good	75 – 90%
Fair	50 – 75%
Poor	25 – 50%
Very Poor	0 – 25%

BORING LOG

PROJECT Mehlville School District Transportation Project
LOCATION St. Louis County, Missouri
DRILLER Midwest Drilling, Inc. **HAMMER** Automatic
EQUIPMENT CME-750 w/CFA **ELEVATION** 548±

BORING NUMBER B-1
SHEET 1 **of** 1
PROJECT NO. 2016-0860.10
DATE DRILLED 10/21/2021

DEPTH (ft)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE RECOVERY (in/in)	SAMPLE BLOWS (per 6 in)	DESCRIPTION (UNIFIED SOIL CLASSIFICATION)	GRAPHIC	SEE REMARK NO.	LAB: MOISTURE CONTENT (%)	LAB: DRY DENSITY (pcf)	LAB: HAND PENETROMETER (ksf)	LAB: UNCONFINED COMPRESSIVE STRENGTH (ksf)	LAB: LIQUID LIMIT	LAB: PLASTICITY INDEX	ELEVATION (ft)
					5" ASPHALTIC CONCRETE									
					4" CRUSHED ROCK									
					FILL: Brown, fat clay, trace fine to coarse sand									
	1	ST	23/24					24	94.6		2.2	53	33	546
3														
	2	SS	15/18	3 4 6				24		5.0				
					LEAN CLAY (CL): Brown, trace fine to coarse sand									543
6														
	3	SS	18/18	3 5 7				23		4.0				
														540
9	4	SS	15/18	2 3 4				25		4.0				
														537
12														
	5	SS	18/18	2 4 5				24		3.0				534
15														
														531
18														
	6	SS	18/18	3 4 5				23		4.0				

Boring terminated at 20 feet.

WATER LEVEL:

X	NONE OBSERVED WHILE DRILLING
____ ft	WHILE DRILLING
____ ft	____ HRS AFTER DRILLING
____ ft	____ DAYS AFTER DRILLING

REMARKS:

BORING LOG

PROJECT Mehlville School District Transportation Project
LOCATION St. Louis County, Missouri
DRILLER Midwest Drilling, Inc. **HAMMER** Automatic
EQUIPMENT CME-750 w/CFA **ELEVATION** 548±

BORING NUMBER B-2
SHEET 1 **of** 1
PROJECT NO. 2016-0860.10
DATE DRILLED 10/21/2021

DEPTH (ft)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE RECOVERY (in/in)	SAMPLE BLOWS (per 6 in)	DESCRIPTION (UNIFIED SOIL CLASSIFICATION)	GRAPHIC	SEE REMARK NO.	LABORATORY TEST RESULTS: MOISTURE CONTENT (%)	DRY DENSITY (pcf)	HAND PENETROMETER (ksf)	UNCONFINED COMPRESSIVE STRENGTH (ksf)	LIQUID LIMIT	PLASTICITY INDEX	ELEVATION (ft)
					5.5" ASPHALTIC CONCRETE									
					5" CRUSHED ROCK									
					FILL: Brown, fat clay, trace fine to coarse sand									
	1	SS	15/18	2 4 6				21		8.0				546
3														
	2	SS	15/18	2 3 4				21		3.0		55	34	
					LEAN CLAY (CL): Brown, trace fine to coarse sand									543
6														
	3	SS	18/18	3 5 5				22		2.0				
														540
9	4	SS	18/18	4 6 7				25		4.0				
														537
12														
	5	SS	18/18	3 3 5				22		1.5				534
15														
														531
18														
	6	SS	18/18	3 5 5				25		4.0				

Boring terminated at 20 feet.

WATER LEVEL:

X	NONE OBSERVED WHILE DRILLING
____ ft	WHILE DRILLING
____ ft	____ HRS AFTER DRILLING
____ ft	____ DAYS AFTER DRILLING

REMARKS:

BORING LOG

PROJECT Mehlville School District Transportation Project | **BORING NUMBER** B-3
LOCATION St. Louis County, Missouri | **SHEET** 1 **of** 1
DRILLER Midwest Drilling, Inc. | **HAMMER** Automatic | **PROJECT NO.** 2016-0860.10
EQUIPMENT CME-750 w/CFA | **ELEVATION** 549± | **DATE DRILLED** 10/21/2021

DEPTH (ft)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE RECOVERY (in/in)	SAMPLE BLOWS (per 6 in)	DESCRIPTION (UNIFIED SOIL CLASSIFICATION)	GRAPHIC	SEE REMARK NO.	LAB: MOISTURE CONTENT (%)	LAB: DRY DENSITY (pcf)	LAB: HAND PENETROMETER (ksf)	LAB: UNCONFINED COMPRESSIVE STRENGTH (ksf)	LAB: LIQUID LIMIT	LAB: PLASTICITY INDEX	ELEVATION (ft)
					6" ASPHALTIC CONCRETE									
					4" CRUSHED ROCK									
	1	SS	15/18	3 3 5	FILL: Brown, fat clay, with coarse gravel			25		2.5				
3					LEAN CLAY (CL): Brown, trace fine to coarse sand									546
	2	SS	18/18	2 3 5				25		4.0				
6														543
	3	SS	18/18	2 3 4				23		3.5				
9	4	SS	18/18	3 3 4				24		2.0				540
					Boring terminated at 10 feet.									
12														537
15														534
18														531

WATER LEVEL:

X	NONE OBSERVED WHILE DRILLING
____ ft	WHILE DRILLING
____ ft	____ HRS AFTER DRILLING
____ ft	____ DAYS AFTER DRILLING

REMARKS:

BORING LOG

PROJECT Mehlville School District Transportation Project
BORING NUMBER B-4
LOCATION St. Louis County, Missouri
SHEET 1 **of** 1
DRILLER Midwest Drilling, Inc. **HAMMER** Automatic **PROJECT NO.** 2016-0860.10
EQUIPMENT CME-750 w/CFA **ELEVATION** 548± **DATE DRILLED** 10/21/2021

DEPTH (ft)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE RECOVERY (in/in)	SAMPLE BLOWS (per 6 in)	DESCRIPTION (UNIFIED SOIL CLASSIFICATION)	GRAPHIC	SEE REMARK NO.	LAB: MOISTURE CONTENT (%)	LAB: DRY DENSITY (pcf)	LAB: HAND PENETROMETER (ksf)	LAB: UNCONFINED COMPRESSIVE STRENGTH (ksf)	LAB: LIQUID LIMIT	LAB: PLASTICITY INDEX	ELEVATION (ft)
					5" ASPHALTIC CONCRETE									
					4" CRUSHED ROCK									
					FILL: Brown, fat clay, trace fine to coarse sand									
	1	SS	12/18	3 5 5				20		6.0				546
3					LEAN CLAY (CL): Brown, trace fine to coarse sand									
	2	SS	18/18	2 4 3				26		3.0				543
6														
	3	SS	18/18	3 3 4				23		3.0				540
9														
	4	SS	18/18	3 4 4				24		3.0				
					Boring terminated at 10 feet.									537
12														
														534
15														
														531
18														

WATER LEVEL:

X	NONE OBSERVED WHILE DRILLING
	ft WHILE DRILLING
	ft ___ HRS AFTER DRILLING
	ft ___ DAYS AFTER DRILLING

REMARKS:

BORING LOG

PROJECT Mehlville School District Transportation Project
LOCATION St. Louis County, Missouri
DRILLER Midwest Drilling, Inc. **HAMMER** Automatic
EQUIPMENT CME-750 w/CFA **ELEVATION** 543±

BORING NUMBER B-5
SHEET 1 **of** 1
PROJECT NO. 2016-0860.10
DATE DRILLED 10/21/2021

DEPTH (ft)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE RECOVERY (in/in)	SAMPLE BLOWS (per 6 in)	DESCRIPTION (UNIFIED SOIL CLASSIFICATION)	GRAPHIC	SEE REMARK NO.	LAB: MOISTURE CONTENT (%)	LAB: DRY DENSITY (pcf)	LAB: HAND PENETROMETER (ksf)	LAB: UNCONFINED COMPRESSIVE STRENGTH (ksf)	LAB: LIQUID LIMIT	LAB: PLASTICITY INDEX	ELEVATION (ft)
					8" ASPHALTIC CONCRETE									
					4" CRUSHED ROCK									
	1	SS	12/18	3 4 7	FILL: Brown, fat clay			20		5.5				
3					LEAN CLAY (CL): Brown									540
	2	SS	18/18	2 3 5				24		6.0				
6														537
	3	SS	18/18	2 3 5				25		3.0				
9	4	SS	18/18	2 3 4				24		2.5				534
					Boring terminated at 10 feet.									
12														531
15														528
18														525

WATER LEVEL:

X	NONE OBSERVED WHILE DRILLING
	ft WHILE DRILLING
	ft ___ HRS AFTER DRILLING
	ft ___ DAYS AFTER DRILLING

REMARKS:

BORING LOG

PROJECT Mehlville School District Transportation Project
LOCATION St. Louis County, Missouri
DRILLER Midwest Drilling, Inc. **HAMMER** Automatic
EQUIPMENT CME-750 w/CFA **ELEVATION** 543±

BORING NUMBER B-6
SHEET 1 **of** 1
PROJECT NO. 2016-0860.10
DATE DRILLED 10/21/2021

DEPTH (ft)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE RECOVERY (in/in)	SAMPLE BLOWS (per 6 in)	DESCRIPTION (UNIFIED SOIL CLASSIFICATION)	GRAPHIC	SEE REMARK NO.	LAB: MOISTURE CONTENT (%)	LAB: DRY DENSITY (pcf)	LAB: HAND PENETROMETER (ksf)	LAB: UNCONFINED COMPRESSIVE STRENGTH (ksf)	LAB: LIQUID LIMIT	LAB: PLASTICITY INDEX	ELEVATION (ft)
					FILL: Brown, fat clay									
	1	SS	8/18	3 4 5				16		3.5				
					LEAN CLAY (CL): Brown									
3														540
	2	SS	18/18	3 4 4				22		6.5				
6														537
	3	SS	18/18	2 3 4				24		2.0				
9	4	SS	18/18	2 3 3				26		1.5				534
					Boring terminated at 10 feet.									
12														531
15														528
18														525

WATER LEVEL:

X	NONE OBSERVED WHILE DRILLING
	ft WHILE DRILLING
	ft ___ HRS AFTER DRILLING
	ft ___ DAYS AFTER DRILLING

REMARKS:

BORING LOG

PROJECT Mehlville School District Transportation Project | **BORING NUMBER** B-7
LOCATION St. Louis County, Missouri | **SHEET** 1 **of** 1
DRILLER Midwest Drilling, Inc. | **HAMMER** Automatic | **PROJECT NO.** 2016-0860.10
EQUIPMENT CME-750 w/CFA | **ELEVATION** 544± | **DATE DRILLED** 10/21/2021

DEPTH (ft)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE RECOVERY (in/in)	SAMPLE BLOWS (per 6 in)	DESCRIPTION (UNIFIED SOIL CLASSIFICATION)	GRAPHIC	SEE REMARK NO.	LAB: MOISTURE CONTENT (%)	LAB: DRY DENSITY (pcf)	LAB: HAND PENETROMETER (ksf)	LAB: UNCONFINED COMPRESSIVE STRENGTH (ksf)	LAB: LIQUID LIMIT	LAB: PLASTICITY INDEX	ELEVATION (ft)
					8" ASPHALTIC CONCRETE									
					4" CRUSHED ROCK									
					FILL: Brown, fat clay, trace coarse gravel									543
	1	SS	5/18	3 2 4				26		4.0				
					LEAN CLAY (CL): Brown									
3														
	2	SS	15/18	3 4 4				25		4.0				540
6														
	3	SS	18/18	3 3 4				23		4.0				537
9														
	4	SS	18/18	2 4 4				21		6.0				
														534
					Boring terminated at 10 feet.									
12														
														531
15														
														528
18														
														525

WATER LEVEL:

X	NONE OBSERVED WHILE DRILLING
	ft WHILE DRILLING
	ft ___ HRS AFTER DRILLING
	ft ___ DAYS AFTER DRILLING

REMARKS:

BORING LOG

PROJECT Mehlville School District Transportation Project
BORING NUMBER B-8
LOCATION St. Louis County, Missouri
SHEET 1 **of** 1
DRILLER Midwest Drilling, Inc. **HAMMER** Automatic **PROJECT NO.** 2016-0860.10
EQUIPMENT CME-750 w/CFA **ELEVATION** 535± **DATE DRILLED** 10/21/2021

DEPTH (ft)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE RECOVERY (in/in)	SAMPLE BLOWS (per 6 in)	DESCRIPTION (UNIFIED SOIL CLASSIFICATION)	GRAPHIC	SEE REMARK NO.	LAB: MOISTURE CONTENT (%)	LAB: DRY DENSITY (pcf)	LAB: HAND PENETROMETER (ksf)	LAB: UNCONFINED COMPRESSIVE STRENGTH (ksf)	LAB: LIQUID LIMIT	LAB: PLASTICITY INDEX	ELEVATION (ft)
					8" ASPHALTIC CONCRETE									
					5" CRUSHED ROCK									
					LEAN CLAY (CL): Brown									534
	1	SS	15/18	1 2 2				25		2.0				
3														
	2	SS	18/18	1 2 2				23		0.5		47	32	531
6														
	3	SS	18/18	3 4 4				24		3.5		47	31	
					FAT CLAY (CH): Brown									528
9	4	SS	18/18	3 4 6				23		6.5				
														525
12														
					With fine chert gravel									522
	5	SS	12/18	5 6 6				22		3.0				
15														
														519
18														
	6	SS	15/15	4 10 50/3"	WEATHERED LIMESTONE			28		1.5				516

Auger refusal on limestone at 20 feet.

WATER LEVEL:

X	NONE OBSERVED WHILE DRILLING
ft	WHILE DRILLING
ft ___	HRS AFTER DRILLING
ft ___	DAYS AFTER DRILLING

REMARKS:

BORING LOG

PROJECT Mehlville School District Transportation Project | **BORING NUMBER** B-9
LOCATION St. Louis County, Missouri | **SHEET** 1 **of** 1
DRILLER Midwest Drilling, Inc. | **HAMMER** Automatic | **PROJECT NO.** 2016-0860.10
EQUIPMENT CME-750 w/CFA | **ELEVATION** 535± | **DATE DRILLED** 10/21/2021

DEPTH (ft)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE RECOVERY (in/in)	SAMPLE BLOWS (per 6 in)	DESCRIPTION (UNIFIED SOIL CLASSIFICATION)	GRAPHIC	SEE REMARK NO.	LAB: MOISTURE CONTENT (%)	LAB: DRY DENSITY (pcf)	LAB: HAND PENETROMETER (ksf)	LAB: UNCONFINED COMPRESSIVE STRENGTH (ksf)	LAB: LIQUID LIMIT	LAB: PLASTICITY INDEX	ELEVATION (ft)
					10" ASPHALTIC CONCRETE									
					5" CRUSHED ROCK									534
	1	SS	15/18	2 2 2	LEAN CLAY (CL): Brown			24		4.0				
3														
	2	SS	18/18	2 2 3				23		4.5				531
6														
	3	ST	24/24					24	92.3		2.3	42	27	528
9	4	SS	18/18	2 3 3				23		3.0				525
12					FAT CLAY (CH): Red and brown									522
	5	SS	18/18	5 5 6				44		6.5				
15														519
18														
	6	SS	6/7	6 50/.5"	WEATHERED LIMESTONE			22		6.0				516

Auger refusal on limestone at 19.5 feet.

WATER LEVEL:

X **NONE OBSERVED WHILE DRILLING**
____ ft **WHILE DRILLING**
____ ft ____ **HRS AFTER DRILLING**
____ ft ____ **DAYS AFTER DRILLING**

REMARKS:

BORING LOG

PROJECT Mehlville School District Bus Transportation Facility | **BORING NUMBER** B-101
LOCATION St. Louis County, Missouri | **SHEET** 1 **of** 1
DRILLER Midwest Drilling, Inc. | **HAMMER** Automatic | **PROJECT NO.** 2026-1010.10
EQUIPMENT CME-550 w/CFA | **ELEVATION** 547± | **DATE DRILLED** 07/03/2026

DEPTH (ft)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE RECOVERY (in/in)	SAMPLE BLOWS (per 6 in)	DESCRIPTION (UNIFIED SOIL CLASSIFICATION)	GRAPHIC	SEE REMARK NO.	LAB: MOISTURE CONTENT (%)	LAB: DRY DENSITY (pcf)	LAB: HAND PENETROMETER (ksf)	LAB: UNCONFINED COMPRESSIVE STRENGTH (ksf)	LAB: LIQUID LIMIT	LAB: PLASTICITY INDEX	ELEVATION (ft)
					2" ASPHALTIC CONCRETE 8" CRUSHED ROCK									
	1	SS	14/18	2 3 5	LEAN CLAY (CL): Brown			27						546
3	2	ST	24/24					24	100.5		2.5			543
6	3	SS	18/18	2 2 3				24						540
9	4	SS	18/18	2 3 5	FAT CLAY (CH): Reddish brown			24						537
12														534
15	5	SS	18/18	3 4 6				24						531
18														528
	6	SS	18/18	4 7 9			1	25						

Boring terminated at 20 feet.

WATER LEVEL:

X	NONE OBSERVED WHILE DRILLING
____ ft	WHILE DRILLING
____ ft	____ HRS AFTER DRILLING
____ ft	____ DAYS AFTER DRILLING

REMARKS:

1) Weathered sandstone observed in sampler tip

BORING LOG

PROJECT Mehlville School District Bus Transportation Facility | **BORING NUMBER** B-102
LOCATION St. Louis County, Missouri | **SHEET** 1 **of** 1
DRILLER Midwest Drilling, Inc. | **HAMMER** Automatic | **PROJECT NO.** 2026-1010.10
EQUIPMENT CME-550 w/CFA | **ELEVATION** 548± | **DATE DRILLED** 07/03/2026

DEPTH (ft)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE RECOVERY (in/in)	SAMPLE BLOWS (per 6 in)	DESCRIPTION (UNIFIED SOIL CLASSIFICATION)	GRAPHIC	SEE REMARK NO.	LABORATORY TEST RESULTS: MOISTURE CONTENT (%)	DRY DENSITY (pcf)	HAND PENETROMETER (ksf)	UNCONFINED COMPRESSIVE STRENGTH (ksf)	LIQUID LIMIT	PLASTICITY INDEX	ELEVATION (ft)
					3" ASPHALTIC CONCRETE 8" CRUSHED ROCK									
	1	SS	14/18	5 5 6	FILL: Brown, fat clay			23				53	33	546
3					LEAN CLAY (CL): Brown									
	2	SS	18/18	2 3 5				25						543
6														
	3	SS	18/18	2 3 3				24				39	20	
														540
9	4	SS	18/18	2 3 4				24						
														537
12					FAT CLAY (CH): Brown									
	5	SS	18/18	3 5 6				29						534
15														
														531
18														
	6	SS	18/18	5 7 7				25						

Boring terminated at 20 feet.

WATER LEVEL:

X	NONE OBSERVED WHILE DRILLING
	ft WHILE DRILLING
	ft ___ HRS AFTER DRILLING
	ft ___ DAYS AFTER DRILLING

REMARKS:

BORING LOG

PROJECT Mehlville School District Bus Transportation Facility | **BORING NUMBER** B-103
LOCATION St. Louis County, Missouri | **SHEET** 1 **of** 1
DRILLER Midwest Drilling, Inc. | **HAMMER** Automatic | **PROJECT NO.** 2026-1010.10
EQUIPMENT CME-550 w/CFA | **ELEVATION** 548± | **DATE DRILLED** 07/03/2026

DEPTH (ft)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE RECOVERY (in/in)	SAMPLE BLOWS (per 6 in)	DESCRIPTION (UNIFIED SOIL CLASSIFICATION)	GRAPHIC	SEE REMARK NO.	LABORATORY TEST RESULTS: MOISTURE CONTENT (%)	DRY DENSITY (pcf)	HAND PENETROMETER (ksf)	UNCONFINED COMPRESSIVE STRENGTH (ksf)	LIQUID LIMIT	PLASTICITY INDEX	ELEVATION (ft)
					4" ASPHALTIC CONCRETE									
					6" CRUSHED ROCK									
					FILL: Gray, lean clay									
	1	SS	16/18	2 3 5				22						546
3														
	2	SS	18/18	3 5 4				23				44	21	543
6														
	3	SS	18/18	3 4 4	LEAN CLAY (CL): Brown			26						540
9	4	SS	18/18	3 5 6				23						537
12														
	5	SS	18/18	3 4 4				23						534
15														
					FAT CLAY (CH): Brown									531
18														
	6	SS	18/18	3 5 6				22						

Boring terminated at 20 feet.

WATER LEVEL:

X	NONE OBSERVED WHILE DRILLING
____ ft	WHILE DRILLING
____ ft	____ HRS AFTER DRILLING
____ ft	____ DAYS AFTER DRILLING

REMARKS:

BORING LOG

PROJECT Mehlville School District Bus Transportation Facility | **BORING NUMBER** B-104
LOCATION St. Louis County, Missouri | **SHEET** 1 **of** 1
DRILLER Midwest Drilling, Inc. | **HAMMER** Automatic | **PROJECT NO.** 2026-1010.10
EQUIPMENT CME-550 w/CFA | **ELEVATION** 548± | **DATE DRILLED** 07/03/2026

DEPTH (ft)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE RECOVERY (in/in)	SAMPLE BLOWS (per 6 in)	DESCRIPTION (UNIFIED SOIL CLASSIFICATION)	GRAPHIC	SEE REMARK NO.	LABORATORY TEST RESULTS: MOISTURE CONTENT (%)	DRY DENSITY (pcf)	HAND PENETROMETER (ksf)	UNCONFINED COMPRESSIVE STRENGTH (ksf)	LIQUID LIMIT	PLASTICITY INDEX	ELEVATION (ft)
					2" ASPHALTIC CONCRETE 10" CRUSHED ROCK									
	1	SS	18/18	2 2 4	FILL: Gray, lean clay, trace gravel			18						546
3														
	2	SS	18/18	2 2 4	LEAN CLAY (CL): Brown			27						543
6														
	3	SS	18/18	2 3 3				23				36	17	
														540
9	4	SS	18/18	2 2 3				25						
														537
12					FAT CLAY (CH): Brown									
	5	SS	18/18	3 4 5				24						534
15														
														531
18														
	6	SS	18/18	6 7 8				24						

Boring terminated at 20 feet.

WATER LEVEL:

X	NONE OBSERVED WHILE DRILLING
	ft WHILE DRILLING
	ft ___ HRS AFTER DRILLING
	ft ___ DAYS AFTER DRILLING

REMARKS:

BORING LOG

PROJECT Mehlville School District Bus Transportation Facility | **BORING NUMBER** B-105
LOCATION St. Louis County, Missouri | **SHEET** 1 **of** 1
DRILLER Midwest Drilling, Inc. | **HAMMER** Automatic | **PROJECT NO.** 2026-1010.10
EQUIPMENT CME-550 w/CFA | **ELEVATION** 549± | **DATE DRILLED** 07/03/2026

DEPTH (ft)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE RECOVERY (in/in)	SAMPLE BLOWS (per 6 in)	DESCRIPTION (UNIFIED SOIL CLASSIFICATION)	GRAPHIC	SEE REMARK NO.	LABORATORY TEST RESULTS: MOISTURE CONTENT (%)	DRY DENSITY (pcf)	HAND PENETROMETER (ksf)	UNCONFINED COMPRESSIVE STRENGTH (ksf)	LIQUID LIMIT	PLASTICITY INDEX	ELEVATION (ft)
					10" CRUSHED ROCK									
					FILL: Brown, lean clay									
	1	ST	21/24					22	95.5		4.0			
3														546
	2	SS	18/18	4 4 6				25						
					LEAN CLAY (CL): Brown									
6														543
	3	SS	18/18	4 5 6				25				48	29	
9	4	SS	18/18	3 4 4				23						540
					FAT CLAY (CH): Brown									
12														537
	5	SS	18/18	5 5 6				24						
15														534
18														531
	6	SS	18/18	5 7 8				22						

Boring terminated at 20 feet.

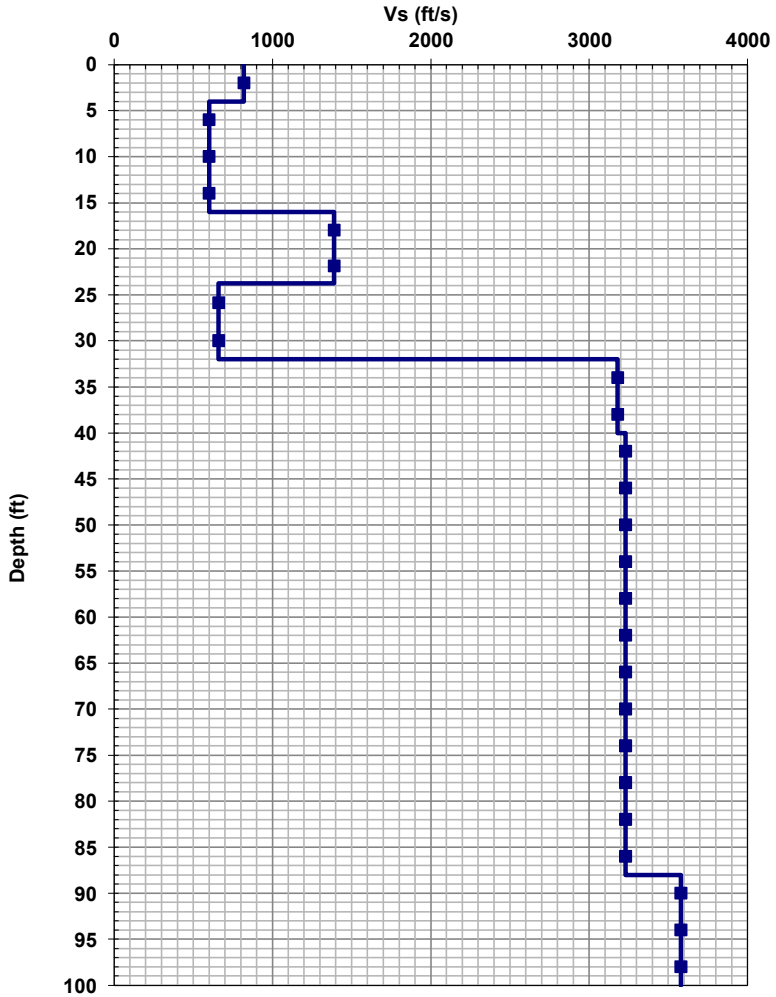
WATER LEVEL:

X NONE OBSERVED WHILE DRILLING
____ ft WHILE DRILLING
____ ft ____ HRS AFTER DRILLING
____ ft ____ DAYS AFTER DRILLING

REMARKS:

Appendix B

Project Name:	Mehlville School District		Date:	11/10/2021
Project #:	2016-0860.10		Test Method	REMI
Location:	St. Louis County, Missouri		ASTM:	D 7400
Traverse:	T-1		Geophone Spacing (m):	8
Operator:	CDI	Latitude:	# of Geophones:	12
Engineer:	PP	Longitude	Elevation:	548 ±

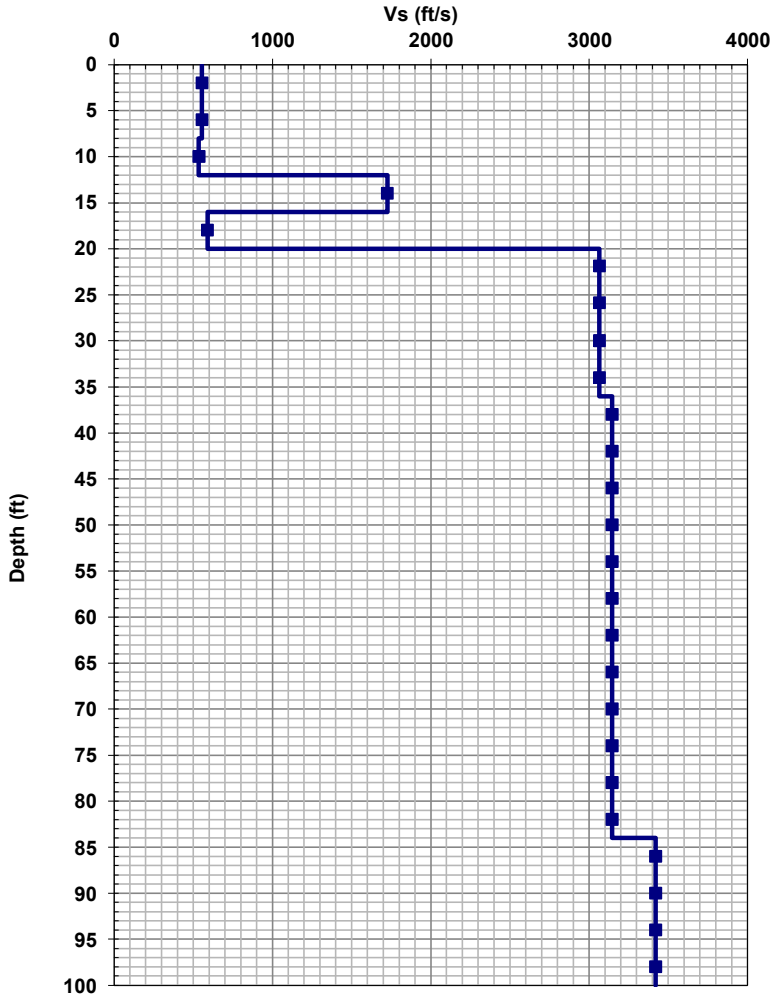


Depth	Vs
feet	ft/s
4	820
8	600
12	600
16	600
20	1390
24	1390
28	660
32	660
36	3180
40	3180
44	3230
48	3230
52	3230
56	3230
60	3230
64	3230
68	3230
72	3230
76	3230
80	3230
84	3230
88	3230
92	3580
96	3580
100	3580

V_{S30} =	1647	ft/s
Site Class*:	C	

**Per IBC Weighted Shear Wave Velocity Criterion (Liquefaction, Soft Clay, etc, Not Considered In This Calculation)*

Project Name:	Mehlville School District		Date:	9/22/2021
Project #:	2016-0860.10		Test Method	REMI
Location:	St. Louis County, Missouri		ASTM:	D 7400
Traverse:	T-2		Geophone Spacing (m):	8
Operator:	CDI	Latitude:	# of Geophones:	12
Engineer:	PP	Longitude	Elevation:	535 ±



Depth	Vs
feet	ft/s
4	555
8	555
12	535
16	1725
20	590
24	3065
28	3065
32	3065
36	3065
40	3145
44	3145
48	3145
52	3145
56	3145
60	3145
64	3145
68	3145
72	3145
76	3145
80	3145
84	3145
88	3420
92	3420
96	3420
100	3420

V_{S30} =	1855	ft/s
Site Class*:	C	

**Per IBC Weighted Shear Wave Velocity Criterion (Liquefaction, Soft Clay, etc, Not Considered In This Calculation)*

To: Mehlville R-IX School District
2900 Lemay Ferry Road
St. Louis, Missouri 63125

Project: Mehlville School District – Bus Transportation Facility

Date: _____

Submitted by:
(full name)

_____

(full address)

_____

_____

1. OFFER

Having examined the Place of the Work and all matters referred to in the Instructions to Bidders and the Contract Documents prepared by BLDD Architects, Inc., Architect for the above mentioned project, we, the undersigned, hereby offer to enter into a contract to perform the Work for:

(Amount shall be shown in both words and figures. In case of discrepancy, the amount shown in words shall govern.)

A. Base Bid: All work associated with the Mehlville School District Bus Transportation Facility for the contract sum of:

_____ Dollars ($_____).

B. Unit Prices: "Unit Price" means a fixed amount for all labor, material, overhead, profit, and all other costs of whatever nature and character for a specified unit of work. Unit Prices as such will not be used to determine the lowest responsible bidder. Any Unit Price which the Owner considers excessive or unreasonable may be rejected or negotiated.

Unit Price #1: For unsuitable soils discovered during your work, please provide a cubic yard cost to remove, legally dispose offsite, and remediate per requirements outlined in the Geotechnical Report.

_____ Dollars ($_____).

C. Alternate Bids: "Alternate Bid" means a fixed amount for all labor, material, overhead, profit, and all other costs of whatever nature and character for the item described. See Section 01 2300 for a more detailed description of each Alternate Item.

Alternate #1: Shade structure system and patio furniture scopes, **DEDUCT** from the Base Bid amount the sum of:

_____Dollars ($_____).

Alternate #2: Fuel pump canopy scope. **DEDUCT** from the Base Bid amount the sum of:

_____ Dollars ($_____).

Allowances: The base bid amount above includes the allowances defined in Section 01 2100 – Allowances.

We have included herewith:

A. Bid Security as required by the Instructions to Bidders.
B. Executed Wage Determination.
C. Executed Federal Work Authorization Program (E-Verify) Addendum, including Exhibit A, Federal Work Authorization Program Affidavit.
D. Anit-Discrimination Against Israel Act Certification, Exhibit E.
E. Contractor's Qualification Statement, AIA A304 as required by the Instructions to Bidders.

Purchasing of building materials for incorporation into the project is exempt from sales tax and therefore such tax shall be excluded from the Bid Sum.

2. ACCEPTANCE

This offer shall be open to acceptance and is irrevocable for thirty (30) days from the Bid closing date.

If the Bid is accepted by the Owner within the time period stated above, we will:

A. Execute the Agreement within ten (10) days of receipt of Notice of Award.

B. Furnish the required bonds within ten (10) days of receipt of Notice of Award in the form described in the Supplementary Conditions.

C. Furnish the required Certificate of Insurance within ten (10) days of receipt of Notice of Award in the form and amounts described in the Supplementary Conditions.

D. Commence work as established by the written Notice to Proceed.

If this Bid is accepted within the time stated, and we fail to commence the Work or we fail to provide the required Bonds(s), the Bid Security shall be forfeited as damages to the Owner by reason of our failures.

In the event our Bid is not accepted within the time stated above, the required security deposit shall be returned to the undersigned, in accordance with the provisions of the Instructions to Bidders; unless a mutually satisfactory arrangement is made for its retention and validity for an extended period of time.

3. CONTRACT TIME

Pending receipt of the Notice to Proceed, the Contractor will have access to the site no earlier than 6:00 a.m. on Monday, March 1, 2027.

We, the undersigned bidder, will fully complete all Work by 5 p.m. on Friday, January 28, 2028 for the new Bus Facility building, Tire Storage, Dumpster Enclosure and surrounding site work; and 5:00 p.m. on Friday, June 30, 2028 for the remaining site work and balance of the project. Refer to Section 01 1000 – Project Summary for Work Sequence.

The undersigned understands and agrees that Liquidated damages will be assessed at $1,500 per day past the date of substantial completion.

4. ADDITIONAL WORK

The undersigned agrees to provide additional construction work ordered by the Owner for which no pre-fixed price has been agreed at the actual cost of the work plus the following percentages for overhead and profit:

A. Add to net extra for job costs for additional work performed by:

1. Contractor's own forces: 15%.
2. Subcontractors, including assigned subcontractors: 5%.
3. Minimum markup: $100

B. Add to net credit for job costs for deleted work originally to have been performed by:

1. Contractor's own forces: 5%.
2. Subcontractors: 0%.

5. ADDENDA

The following Addenda have been received. The modifications to the Bid Documents noted therein have been considered and all costs thereto are included in the Bid Sum.

Addendum # _____ Dated _____

Addendum # _____ Dated _____

Addendum # _____ Dated _____

Addendum # _____ Dated _____

6. SUBCONTRACTORS

If requested, undersigned agrees to provide a list of major Subcontractors to the Architect within 24 hours after the Bid Opening.

7. BID FORM SIGNATURE(S)

The Corporate Seal of

_____
(Bidder - please print the full name of your Proprietorship, Partnership, or Corporation)

was hereunto affixed in the presence of:

_____
(Authorized signing officer) (Title)

(Seal)

_____
(Authorized signing officer) (Title)

If the bid is a joint venture or partnership, add additional forms of execution for each member of the joint venture in the appropriate form or forms as above.

END 00 4100

1.1. AGREEMENT BETWEEN OWNER AND CONTRACTOR

A. AIA Document A101 - 2017, "Standard Form of Agreement Between Owner and Contractor," is hereby incorporated into the Procurement and Contracting Requirements by reference.

1. Amended copies of AIA Document A101 - 2017, " Standard Form of Agreement Between Owner and Contractor," is bound in this Project Manual.

END 00 5200

1.1. GENERAL CONDITIONS OF THE CONTRACT

A. AIA Document A201 - 2017, "General Conditions of the Contract for Construction," is hereby incorporated into the Procurement and Contracting Requirements by reference.

1. Refer to Section 00 7300 – Supplement to the General Conditions for amendments to the standard General Conditions.

END 00 7200

GENERAL CONDITIONS OF THE CONTRACT

The General Conditions of the Contract is AIA A201 - 2017 “General Conditions of the Contract for Construction”, hereinafter referred to as the "General Conditions", whether bound within or not.

SUPPLEMENT TO GENERAL CONDITIONS OF THE CONTRACT

The following supplements modify, change, delete or add to parts of the General Conditions. Where parts are changed, deleted from or added by the following Articles, the unaffected parts of that provision shall remain in effect.

TABLE OF CONTENTS TO STANDARD ARTICLES AMENDED BY THE SUPPLEMENTARY CONDITIONS

Title	Article
General Provisions	1
Owner	2
Contractor	3
Architect	4
Payments and Completion	9
Insurance and Bonds	11
Uncovering & Correction of Work	12
Claims and Disputes	15

AMENDMENTS

ARTICLE 1 - GENERAL PROVISIONS

1.1.1 THE CONTRACT DOCUMENTS

Subparagraph 1.1.1 -- The following sentence added:

1.1.1 The Owner-Contractor Agreement takes precedence over all Contract Documents.

1.5 "Ownership and use of Drawings, Specifications and Instruments of Service"

The following subparagraph added:

1.5.3 Number of copies furnished: The successful Contractor will be supplied with a maximum of fifteen (6) sets of construction documents for construction purposes, at no charge. Additional sets will be furnished at Contractor's request, for the cost of reproduction.

ARTICLE 2 - OWNER

The following Subparagraph added:

2.1.3 "The Owner" refers to Mehlville School District, 2900 Lemay Ferry Road, St. Louis, Missouri 63125.

ARTICLE 3 - CONTRACTOR

The following subparagraph added:

3.6.1 As set forth in 144.062 RSMo and 144.030 RSMo, Contractors who purchase materials and/or supplies "for the purpose of constructing, repairing or remodeling facilities for" the Owner" are exempt from paying sales tax. The official State tax exemption certificate will be furnished to the Contractor. The quoted phrase was taken directly from the statute.

Subparagraph 3.12.7 -- Revised to read as follows:

3.12.7 The Contractor shall perform no portion of the work requiring submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittal has been reviewed by the Engineer. Such work shall be in accordance with submittals.

Subparagraph 3.12.8 -- Revised to read as follows:

3.12.8 The Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Engineer's review of Shop Drawings, Products Data, Samples or similar submittals unless the Contractor has specifically informed the Engineer in writing of such deviation at the time of submittal and the Engineer has given written approval to the specific deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the Engineer's review thereof.

ARTICLE 4 - ADMINISTRATION OF THE CONTRACT

4.1 GENERAL

Subparagraph 4.1.1 -- The following Clause added to 4.1.1:

4.1.1 "The Architect" refers to BLDD Architects, 103 W. Lockwood, Suite 218, Webster Groves, Missouri 63119, whose name appears on the drawings and who by Contract with the Owner, is authorized to prepare all drawings, specifications, and details of this work.

4.2 ADMINISTRATION OF THE CONTRACT

Subparagraph 4.2.2 -- First line revised to read as follows:

4.2.2 The Architect will, as provided in the Owner-Architect Agreement, visit the site at intervals appropriate to.....

Subparagraph 4.2.7 -- First line revised to read as follows:

4.2.7 The Architect will review or take other .....

Subparagraph 4.2.7 -- Last sentence revised to read as follows:

4.2.7 The Architect's review of specific item shall not indicate approval of an assembly of which the item is a component.

ARTICLE 9 - PAYMENTS AND COMPLETION

9.3 APPLICATIONS FOR PAYMENTS

Subparagraph 9.3.1 -- The following sentence added:

9.3.1 The form of Application for Payment shall be notarized AIA Document G702, Application G702, Application and Certification for Payment, supported by AIA Document G703, Continuation Sheet.

ARTICLE 11 - INSURANCE

11.1 CONTRACTOR'S LIABILITY INSURANCE

11.1.1 Delete in its entirety and substitute:

The Contractor shall purchase and maintain such insurance (in companies registered to do business in the State of Missouri and having an A.M. Best Rating of A-IX or higher) that will protect them from claims set forth below which may arise out of or result from Contractor's operations under the contract, whether such operations be by himself or by any subcontractor or by anyone directly or indirectly employed by them, or by anyone for whose acts they may be liable. The coverage shall conform to the state of Federal requirements but not less than the following limits:

11.1.1.1 Workmen's Compensation - Statutory limits required by State Law.

11.1.1.2 Employer's Liability Insurance shall be in amounts no less than $1,000,000.00 each accident for bodily injury, $1,000,000 for bodily injury by disease and $1,000,000 each employee for bodily injury by disease. If there is an exposure of injury to Contractor's employees under the U.S. Longshoremen's and Harbor Workers Compensation act, the Jones Act or under laws, regulations or statutes applicable to maritime employees, coverage shall be included for such injuries or claims. If the contractor's Employers Liability limits are below those stated above an umbrella liability policy may be used to the requested limit.

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

1. Premises and Operations
2. Products and Completed Operations
3. Contractual Liability insuring the obligations assumed by the Contractor under this Contract
4. Broad Form Property Damage (including Completed Operations)
5. Explosion, Collapse, and Underground Hazards
6. Personal Injury Liability and Advertising Injury Liability

Except with respect to bodily injury and property damage included within the products and completed operations hazards, the general aggregate limit shall apply separately to the Contractor's project under this Contract. Completed Operations coverage must be maintained for the one year correction period provided by the agreement.

Limit of Liability. The Commercial General Liability policy limits shall not be less than:

$1,000,000 Each Occurrence (Combined Single Limit for Bodily Injury and Property Damage)
$1,000,000 Aggregate for Products / Completed Operations
$1,000,000 Personal Injury / Advertising Injury
$1,000,000 General Aggregate (provide endorsement to apply the General Aggregate per project, if available. If not, see Umbrella Liability section.

Additional Insured: The District, all of its officers, directors and employees, shall be named as Additional Insureds under the Commercial General Liability Insurance using ISO Additional Insured Endorsements CG 20 10 and CG 20 37, or substitute providing equivalent coverage. These endorsements must be stated on the insurance certificate provided to the District and a copy of the endorsements confirming coverage should accompany the insurance certificate.

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

11.1.1.4 Comprehensive Automobile Liability – The policy should be written on ISO form CA 0001, CA 0005, CA 0002, CA0020 or a substitute form providing equivalent coverage and shall provide coverage for all owned, hired and non-owned vehicles. The limit of liability should be at least $1,000,000 Combined Single Limit for Bodily Injury and Property Damage each accident and should also cover Automobile Contractual Liability. The policy shall be endorsed to be primary coverage and any other insurance carried by the District shall be excess only and will not contribute with Contractor's insurance. To confirm coverage, a copy of the Additional Insured Endorsement and the Primary Insurance Endorsement should accompany the insurance certificate.

11.1.1.5 Umbrella Liability – The Contractor should probide an umbrella excess liability policy that will provide a minimum of $1,000,000 per occurrence / $1,000,000 aggregate over the above listed coverages. This policy should "follow-form" of the underlying policies and comply with all insurance requirements of those policies. If the General Aggregate of the Commercial General Liability policy does not apply per project, the limits should be $2,000,000 per occurrence / $2,000,000 aggregate.

11.1.1.6 Waiver of Subrogation - The Commercial General Liability and Automobile Liability policies shall each contain a waiver of subrogation in favor of the District and its officers, directors and employees.

Add the following subparagraphs:

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

11.1.4.1 Copies of Policies – Contractor shall furnish a certified copy of any and all insurance policies required under this Contract within ten (10) days of District's written request for said policies.

11.1.4.2 Subcontractors – Contractor shall cause each Subcontractor to purchase and maintain insurance of the types and amounts specified herein. Limits of such coverage may be reduces only upon written agreement of District. Contractor shall provide to District copies of certificates evidencing coverage for each Subcontractor. Subcontractors' commercial general liability and business automobile liability insurance shall name District and Engineer as Additional Insured and have the Waiver of Subrogation endorsement added.

11.1.4.3 Other Insurance – The District may require insurance coverage in excess of the types and amount required in this Exhibit. Contractor shall attempt in good faith to obtain quotes for such additional coverage and provide them to District for review. Contractor shall purchase any such additional insurance as may be requested by the District in writing. District shall pay any additional premium for such additional coverage.

11.3 OWNER'S INSURANCE

The following subparagraphs added:

11.2.1 The Contractor is hereby informed that the Owner will carry Fire and Extended Coverage Insurance which will include provisions for vandalism but not provisions for theft, mysterious disappearance, or glass breakage.

The Owner will also carry the Builder's Risk Insurance for the project.

11.3.2 The Contractor is hereby made aware that he will be held responsible for a complete job in every detail, and shall replace any contract items which are stolen or which mysteriously disappear and shall replace any broken glass before Owner's acceptance.

ARTICLE 12 - UNCOVERING & CORRECTION OF WORK

The following subparagraph added:

12.2.4.1 Upon failure of the Contractor to make repairs within ten (10) days after notice from the Owner's Representative, the Owner shall have such work done and the cost thereof charged to the Contractor.

ARTICLE 15 - CLAIMS AND DISPUTES

Subparagraph 15.1.3.2 -- Revised to read as follows:

15.1.3.2 Continuing Contract Performance. Pending final resolution of a Claim, unless otherwise agreed in writing the Contract shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

END 00 7300

1. GENERAL

1.1. WORK INCLUDES

A. Work covered by contract documents: Project consists of a new Transportation Garage + Office building on the Mehlville High School Campus. The existing adjacent parking lot will also be reviewed during the design process to possibly add additional parking as well as improve the vehicular traffic circulation at that area of the site.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 2300 - Alternates
2. Section 01 3119 - Project Meetings
3. Section 01 5000 - Temporary Facilities and Controls
4. Section 01 7700 - Closeout Procedures

1.3. DEFINITIONS. The following terms are used throughout the contract documents. The work will be governed in accord with the definitions.

A. Fabricated: "Fabricated" pertains to items specifically assembled or made of selected materials or components to meet individual design requirements.

B. Manufactured: "Manufactured" means standard units, usually mass produced by an established manufacturer of the respective item.

C. Provide: "Provide" means furnish and install.

D. Shop fabricated or shop made: "Shop fabricated or shop made" refers to items made by the Contractor in his own shop.

1.4. INSURANCE: See the Conditions of the Contract.

1.5. OTHER REQUIREMENTS

A. Criminal Background Check.

1. Before Employment of any employee or retention of an independent contractor, subcontractor or supplier who is an individual for work on this project, the contractor shall conduct criminal background checks through the FBI, the St. Louis County Police Department (or the previous county of out of county residents) and all appropriate state agencies and any other background checks as may be standard for entities providing services to public schools, including without limitation, a thorough review of the lists of the registered sex offenders as provided by the St. Louis County Police Department, and any such individual who does not pass such background check as determined by the Customer in its sole discretion shall not be permitted to enter the premises where the Project is located or any other school district property or to work on the Project. In addition, the Contractor shall update its background check on monthly basis to confirm its continued compliance with its requirement.
2. Contractor shall include all of these requirements in its contract with its subcontractors and suppliers.

3. See attached Request for Criminal Record Check form.

B. Qualifications of Bidders: Proposals are intended to be open to all qualified contractors. Acceptance of the proposal will be made by the Mehlville School District with cost and quality the determining factors in selecting the best value. The Mehlville School District may make such investigation as it deems necessary to determine the ability of the contractor to perform the work and the contractor shall furnish to the Mehlville School District all such information and data for this purpose as the Mehlville School District may request. The Mehlville School District desires to avoid workplace disruptions that could affect the contractor's ability to complete this project in the most timely and effective manner possible. The Mehlville School District reserves the right to reject any proposal if the evidence submitted by, or investigation of, such contractor fails to satisfy the Mehlville School District that such contractor is properly qualified to carry out the obligations of the contract and to complete the work contemplated therein. The Mehlville School District also reserves the right to reject any and/or all proposals.

C. Vendor shall comply with RSMo. 292.675 and provide construction training as required by the Owner and applicable law. Vendor shall provide a ten-hour OSHA construction safety program for on-site employees which includes a course in construction safety and health approved by OSHA or a similar program approved by the Missouri Department of Labor and Industrial Relations which is at least as stringent as an approved OSHA program. All employees are required to complete the program within 60 days of beginning work on such project. Vendor shall forfeit as a penalty to Owner, $2,500 plus $100 for each employee employed by Vendor or its subcontractors for each calendar day or portion thereof that any such employee is employed without the required training.

D. Vendor shall comply with RSMo 34.600 simultaneously with its execution and delivery of this Agreement and shall provide the Anti-Discrimination against Israel Certification attached hereto.

E. Vendor and all subcontractors and suppliers shall comply with the provisions of the "Missouri Domestic Products Procurement Act."

1.6. WORK BY OTHERS

A. The Owner will award contracts which will commence on during construction of the Transportation Facility project. Work under these contracts includes:

1. Furniture Installation: The Owner will award contracts with a furniture installer for the installation of furniture in the spaces and rooms developed and created as a part of this Project. It will be the (General) Contractor's responsibility to coordinate with the furniture installer the schedule for furniture installation. The (General) Contractor is to include the dates and durations in the overall Project Schedule (in accordance with Section 01 3216) to allow the installation of furniture to occur BEFORE the specified date for Owner occupancy. If the work of this Contract is delayed for any reason and, subsequently, does NOT allow for the timely and proper installation of the furniture, it will be the (General) Contractor's responsibility to coordinate any revised installation dates and provide storage for any furniture that cannot be installed as scheduled. All costs from the furniture installer associated with revised delivery dates, storage of uninstalled furniture, and labor increases due to multiple installation efforts, will be the responsibility of the (General) Contractor.
2. Construction of a new concession/restroom/storage building, team equipment building, press box, and parking lot with associated fire lane.

B. Items noted "N.I.C" (Not-in-Contract) will be furnished and installed by the Owner or Owner's separate contractor(s).

C. Items furnished by the Owner for final connection by the contractor: Equipment and appliances as indicated in the Contractor Documents.

1.7. CONTRACTOR USE OF PREMISES

A. Contractor to prepare and submit Site Logistics Plan for Architect and Owner approval prior to start of Work. Refer to Section 01 5000 – Temporary Facilities and Controls.

B. Confine operations at site to areas permitted by:

1. Law
2. Permits
3. Contract
4. Drawings
5. Owner's representative

a. Confer with Owner's representative and obtain full knowledge of all site rules and regulations affecting work.
b. Conform to site rules and regulations while engaged in project construction.
c. Site rules and regulations take precedence over others that may exist outside such jurisdiction.
d. Employee list: The Owner's representative may examine Contractor's list of employees, including those of his subcontractors and their agents.
e. Vehicle use: Rigidly enforce the following:

1) Keep all vehicles, mechanized or motorized equipment locked at all times when parked and unattended on the Owner's premises.
2) Parking: Permitted only in areas designated by Drawings.

C. Do not unreasonably encumber site with materials or equipment.

D. Do not load structures with weight that will endanger structure.

E. Assume full responsibility for protection and safekeeping of products stored on premises.

F. Move all stored products or equipment which interfere with operations of the Owner.

G. Obtain and pay for use of additional storage or work area needed for operations.

H. Use of Site: Confine operations at site to areas as designated by Contract Documents. Do not disturb portions of Project site beyond areas in which the Work is indicated.

I. Fire Protection:

1. Fires: Contractor shall prohibit the lighting of fires about the premises and use due diligence to see that refuse and such not be burned at the construction site. Promptly remove all refuse and such from the site for legal disposal. Prevent the accumulation of combustibles on the site or within the building.
2. Welding and cutting: It shall be the responsibility of each contractor to take precautionary measures to prevent fire.
3. Heaters: The heaters in Contractor's job offices shall be properly installed to protect combustible walls, floors, and roof. Salamander heaters or other types of open flame heaters shall not be used except with the special permission of Owner, and then only when such heaters are maintained under constant supervision.

4. Flammables: Gasoline and other fuels shall be kept and handled in accord with NFPA and in UL listed and labeled safety cans, and shall be stored away from hazardous work areas.

J. Smoking inside of the building, including those areas associated with the work of this contract, will not be permitted. Smoking on the premises outside of the building will also not be permitted.

1.8. HAZARDOUS MATERIALS

A. No asbestos containing materials, lead based paints, or other hazardous materials shall be furnished or installed in this work.

1.9. WORK SEQUENCE

A. Construct work in phases to accommodate Owner's occupancy requirements during the construction period; coordinate construction schedule and operations with the Owner:

1. **March 1, 2027**: Construction Phase Commencement and mobilization.
   January 28, 2028: Date of Substantial Completion for Bus Transportation Facility, Tire Storage, Dumpster Enclosure and surrounding area.
   January 31 – February 4, 2028: Punch new Bus Facility, Tire Storage and Dumpster Enclosure.
   February 7 – 18, 2028: Furniture Installation in new Bus Facility.
   March 20 – 24, 2028 (Spring Break): Contractor to move equipment from existing garage to new bus facility. District moves into new bus facility and ancillary buildings.
   April 3 - May 31, 2028: Demolish existing garage building and old trailer. Move and relocate newer trailer to new location. Continue ongoing site work.
   June 1 - 30, 2028: Complete remaining site work, asphalt, and balance of work.
   June 20, 2028: Date of Substantial Completion for site work
2. Reference Phasing Drawings.
3. Existing bus garage, (2) two trailers and ancillary functions & structures will remain occupied and functional during construction of new bus facility, site improvements, etc.
4. All buses will need to be located and parked on site, operational, functional and with appropriate parking and access for the duration of the project.
5. Where buses are parked, there must always be security fencing. This fencing can be temporary.
6. Bus driver parking must be provided, close to bus parking, and accessible to bus garage.
7. This project is located on a school campus that will remain operational. Construction and development activities cannot impede school functions.
8. Maintain safety standards at all times.

1.10. OWNER OCCUPANCY

A. Full Owner Occupancy: Owner will occupy site and existing and adjacent building(s) during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations.

1. Coordination: Coordinate operations that may result in high levels of noise and vibration, odors, utility outages, or other disruption to the Owner’s operations.

   a. Notify Owner not less than 72 hours in advance of activities that will affect Owner's operations.

2. Egress: Unless otherwise indicated, egress from all Owner occupied areas shall be maintained at all times.

END 01 1000

MISSOURI STATE HIGHWAY PATROL

SHP-158S 11/18

REQUEST FOR CRIMINAL RECORD CHECK

PLEASE PRINT OR TYPE.

GENERAL INFORMATION

APPLICANT'S LAST NAME	FIRST	MIDDLE	JR / SR

MAIDEN / ALIAS LAST NAME	FIRST	MIDDLE	JR / SR

SEX	DATE OF BIRTH (MM/DD/YYYY)	SOCIAL SECURITY NUMBER	RACE
☐ MALE ☐ FEMALE			☐ BLACK ☐ INDIAN ☐ OTHER ☐ WHITE ☐ ASIAN

ADDRESS	STREET - P.O. BOX	CITY	STATE	ZIP CODE

fold fold

TYPE OF RECORD CHECK — PROCESSING FEE — METHOD OF PAYMENT

(per Sections 43.527 and 43.530, RSMo.)

☐ **$14.00 NAME SEARCH**
Based on NAME, DATE OF BIRTH, AND SOCIAL SECURITY NUMBER. Response will be returned with all open records and records of conviction.

☐ $20.00 FINGERPRINT SEARCH
- ☐ Open Records
- ☐ Open and Closed Records

☐ $2.00 NOTARY LETTER

Fee is payable either by check or money order (NO CASH) to "State of Missouri, Criminal Record System Fund."

Either the Date of Birth OR Social Security Number MUST be provided for processing.

For faster processing criminal record checks are available online at: www.machs.mo.gov

Please forward the request and fee to:

Missouri State Highway Patrol
Criminal Justice Information Services Division
Post Office Box 9500
Jefferson City, MO 65102

fold fold

MSHP / CENTRAL REPOSITORY RESPONSE

SEND REPLY TO (Print or type your mailing label below.)

Telephone (include area code) _____

MISSOURI STATE HIGHWAY PATROL • CENTRAL REPOSITORY •

Criminal Justice Information Services Division
General Information

The Missouri Criminal Records Repository (MCRR) collects, maintains, and disseminates Criminal History Record Information (CHRI) as defined by Sections 43.500 and 589.400, RSMo. CHRI is information collected by criminal justice agencies on individuals and consists of arrests, prosecutions, final dispositions, correctional supervision, and releases. All felony and serious misdemeanor arrests (referred to as reportable arrests), including offender registration information as defined under Section 589.400, RSMo, and all alcohol and drug related traffic offenses are reportable to the MCRR.

Criminal background checks may be requested by means of:

1) A **Personal Identifier Search** (name-based) which searches information based on the name, date of birth, and social security number of an individual.
2) A **Fingerprint Based Search** which searches the state's criminal history files by conducting a fingerprint comparison of the applicants fingerprints with the criminal (arrest) fingerprints on file with the Central Repository. Fingerprint images are collected and submitted using the standard federal applicant fingerprint card (FD-258).

The Personal Identifier Search requires a payment of **$14.00** per request. The background check results are considered a ***"possible match"*** and will include only open records. Any individual, business, or agency may request and receive open record information by means of a personal identifier search. **Open records include:**

- Records containing convictions, such as plead guilty to, or convicted of.
- Arrest information that is less than 30 days old from the date of arrest.
- Charges filed from the prosecutor, awaiting final disposition from the court.
- Records that contain a suspended imposition of sentence (SIS) during the probation period.

A Fingerprint Based Search requires a payment of **$20.00** per request. The results of a fingerprint-based background check are considered a ***"positive match"*** and will provide either open records or closed (complete) records as requested by the applicant.

An applicant may choose to conduct a fingerprint based criminal record check containing open records thus limiting the dissemination of criminal history information to **only** open record information. The Criminal Justice Information Services (CJIS) Division will release fingerprint-based criminal history information containing only open record information to any individual, business, or agency when requested by the applicant.

An applicant may choose to conduct a fingerprint-based criminal record check for release of closed records thus allowing dissemination of all criminal history information on file with the Central Repository. Closed records will only be released with a record check submitted by means of a fingerprint comparison and will only be released directly to the applicant or to a qualified entity if authorized in accordance with Section 610.120 and Chapter 43, RSMo. **Closed records include**:

- All criminal history data, including all arrests (filed or not filed charges).
- Charges that have been nolle prossed, dismissed, or found not guilty in a court of law.
- Suspended Imposition of Sentence (SIS) after the probation period is complete.

Notary Letters are provided upon request and require an additional $2.00 processing fee, per request. A notary letter may be requested with either a personal identifier search or a fingerprint search.

PENALTY — A person who knowingly violates any provision of Sections 43.532, 43.540, 610.100, 610.105, 610.106 or 610.120 RSMo is guilty of a class A misdemeanor.

FBI Record Requests

The FBI only has open files meaning that if someone has the authority to receive the records; they receive all that is on file.

Individuals that need a Federal or Federal Bureau of Investigation (FBI) background check, for personal reasons or for employment purposes for entities not authorized through Missouri State Statute or the Missouri VECHS program, can submit fingerprints with an $18.00 fee directly to the FBI. For information on how to obtain a federal background check directly from the FBI, please refer to information regarding the FBI's Identity History Summary Check on the FBI's website at www.fbi.gov.

ANTI-DISCRIMINATION AGAINST ISRAEL ACT CERTIFICATION

Statutory Requirement: Section 34.600, RSMo, precludes entering into a contract with a company to acquire products and/or services "unless the contract includes a written certification that the company is not currently engaged in and shall not, for the duration of the contract, engage in a boycott of goods or services from the State of Israel; companies doing business in or with Israel or authorized by, licensed by, or organized under the laws of the State of Israel; or persons or entities doing business in the State of Israel."

Exceptions: The statute provides two exceptions for this certification: 1) "contracts with a total potential value of less than one hundred thousand dollars" or 2) "contractors with fewer than ten employees." Therefore the following certification is required prior to any contract award.

Section 34.600, RSMo, defines the following terms:

> **Company -** any for-profit or not-for-profit organization, association, corporation, partnership, joint venture, limited partnership, limited liability partnership, limited liability company, or other entity or business association, including all wholly-owned subsidiaries, majority-owned subsidiaries, parent companies, or affiliates of those entities or business associations.
>
> **Boycott Israel** and **Boycott of the State of Israel -** engaging in refusals to deal, terminating business activities, or other actions to discriminate against, inflict economic harm, or otherwise limit commercial relations specifically with the State of Israel; companies doing business in or with Israel or authorized by, licensed by, or organized under the laws of the State of Israel; or persons or entities doing business in the State of Israel, that are all intended to support a boycott of the State of Israel. A company's statement that it is participating in boycotts of the State of Israel; companies doing business in or with Israel or authorized by, licensed by, or organized under the laws of the State of Israel; or persons or entities doing business in the State of Israel, or that it has taken the boycott action at the request, in compliance with, or in furtherance of calls for a boycott of the State of Israel; companies doing business in or with Israel or authorized by, licensed by, or organized under the laws of the State of Israel; or persons or entities doing business in the State of Israel shall be considered to be conclusive evidence that a company is participating in a boycott of the State of Israel; companies doing business in or with Israel or authorized by, licensed by, or organized under the laws of the State of Israel; or persons or entities doing business in the State of Israel; provided, however that a company that has made no such statement may still be considered to be participating in a boycott of the State of Israel; companies doing business in or with Israel or authorized by, licensed by, or organized under the laws of the State of Israel; or persons or entities doing business in the State of Israel if other factors warrant such a conclusion.

Certification: The vendor must therefore certify their current status by completing either Box A, Box B, or Box C on the next page of this Exhibit.

BOX A:	To be completed by any vendor that does not meet the definition of "company" above, hereinafter referred to as "Non-Company."
BOX B:	To be completed by a vendor that meets the definition of "Company" but has less than ten employees.
BOX C:	To be completed by a vendor that meets the definition of "Company" and has ten or more employees.

BOX A – NON-COMPANY ENTITY

I certify that _____ (Entity Name) currently **DOES NOT MEET** the definition of a company as defined in section 34.600, RSMo, but that if awarded a contract and the entity's business status changes during the life of the contract to become a "company" as defined in section 34.600, RSMo, and the entity has ten or more employees, then, prior to the delivery of any services and/or supplies as a company, the entity agrees to comply with, complete, and return Box C to the Division of Purchasing at that time.

Authorized Representative's Name (Please Print)	Authorized Representative's Signature
Entity Name	Date

BOX B – COMPANY ENTITY WITH LESS THAN TEN EMPLOYEES

I certify that _____ (Company Name) **MEETS** the definition of a company as defined in section 34.600, RSMo, and currently has less than ten employees but that if awarded a contract and if the company increases the number of employees to ten or more during the life of the contract, then said company shall comply with, complete, and return Box C to the Division of Purchasing at that time.

Authorized Representative's Name (Please Print)	Authorized Representative's Signature
Company Name	Date

BOX C – COMPANY ENTITY WITH TEN OR MORE EMPLOYEES

I certify that _____ (Company Name) **MEETS** the definition of a company as defined in section 34.600, RSMo, has ten or more employees, and is not currently engaged in a boycott of goods or services from the State of Israel; companies doing business in or with Israel or authorized by, licensed by, or organized under the laws of the State of Israel; or persons or entities doing business in the State of Israel as defined in section 34.600, RSMo. I further certify that if the company is awarded a contract for the services and/or supplies requested herein said company shall not engage in a boycott of goods or services from the State of Israel; companies doing business in or with Israel or authorized by, licensed by, or organized under the laws of the State of Israel; or persons or entities doing business in the State of Israel as defined in section 34.600, RSMo, for the duration of the contract.

Authorized Representative's Name (Please Print)	Authorized Representative's Signature
Company Name	Date

1. GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements governing allowances.

B. Types of allowances include the following:

1. Contingency Allowances.

C. All allowances must be included in the base bid amount.

D. The Mehlville School District will have the sole discretion on how allowances will be used.

1.2 SELECTION AND PURCHASE

A. At the earliest practical date after award of the Contract, advise Architect of the date when final selection, or purchase and delivery, of each product or system described by an allowance must be completed by the Owner 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.

1.3 ACTION SUBMITTALS

A. Submit proposals for purchase of products or systems included in allowances in the form specified for Change Orders.

1.4 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.

1.5 CONTINGENCY ALLOWANCES

A. Use the contingency allowance only as directed by Architect for Owner's purposes and only by Change Orders that indicate amounts to be charged to the allowance.

B. Contractor's overhead, profit and related costs for Work, products and equipment under the contingency allowance are included in the allowance and are not part of the Contract Sum. These costs include delivery, installation, supervision, coordination, insurance, equipment rental, and similar costs.

C. Change Orders authorizing use of funds from the contingency allowance will include Contractor's related costs and reasonable overhead and profit.

D. At Project closeout, credit unused amounts remaining in the contingency allowance to Owner by Change Order.

1.6 ADJUSTMENT OF ALLOWANCES

A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.

1. Include installation costs in purchase amount only where indicated as part of the allowance.
2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other markups.
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.

2. PRODUCTS

Not Used

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.

3.3 SCHEDULE OF ALLOWANCES

A. Allowance No. 1: Contingency Allowance:

1. Include an allowance of **$500,000** for unforeseen conditions.

END 01 2100

1. GENERAL

1.1. WORK INCLUDES

A. Work specified for alternate bids.

B. Referenced specification sections specify the materials and methods to achieve the required work.

C. Coordinate pertinent related work and modify surrounding construction or new work to complete the project under each accepted alternate bid.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 1000 - Project Summary
2. Specification sections as applicable.

1.3. SELECTION AND AWARD OF ALTERNATES:

A. Indicate variation of Bid Sum for alternates described below. Indicate on Bid Form the amount to be added to or deducted from the Base Bid amount.

B. The order in which alternate bids appear on the bid form is not necessarily the order in which alternate bids will be awarded.

1.4. SCHEDULE OF ALTERNATES:

A. Deduct Alternates

1. Alternate No. 1: Shade structure system scope and exterior patio furniture scope.
2. Alternate No. 2: Fuel pump canopy system scope.

2. PRODUCTS

Not used.

3. EXECUTION

Not used.

END 01 2300

1. GENERAL

1.1. WORK INCLUDES

A. Construction mobilization.

B. Schedules.

C. Submittals.

D. General Contractor duties.

E. Subcontractors' duties

F. Meetings.

G. Coordination.

H. Closeout procedures.

I. Testing.

1.2. RELATED WORK

A. Specified Elsewhere:

1. General Conditions: Duties of the Contractor
2. Section 01 7700 - Closeout Procedures

1.3. DEFINITIONS

A. RFI: Request for Information: Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4. CONSTRUCTION MOBILIZATION

A. Cooperate with the Architect in allocation of mobilization areas of site; for field offices and sheds, for site access, traffic, and parking facilities.

B. During construction, coordinate use of site and facilities through the Architect.

C. Comply with Architect's procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.

D. Comply with contract requirements for use of temporary utilities and construction facilities.

1.5. SCHEDULES

A. Submit preliminary progress schedule in accordance with Contract requirements and Section 01 3216 – Construction Schedule.

B. After review, revise and resubmit schedule.

C. During progress of work, revise and resubmit schedule as indicated by the Architect.

1.6. SUBMITTALS

A. Make submittals in accordance with Section 01 3300 – Submittal Procedures.

B. Submit shop drawings, product data and samples for review and compliance with contract documents, for field dimensions and clearances, for relation to available space, and for relation to work of separate contracts. Revise and resubmit as required.

C. Submit applications for payment on AIA G702 forms (or as otherwise accepted by the Owner) for review.

D. Submit Requests for Information (RFIs) of Contract Documents, and obtain same through Architect.

E. Process requests for substitutions, and change orders, through Architect.

F. Deliver closeout submittals for review and preliminary inspection reports.

1.7. GENERAL CONTRACTOR DUTIES

A. Coordinate work of all contractors.

B. Enforce predetermined on-site lines of authority and communication; conduct coordination meetings attended by:

1. Contractors and subcontractors.
2. Architect's Representative.
3. Owner's Representative

C. Construction schedules:

1. Develop and maintain project schedule.
2. Coordinate schedules of all subcontractors.
3. Monitor schedule as work progresses.

    a. Identify potential variances between schedule and probable completion dates.
    b. Report to Architect adjustments in schedule to meet approved completion date.
    c. Provide summary reports of each monitoring.
    d. Document all changes in schedule.

4. Observe work of all subcontractors to monitor compliance with project schedule.

    a. Verify that each subcontractor's labor force and construction equipment are available and adequate for maintaining the project schedule.
    b. Verify that product deliveries are adequate to maintain project schedule.
    c. Report conditions which will adversely affect critical items on project schedule to Architect with recommendations for corrective action.

D. Temporary Utilities:

1. Allocate use and location of temporary offices and storage trailers.
2. Monitor use of temporary utilities.
3. Verify that adequate services are provided to comply with specifications for work and climatic conditions.
4. Verify proper maintenance and operation of temporary utilities.
5. Administer traffic and parking controls.

E. Payments:

1. Submit applications for payment on AIA G702 - Application and Certifcate for Payment and AIA G703 Continuation Sheet (or as otherwise accepted by the Owner) to Architect for review no later than the last day of the month covered by the application for payment.

    a. Include the following with each application:

        1) General Contractor and sub-contractor Lien Waivers.
        2) Certified Payroll Reports.
        3) Documentation of Stored Materials.

2. Refer to AIA A101 Standard form of Agreement Between Owner and Contractor and AIA A201 General Conditions of the Contract for Construction for additional information and requirements.
3. Submit Contractor's application for payment including:

    a. Request for Partial Payment.
    b. Contractor’s Sworn Statement and Affidavit
    c. Waivers of Lien.
    d. Requests for Payment for Stored Materials.

F. Changes:

1. Recommend necessary or desirable changes to Architect.
2. Review subcontractor's requests for changes or substitutions; submit recommendations to Architect.
3. Enforce adherence to all modifications in contract documents.
4. Assist Architect in negotiating proposals for change with subcontractors.

G. Permits and Fees:

1. Obtain building permits and special permits for permanent improvements.

    a. Costs of permits will be reimbursed by the Owner.

2. Obtain approvals from all authorities having jurisdiction. Schedule and be present for all inspections by governmental units and authorities having jurisdiction.
3. Verify that subcontractors have obtained permits for inspections and temporary facilities.
4. Verify that subcontractors have included utility company fees.

H. Inspection:

1. Inspect work to assure that work is performed in accord with Contract Documents.
2. Reject or stop portions of the work which are not in accord with Contract Documents.

I. Interpretations of Contract:

1. Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit a Request for Information (RFI) to the Owner and Architect.

    a. Coordinate and submit RFIs in a prompt manner to avoid delays in the Work.

2. Transmit written interpretations to the concerned parties.

J. Administer Coordination and Processing of:

1. Shop drawings, product data and samples.
2. Project record documents.

K. Maintain Reports and Records at Job Site:

1. Daily log of progress of work, available to Architect and Owner's representative.
2. Records:

    a. Contracts.
    b. Purchases.
    c. Materials and equipment records.
    d. Specified handbooks, codes and standards.
    e. Daily log of project manpower by craft, including equipment and activities.
    f. Inspection reports.

3. Verify that contractors and subcontractors maintain project record documents on a current basis.
4. At completion of project, assemble project record documents in accordance with Contract requirements and deliver to Architect.
5. Assemble documentation for handling of claims and disputes.

L. Verify that specified cleaning is done:

1. During progress of work.
2. At completion of contract.

M. Notification of start-up of permanent mechanical and electrical equipment:

1. Notify all parties seven (7) days prior to start-up date.
2. Record dates of start of operation of systems and equipment.

N. Substantial Completion:

1. Upon Contractor's determination of substantial completion of work or a portion thereof, prepare for Architect a list of incomplete or unsatisfactory items.
2. Upon Architect's certification of date of substantial completion, coordinate correction and completion of work.

O. Final Completion:

1. Upon subcontractor's determination that work is finally complete:

a. Submit written notice to Architect that work is ready for final acceptance.
b. Secure and transmit to Architect specified closeout submittals.

2. Turn over to Architect:

a. Operations and maintenance data.
b. Spare parts and maintenance materials.

1.8. SUBCONTRACTORS' DUTIES

A. Coordinate work of employees and subcontractors under the Contract.

B. Conduct work to assure compliance with schedules.

C. Transmit written instructions to concerned suppliers, subcontractors.

D. Transmit all submittals and notices to Contractor, Architect and the Owner in accordance with the contract documents.

E. Under the administration of the Contractor, coordinate work with that of other contractors.

F. Cooperate with Contractor.

1.9. PRELIMINARY COORDINATION MEETING

A. A preliminary coordination meeting will be held at a time and place designated by the Architect for the purpose of identifying responsibilities of the Owner's and the Architect's personnel, and for explanation of administrative procedures.

B. The Contractor shall also use this meeting for the following minimum agenda:

1. Construction schedule.
2. Use of areas of the site.
3. Delivery and storage.
4. Safety.
5. Security.
6. Cleaning up.
7. Subcontractor procedures relating to:

a. Submittals.
b. Change orders.
c. Applications for payment.
d. Record documents.

C. Attendees shall include:

1. The Owner.
2. The Architect, and its consultants as required.
3. The Contractor and its superintendent.
4. Major subcontractors, suppliers, and fabricators as necessary.
5. Others interested in the work.

1.10. COORDINATION

A. Perform all work between the hours of 7:00 AM and 5:00 PM Monday through Friday, unless other arrangements are made with the Owner.

B. The Contractor is responsible for all security with regard to the construction. The Contractor shall cooperate completely with the Owner's security forces and measures.

C. Where necessary, in writing, inform each party involved of special procedures required for coordination; describe required notices, reports and attendance at meetings.

1. Inform the Owner when coordination of his work and activities is required.

D. See other requirements in other portions of the Contract Documents.

E. Coordination drawings:

1. Each Contractor shall prepare coordination drawings as required:

a. To coordinate installation of products fabricated off-site by separate entities.
b. Where limited space available may cause conflicts in the locations of installed products.
c. To coordinate the work of other Contractors/trades.

2. Where space is limited, show plan and cross-section dimensions of space available, including structural obstructions and ceilings as applicable.
3. Where drawings are to provide coordination between shop drawings prepared by separate entities, show specific interrelationship between components shown on separate drawings.
4. Show installation sequences when necessary for proper installation.

1.11. CLOSEOUT PROCEDURES

A. Closeout project in accordance with Section 01 7700 – Closeout Procedures.

B. Notify Architect when Work is considered ready for Substantial Completion. Accompany Architect on preliminary review to determine items to be listed for completion or correction in Contractor's notice of Substantial Completion.

1. Substantial Completion will not be granted until, among other things, all inspections by authorities having jurisdiction are complete and fully accepted.

C. Comply with Contract requirements to correct items of work listed in executed Certificates of Substantial Completion.

D. Notify Architect when Work is considered finally complete. Accompany Architect for final acceptance.

E. Comply with Contract requirements for completion of items of Work determined as necessary for final acceptance.

1.12. TESTING

A. Testing shall be in accordance with Section 01 4000 – Quality Requirements.

B. Notify Architect of test schedules.

C. Verify that required personnel are present.

D. Verify that specified tests are made as scheduled.

2. PRODUCTS

Not Used.

3. EXECUTION

Not Used.

END 01 3100

1. GENERAL

1.1. WORK INCLUDES

A. Contractor requirements:

1. Attend specified meetings.
2. Ensure attendance of subcontractors and suppliers when required or directed.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 1000 – Project Summary
2. Section 01 3300 – Submittal Procedures
3. Section 01 7700 – Closeout Procedures

1.3. PRECONSTRUCTION MEETING

A. Before starting construction, the Architect will schedule and conduct a Preconstruction Meeting. Architect will:

1. Prepare agenda.
2. Distribute written notice and agenda of meeting in advance of meeting date.
3. Make physical arrangements for meeting.
4. Record minutes; include significant proceedings and decisions.
5. Distribute copies of minutes to participants within five business days after meeting.

B. Attendance:

1. Owner's representative
2. Architect and its consultants as required.
3. Contractor and subcontractors as necessary.

C. Minimum agenda:

1. Key personnel / duties
2. Contract amount / scope
3. Chain of authority and communications
4. General requirements

    a. Certificate of Insurance
    b. Performance and Payment Bonds
    c. Notice to Proceed

5. Construction schedule
6. Work hours and timelines
7. Temporary facilities and controls
8. No smoking policy
9. Payment procedures and regulations

    a. Schedule of values

b. Application for payment
c. Lien waivers
d. Retainage
e. Stored materials

10. Employee requirements

a. Equal Employment Opportunity
b. Prevailing wages
c. Certified payroll

11. Submittals

a. List of subcontractors and suppliers
b. Shop drawings, product data and samples
c. Material Safety Data Sheets (MSDS)
d. Product substitutions

12. Change orders
13. Record documents
14. Distribution of documents
15. Project meetings

a. Payment/progress meetings
b. Coordination meetings

16. Questions

1.4. PAYMENT/PROGRESS MEETINGS

A. The General Contractor will schedule and conduct monthly payment and progress meetings. Contractor will:

1. Prepare agenda.
2. Distribute written notice and meetings five business days in advance of meeting date.
3. Make physical arrangements for meetings.
4. Record minutes; include significant proceedings and decisions.
5. Distribute copies of minutes to participants within five business days after meetings.

B. Architect will ascertain that work is expedited consistent with construction schedule and Contract Documents.

C. Regular meeting dates, times and locations will be established at Pre-Construction Meeting.

D. Attendance:

1. Owner's Representatives
2. Architect and its consultants as required
3. Contractor and subcontractors as neccessary

E. Minimum agenda:

1. Review and approve minutes of previous meeting.
2. Review work progress for the last period

3. Review anticipated work progress for the next period
4. Review construction issues:

    a. Field observations, problems and decisions
    b. Requests for Information
    c. Requests for Proposal
    d. Change Orders

5. Review status of submittals
6. Review of progress cleaning
7. Update project schedule (an approved updated Project Schedule is required prior to approval of application for payment)
8. Update record documents (approved updated Record Documents are required prior to approval of application for payment)
9. Listen to owner concerns
10. Review application for payment
11. Identify other business
12. Identify upcoming meetings:

    a. Coordination meeting
    b. Payment/Progress meeting

1.5. PROGRESS MEETINGS

A. The General Contractor will schedule and conduct progress meetings. Meetings will be scheduled bi-weekly. Contractor will:

    1. Prepare agenda
    2. Distribute written notice and agenda of meeting five (5) business days in advance of meeting date
    3. Make physical arrangements for meetings
    4. Preside at meetings
    5. Record minutes; include significant proceedings and decisions
    6. Distribute copies of minutes of meetings to participants and Owner within five (5) business days after meetings

B. Attendance:

    1. Architect
    2. General Contractor
    3. Other Contractors
    4. Subcontractors and suppliers as pertinent to agenda

C. Minimum agenda:

    1. Review and approve minutes of previous meeting
    2. Review work progress for the last period
    3. Review anticipated work progress for the next period
    4. Review construction issues:

        a. Field observations, problems and decisions
        b. Problems which impede planned progress
        c. Requests for Information
        d. Requests for Proposal

e. Change Orders

5. Review changes proposed by Owner for:

    a. Effect on construction schedule
    b. Effect on completion date

6. Review construction schedule; develop corrective measures and procedures to regain planned schedule
7. Review of quality control procedures and recent test results.
8. Update project record documents
9. Review submittal schedules, expediting submittals as required to maintain schedule
10. Identify other business

END 01 3119

1. GENERAL

1.1. WORK INCLUDES

A. Contractor's construction schedule.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 1000 - Project Summary.
2. Section 01 3100 - Project Coordination.
3. Section 01 3300 - Submittal Procedures.

1.3. INFORMATIONAL SUBMITTALS

A. The following submittals are to be submitted for information only. Submit in accordance with Section 01 3300:

1. Submit initial schedule within ten business days after date of Preconstruction Meeting.

a. Architect will review schedule and return reviewed copy within ten business days after receipt.
b. When requested, re-submit within five business days after return of reviewed copy.

2. Submit updated schedules accurately depicting progress to first day of each month.

2. PRODUCTS

2.1. FORM OF SCHEDULES

A. Prepare a standard horizontal bar chart.

1. Provide separate horizontal bar row for each class of work, activity or long-lead equipment item.
2. Order: Table of contents of Project Manual.
3. Identify each row:

a. By major specification section number.
b. By distinct graphic delineation.

4. Horizontal time scale: Identify first work day of each week.
5. Scale and spacing: To allow space for updating.

2.2. CONTENT OF SCHEDULES

A. Indicate complete sequence of construction by activity.

1. Shop drawings, product data and samples: In accordance with Section 01 3300.

a. Submittal dates.
b. Dates when reviewed copies will be required.

2. Decision dates for: Selection of finishes.
3. Product procurement date, fabrication time and delivery dates.
4. Dates for beginning, and completion of, each element of construction.

B. Identify dates of Substantial Completion and Final Completion.

C. Identify work of separate buildings, each separate area, or separate phases, or other logically grouped activities.

D. Indicate cumulative percentage of work completed as of first day of each month.

E. Furnish separate schedule, showing submittals, review items, procurement schedules and delivery dates for all specified items.

F. Define critical portions of entire schedule.

G. Schedule to include all aspects of work, including sitework, shell, MEP rough-in, MEP trim-out, and finishes, as well as administrative activities such as shop drawing review, tests, and inspections.

1. Schedule shall include placement of substrates, including curing periods. The curing periods shall be adequate to allow substrates to have the appropriate moisture content required for application of finishes.

3. EXECUTION

3.1. UPDATING

A. Update at two week intervals. Indicate:

1. Progress of each activity since previous submission.
2. Projected completion dates for all activities.
3. Activities modified since previous submission.

B. Compare projected completion dates to previous submission. State whether behind, on, or ahead of previous projection.

C. Include:

1. Major changes in scope.
2. Revisions in duration of activities.
3. Other identified changes.

D. Furnish narrative report, when requested by the Architect, which includes:

1. Discussion of problem areas, including current and anticipated delay factors, and their impact.
2. Corrective action taken, or proposed, and its effect.
3. Description of revisions.

4. Effect of change in schedules of other contractors.

a. Effect of schedule due to change in scope.

b. Other changes that will affect schedule.

3.2. DISTRIBUTION

A. Distribute copies of reviewed schedules to:

1. Job site file.
2. Separate contractors, subcontractors and suppliers on as-needed basis.
3. Architect and its consultants.
4. Owner's representative.

B. Instruct recipients to report inability to comply with projected completion dates, and to furnish a detailed explanation together with suggested remedies.

END 01 3216

1. GENERAL

WORK INCLUDES

A. Proposed products list.

B. Submittal Schedule

C. Submittals procedures.

D. Shop drawings.

E. Product data.

F. Samples

G. Manufacturers' instructions.

H. Schedule of Values.

I. Contractor responsibilities.

J. Architect's duties.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 3100 - Project Coordination
2. Section 01 3119 - Project Meetings: Meeting minutes.
3. Section 01 4000 - Quality Requirements: Test reports.
4. Section 01 7700 - Closeout Procedures: Contract warranty and manufacturer's certificates; closeout submittals.

1.3. DEFINITIONS

A. Shop Drawings: Shop drawings are original drawings prepared by Contractor, subcontractor, sub-subcontractor, supplier, or distributor, which illustrate some portion of the work, showing fabrication, layout, setting or erection details, and including relationship to adjoining work.

1. Prepared by qualified detailer.
2. Identify details by reference to sheet and detail number shown on Contract Documents. The Contract Documents are not fabrication drawings and shall not be copied or referenced as shop drawings.
3. Minimum sheet size: 8-1/2" x 11".

B. Product Data:

1. Manufacturer's standard schematic drawings.

a. Modify to delete information which is not applicable to project.
b. Supplement standard information to provide additional information applicable to project.

2. Manufacturer's catalog sheets, brochures, diagrams, schedules, performance charts, illustrations and other standard descriptive data.

a. Clearly mark to identify pertinent materials, products or models. Submittals that do not clearly identify the products to be used on this project will be rejected.
b. Show dimensions and clearances.
c. Show performance characteristics and capacities.
d. Show wiring diagrams and controls.

C. Samples: Physical samples to illustrate materials, equipment or workmanship. Approved samples establish standards by which complete work is judged. Maintain at site as directed. Protect until no longer needed.

1. Samples shall be of sufficient size to clearly illustrate:

a. Functional characteristics of product or material, with integrally related parts and attachment devices.
b. Expected range of color/texture/quality variations within individual pieces and from piece-to-piece.

1.4. CONTRACTOR'S USE OF ARCHITECT'S ELECTRONIC FILES

A. General: At Contractor's written request, copies of Architect's electronic files will be provided to Contractor for Contractor's use in connection with Project, subject to the following conditions:

1. Contractors and subcontractors may obtain electronic media files of the contract drawings and/or copies of the specifications.
2. Upon request to obtain electronic files, the Contractor shall complete the "Electronic File Transfer" form provided by BLDD and email to the Architect.
3. Construction drawings for this project have been prepared utilizing Autodesk Revit 2025. We make no representation as to the compatibility of these files with your hardware or your software beyond the specified release of the referenced specifications.
4. If the information requested includes electronic drawings prepared by others, the Contractor will be responsible for obtaining approval from the appropriate Design Professional for use of that part of the document.
5. The electronic contract documents can be used for preparation of shop drawings and as-built drawings only. The information may not be used in whole or in part for any other project.
6. The drawings prepared by BLDD for bidding purposes may not be used directly for ductwork layout drawings or coordination drawings.

7. The use of these Autodesk documents by the Contractor does not relieve them from their duty to fully comply with the contract documents, including, and without limitation, the need to check, confirm and coordinate all dimensions and details, take field measurements, verify field conditions and coordinate your work with that of the other contractors for the project.
8. The information is provided to expedite the project and assist the Contractor with no guarantee by BLDD as to the accuracy or correctness of the information provided. BLDD accepts no responsibility or liability for the Contractor's use of these documents.

1.5. SPECIFIED PRODUCTS LIST

A. Within 15 business days after date of Notice of Award submit to the Architect complete list of all products which are proposed for installation.

B. Tabulate list by each applicable specification section.

C. For products specified under reference standards, include with listing of each product:

1. Name and address of manufacturer.
2. Trade name
3. Model or catalog designation
4. Manufacturer's data, including:

a. Performance and test data
b. Reference standards

1.6. SUBMITTAL SCHEDULE

A. Prior to initial Application for Payment, submit the following:

1. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and its consultants and additional time for handling and reviewing submittals required by those corrections.

a. Schedule submittals to expedite the project.
b. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.

c. Processing Time: Allow time for submittal review, including time for resubmittals. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
d. Initial Submittal: Submit concurrently with construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.

e. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.

1) Submit revised submittal schedule to reflect changes in current status and timing for submittals.

f. Format: Arrange the following information in a tabular format:

1) Specification Section number and title.
2) Name of subcontractor.
3) Description of the Work covered.
4) Anticipated date for Architect's final release or approval.
5) Scheduled date of fabrication.
6) Scheduled date of delivery.

g. Updating: The submittal schedule shall be updated and distributed in conjunction with updates of the Construction Schedule.

1.7. SUBMITTAL PROCEDURES - GENERAL

A. Submittal Review Cover Sheet: Each submittal must include the attached "Submittal Review Cover Sheet" provided in Appendix A of this Section.

B. Transmit each submittal with Architect accepted transmittal form, containing:

1. Date
2. Project title and number
3. Contractor's name and address
4. The number of shop drawings, product data and samples submitted.
5. Notification of deviations from Contract Documents.
6. Other pertinent data, including applicable specifications section and submittal number.

C. Sequentially number the transmittal forms. Re-submittals to have original number with a numeric suffix (e.g. -01, -02, etc.).

D. Identify project; Contractor; pertinent Drawing sheet and detail number(s); and Specification Section number, as appropriate. Submittals shall also include:

1. Data and revision dates
2. Names of:

a. Architect
b. Subcontractor
c. Sub-subcontractor
d. Supplier
e. Manufacturer
f. Separate detailer when pertinent

3. Identification of product or materials.

a. Product shall be identified the same as indicated in the Contract Documents. For example, acoustical ceiling tile "ACT1" shall be identified as "ACT1" in all submittals.

b. Mark submittal to show precisely which products and options are applicable. Each specified product shall be individually and clearly identified.

4. Relation to adjacent structure or materials.
5. Field dimensions, clearly identified as such.
6. Specified standards where applicable, such as ASTM number or ANSI.
7. Provide space for Contractor and Architect review stamps.
8. Identification of previously approved deviation from Contract Documents.

E. Marks: All marks and identifications on the submittals must be clear and legible. They shall be made by electronic means. Highlighter and pencil marks will not be acceptable.

F. Reproduction of the Contract Documents will not be accepted as submittals. The Contract Documents are protected by copyright laws, and shall not be reused or copied in any form without written permission of the authors.

G. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
3. 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.

H. Contractor's Review and Approval: Stamp each submittal with a uniform approval stamp, signed or initialed, including 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.

1. By making submittals Contractor is certifying that their review is complete, products and field dimensions have been verified, coordination with adjacent construction work and with other trades is complete, and the submittal is in accordance with the requirements of the Work and the Contract Documents.

I. Deviations and Additional Information: Identify variations from Contract Documents and product or system limitations which may be detrimental to successful performance of the completed work. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations.

J. Material Safety Data Sheets (MSDS): MSDS shall <u>not</u> be submitted.

1. **<u>The Architect will not review submittals that include MSDS and will return the entire submittal for resubmittal</u>.**

K. Rejection of Submittals: The Architect may reject submittals without review, or with only a partial review, for any of, but not limited to, the following reasons:

1. Submittal was not required by the Contract Documents.
2. Submittal is incomplete, including lack of Contractor's review stamp or letter of transmittal.
3. Submittal lacks identification.
4. Submittal lacks clear identification of applicable products and options.
5. Submittal items requiring Contractor verification or input from the Contractor have not been completed.
6. Product submitted is an unauthorized substitution. Refer to Section 01 6000 for substitution procedures.

1.8. ELECTRONIC SUBMITTAL PROCEDURES

A. Electronic Submittals will be made via one of the following methods:

1. Online Construction Project Management software. (Preferred)
2. Email attachments.

B. All documents transmitted for purposes of administration of the contract are to be in electronic (PDF) format and transmitted via via email or an Internet-based submittal service that receives, logs and stores documents, and notifies addressees via email.

1. Beyond submittals for review, information, and closeout, this procedure applies to requests for information (RFIs), progress documentation, contract modification documents (e.g. supplementary instructions, change proposals, change orders), applications for payment, field reports and meeting minutes, and any other document any participant wishes to make part of the project record. The intent shall be that construction phase documentation be paperless to the greatest extent possible.
2. Developer/Contractor and Architect are required to use this service.
3. It is Developer/Contractor's responsibility to submit documents in PDF format.
4. Subcontractors, suppliers, and Architect's consultants will be permitted to use the service at no extra charge.
5. Users of the service need an email address, Internet access, and PDF review software that includes ability to mark up and apply electronic stamps (such asBluebeam PDF Revu, www.bluebeam.com), unless such software capability is provided by the service provider.
6. Paper document transmittals will not be reviewed.
7. All other specified submittal and document transmission procedures apply, except that electronic document requirements to not apply to actual physical samples or color selection charts. Transmittals for these items must still be posted to the service so that team members may take action on them, however, and to act as a record of the submittal made, selections determined and action taken.

C. Cost: The cost of the service will be the responsibility of the Contractor.

D. Project Closeout: Architect will determine when to terminate the service for the project and is responsible for obtaining archive copies of files for Owner.

E. The following types of submittals may be transmitted electronically as outlined in this Section:
   1. Shop drawings.
   2. Product data.
   3. Manufacturer’s installation instructions.
   4. Schedule of Values.
   5. Construction Schedule.
   6. Draft pay applications.
   7. RFI’s.
   8. RFP response.
   9. Specified product list.
   10. O&M manuals.
   11. Record Drawings.

1.9. SAMPLE SUBMITTAL PROCEDURES

A. Submit samples to illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.

   1. Submit samples of finishes from the full range of manufacturers' colors, textures, and patterns, standard and premium, for Architect's selection. If documents indicate ‘match existing’, Architect can select custom color.
   2. Reviewed samples which may be used in the work are indicated in individual specification sections.
   3. Submit scans of front and back of all physical samples and submit with General Contractor cover sheet prior to delivery of physical samples to Architects office.
   4. The General Contractor is responsible for delivery of physical samples to Architects office.
   5. If physical samples are delivered to Architects office without being scanned, contractor shall pick up samples and re-deliver.
   6. All physical sample scans shall be legible so that manufacturers name, color name and number, etc. is clearly visible.

B. Quantity: Submit number of samples specified in respective specification sections, but not less than two samples, one of which will be retained by Architect. Submit additional samples when requested by the Architect.

C. Identification: Include permanent identification on each sample, with full Project Information.

1.10. MANUFACTURER'S INSTRUCTIONS SUBMITTAL PROCEDURES

A. When specified in individual specification Sections, submit manufacturer's printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, in quantities specified for Product Data.

B. Identify conflicts between manufacturers' instructions and Contract Documents.

1.11. SCHEDULE OF VALUES

A. Submit Schedule of Values to Architect at least 15 business days prior to submitting first application for payment.

   1. When requested, support values given with data to substantiate its correctness.
   2. Schedule of Values will be used as the only basis for application for payment.

3. Payment for materials stored on or off site will be limited to those materials itemized in Schedule of Values.

B. Form of Submittal

1. Submit typewritten Schedule of Values on form acceptable to the Owner and the Architect.
2. Use Project Manual Table of Contents as basis of format for listing costs of all work, unless otherwise indicated by the Architect.

3. Round off figures to nearest one whole dollar. Sum of all values listed in Schedule shall equal total Contact Sum.

4. Multiple Buildings: If the Work involves more than one building or major structure, divide the allocation of values to correspond to each building or structure.

C. Preparation:

1. Itemize separate line item cost for each of the following cost items:

   a. Overhead and profit.
   b. Bonds.
   c. Insurance.
   d. General Requirements: Breakdown general requirements to include a separate item for temporary facilities. Show initial installation, maintenance, and fuel consumption.
   e. Allowances.

2. Itemize separate line item cost for work required by each Section of the Specifications. Identify work of:

   a. Contractor's own labor forces.
   b. All subcontractors.
   c. All major suppliers of products or equipment.

3. Breakdown installed costs into:

   a. Material: Delivered cost of product, with taxes paid when applicable.
   b. Labor: Labor cost, excluding overhead and profit.

4. For each line item which has installed value of more than $5,000.00, breakdown cost of each major product, system, or operation. Breakdown as follows:

   a. Specification Section number.
   b. Description of work or material.
   c. Contractor, subcontractor or supplier.
   d. Unit of measurement (e.g. unit, square foot, floor, etc.).
   e. Unit value.
   f. Scheduled Value.

D. Review and re-submittal:

1. After review by Architect, revise and resubmit Schedule as indicated.
2. Resubmit revised Schedule following original submittal procedure.

E. Update Schedule of Values when:

1. Indicated by Architect.
2. Change of Subcontractor or supplier occurs.
3. Change of product or equipment occurs.

2. PRODUCTS

Not used.

3. EXECUTION

3.1. CONTRACTOR RESPONSIBILITIES

A. Review shop drawings, product data, and samples prior to submission to Architect. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

1. Verify:

a. Field dimensions.
b. Field construction criteria.
c. Catalog numbers and similar data.

2. Coordinate each submittal with requirements of:

a. The work.
b. The Contract Documents.
c. The work of other contractors and Subcontractors.

3. Contractor's responsibility for errors and omissions in submittals is not relieved by Architect's review of submittals.
4. Prior to submission, notify Architect in writing of all proposed deviations in submittals from contract requirements.

B. Do not begin any work which requires submittals without having Architect's stamp and approval.

C. After Architect's review, make response indicated by the Architect's stamp. Distribute copies of reviewed submittals to concerned parties.

1. Instruct parties to promptly report any inability to comply with provisions.

D. Coordinate all subcontractor's submittals:

1. Subcontractors make submittals to Contractor.

2. Contractor review and initial submittal for compliance with scope, coordination and integration with the work of all other subcontractors.
3. Contractor shall transmit reviewed copies of subcontractors' submittals to Architect.
4. Contractor shall retain copy of submittals after review by Architect and distribute copies to submitting subcontractor and to other subcontractors for coordination and integration.
5. Contractor shall enforce re-submittal requirements.

3.2. ARCHITECT'S DUTIES

A. Review submittals within 10 business days unless notice is otherwise given to the Contractor.

B. Review for:

1. Consistency with design concept of project.
2. Compliance with Contract Documents.

C. Review of separate item does not constitute review of assembly in which item functions.

D. Partial submittals prepared for a portion of the Work will be reviewed only when use of partial submittals has received prior approval from Architect.

E. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

F. Submittals not required by the Contract Documents may be returned by the Architect without action.

G. Affix stamp, data and initials or signature certifying to review of submittal, and with indications for Contractor response.

3.3. RESUBMISSION REQUIREMENTS

A. Shop drawings:

1. Revise initial drawings as indicated and resubmit in accordance with submittal procedures.
2. Indicate on drawings all changes which have been made in addition to those requested by Architect.

B. Product data and samples: Submit new data and samples as specified for initial submittal.

C. Make all re-submittals within 10 business days after date of Architect's previous review.

D. Assign alphabetic suffix to original submittal number for each re-submittals.

3.4. DISTRIBUTION OF SUBMITTALS AFTER REVIEW

A. Architect will distribute reviewed submittals to:

1. Architect.
2. Owner.
3. General Contractor.

B. General Contractor will distribute copies of shop drawings and product data which carry Architect's stamp to:

1. Contractor's file.
2. Job site file.
3. Record Documents file.
4. Other Contractors.
5. Subcontractors.
6. Suppliers.
7. Fabricators.

C. General Contractor will distribute samples in accordance with Contract Documents.

ATTACHMENTS TO THIS SECTION: APPENDIX A
APPENDIX B

END 01 3300

SECTION 01 3300 - APPENDIX A

SUBMITTAL REVIEW COVER SHEET

Buerkle Restrooms

BLDD Project Number: 257EI02.400

CONTRACTOR NAME: _____

SUBMITTAL NUMBER: _____

SPECIFICATION SECTION NUMBER: _____

SPECIFICATION NAME: _____

I certify that this submittal has been reviewed by (Individual's Name) _____ and has been found to be in compliance with the requirements of the Contract Documents. ALL clarifications, changes, and variations from the Contract Documents have been flagged and noted on this submittal.

Date: _____

SECTION 01 3300 – APPENDIX B

FILE NAMING CONVENTIONS FOR ELECTRONIC SUBMITTALS:

(For date format use YYYY-MM-DD) (Revision Number sequence MUST start with "00")

1. Schedule of Values: Submit in PDF format only.

   "Schedule of Values+Contractor Name+00.pdf" – Name with contractor name and revision number.

2. Pencil Pay Request: Submit in PDF format only.

   "Pay Request+Contractor Name+00+YYYY-MM-DD.pdf" – Pay request with contractor name and revision number with month end date.

3. Construction Schedule: Submit in PDF format only.

   "Construction Schedule+Project Name+00+YYYY-MM-DD.pdf" – Schedule with revision number with date submitted.

4. Shop Drawings: submit in PDF format only.

   "051200+topic+00.pdf" – Spec section number with related Topic/Description and Revision Number

5. Test Reports: Submit in PDF format only. (Some will be uploaded by owner's testing agency, and some by contractors.)

   "033000+Report Description+00+YYYY-MM-DD.pdf" – Spec Section Number with Report Description, Revision Number, and Date Submitted.

6. RFP: A/E will issue in .pdf format. Contractor should add information and respond in.pdf format.

   "RFP 001 – topic.pdf" – RFP sequence and description.

7. RFI (Request For information): Contractor to issue in PDF format. A/E will respond in PDF format.

   "RFI 001 – topic.pdf" - RFI sequence and description.

8. ASI (Architect's Supplemental Instruction): A/E will issue in pdf format. Contractor to respond.

   "ASI 001 – topic.pdf" – ASI sequence & description

9. CCD Construction Change Directive - A/E will issue in pdf format. Contractor to return signed copy.

   "CCD 001 – topic.pdf" – ASI sequence & description

10. Minutes: responsible party shall upload in PDF format.

    "minutes 001 – YYYY_MM_DD - topic".pdf – Minutes sequence, date, and description.

11. Change Orders: Once fully executed, change orders will be posted. Drawings will be updated.

    "CO 001 – topic.pdf" – CO sequence and description.

1. GENERAL

1.1. WORK INCLUDES

A. This 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 are not limited by provisions of this Section.

C. Owner shall provide all tests and inspections not explicitly assigned to General Contractor.

1. Contractor shall provide:

a. Quality-assurance services as defined in this Section.
b. Quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
c. Warranty inspections and manufacturer representative inspections required by manufacturers or specified elsewhere in the Contract Documents.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 3216 – Construction Schedule
2. Section 01 7329 – Cutting and Patching
3. Divisions 02 through 33 for specific test and inspection requirements.

1.3. DEFINITIONS

A. Experienced: When used with an entity, "experienced" means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

B. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

C. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).

D. Laboratory Mockups: Full-size, physical assemblies that are constructed at testing facility to verify performance characteristics.

E. Mockups: Full-size, physical assemblies that are constructed on-site. Mockups are used to verify selections made under sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

F. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.

G. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

H. Preconstruction Testing: Tests and inspections that are performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.

I. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards.

J. 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.

K. 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.

L. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.

M. Testing Agency: An entity engaged to perform specific tests, inspections, or both. “Testing laboratory” or “inspecting agency” shall mean the same as testing agency.

1.4. DELEGATED DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If the criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated Design Services Statement: Submit a statement signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.

1.5. 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 uncertainties and 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.

1.6. SUBMITTALS

A. Submit in accordance with Section 01 3300:

1. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article 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.
2. Schedule of Tests and Inspections: Schedule shall be integrated and coordinated with project scheduled in Section 01 3216 – Construction Schedule. Include the following:

    a. Specification Section number and title.
    b. Description of test and inspection.
    c. Identification of applicable standards.
    d. Identification of test and inspection methods.
    e. Number of tests and inspections required.
    f. Time schedule or time span for tests and inspections.
    g. Entity responsible for performing tests and inspections.
    h. Requirements for obtaining samples.
    i. Unique characteristics of each quality-control service.

3. Reports: Prepare and submit certified written reports that include the following:

    a. Date of issue.
    b. Project title, number and location.
    c. Name, address, and telephone number of testing agency.
    d. Names of individuals making tests and inspections.
    e. Name and signature of laboratory inspector.
    f. Dates and locations of samples and tests or inspections.
    g. Description of the Work and test and inspection method.
    h. Identification of product and Specification Section.
    i. Complete test or inspection data.
    j. Test and inspection results and an interpretation of test results.
    k. Record of temperature and weather conditions at time of sample taking and testing and inspecting.

l. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
m. Recommendations on retesting and reinspecting.

4. 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.

1.7. QUALITY ASSURANCE

A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. 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.

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. 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.

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 to those indicated for this Project in material, design, and extent.

F. 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 E548; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.

G. 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.

H. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, unless indicated otherwise, 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.
d. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
e. When testing is complete, remove test specimens, assemblies, mockups, and laboratory mockups; do not reuse products on Project.

2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to 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.

I. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
3. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction at Project.
4. Demonstrate the proposed range of aesthetic effects and workmanship.
5. Obtain Architect's approval of mockups before starting work, fabrication, or construction.

a. Allow three days for initial review and each re-review of each mockup.

6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
7. Demolish and remove mockups when directed, unless otherwise indicated.

1.8. QUALITY CONTROL

A. Owner Responsibilities:

1. Where tests and inspections are the Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
2. 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.
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, and the Contract Sum will be adjusted by Change Order.\

B. Contractor’s Responsibilities:

1. General:

a. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
b. Where tests and inspections are the Contractor's responsibility, Contractor shall engage a qualified testing agency to perform these services.

1) Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.

c. Notify testing agencies at least 48 hours in advance of time when Work that requires testing or inspecting will be performed.
d. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.

1) Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

e. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.

2. 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.

a. Schedule times for tests, inspections, obtaining samples, and similar activities.

3. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents.

a. 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.

4. Associated Services: Cooperate with agencies and personnel 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:

a. Access to the Work.
b. Incidental labor and facilities necessary to facilitate tests and inspections.
c. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining and handling samples.
d. Facilities for storage and field curing of test samples.
e. Delivery of samples to testing agencies.
f. Preliminary design mix proposed for use for material mixes that require control by testing agency.
g. Security and protection for samples and for testing and inspecting equipment at Project site.

5. 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 01 3300 - Submittal Procedures.
6. 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.

7. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, the Contractor shall pay for quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

C. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Promptly notify Architect and Contractor 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 to Architect and Contractor of each test, inspection, and similar quality-control service.
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.

1.9. SPECIAL INSPECTIONS

A. Special Tests and Inspections: Conducted by a qualified testing agency or special inspector as required by authorities having jurisdiction, as indicated in individual Specification Sections. Responsibilities are as specified in the Quality Control article of this Section.

2. PRODUCTS

Not Used

3. EXECUTION

3.1. TEST AND INSPECTION LOG

A. Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and modifications as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

3.2. 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 requirements for Section 01 7329 – Cutting and Patching.

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 01 4000

1. GENERAL

1.1. WORK INCLUDES

A. Temporary Utilities.

B. Support Facilities.

C. Security and Protection Facilities.

D. Temporary Controls.

E. Progress Cleaning.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 3100 - Project Coordination
2. Section 01 7700 - Closeout Procedures

1.3. USE CHARGES

A. General: Costs associated with installation, operation, maintenance, removal, restoration, and warranty extensions for all work of this Section 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, occupants of Project, testing agencies, and personnel of authorities having jurisdiction.

1. Conservation Measures: Contractor shall exercise conservation measures for all utilities paid for by Owner.

1.4. TEMPORARY UTILITIES/SERVICES RESPONSIBILITY

A. Responsibility: The following temporary utilities and facilities on the construction site shall be provided by the party indicated below. Items of this Section not listed below are provided by General Contractor.

Item	Provider
Parking Spaces	Refer to civil phasing site plans
Field Offices	General Contractor
Storage Areas and Sheds	Each Prime Contractor, coordinated by General Contractor.
Trash containers and Trash removal	General Contractor
Sanitary Facilities (Toilets)	General Contractor

Temporary Water	General Contractor (use Owner's existing system)
Temporary Sewer	General Contractor (use Owner's existing system)
Temporary Electricity and Lighting	General Contractor (use Owner's existing system)
Temporary Heating	General Contractor
Temporary Ventilation and Humidity Control	General Contractor
Progress Cleaning	Each Prime Contractor, coordinated by General Contractor.

1.5. INFORMATIONAL SUBMITTALS

A. The following submittals are to be submitted for information only. Submit in accordance with Section 01 3300:

1. Site Logistics Plan: include the following information, for each construction phase:

a. Construction fence and gate locations.
b. Security fencing and gate locations - owner provided pad lock
c. Temporary road and paving areas.
d. Vehicle parking.
e. Traffic directional signage, barricades and other traffic control measures.
f. Location of Field Offices and Sheds.
g. Utility hookups.
h. Location of Project Identification Signage.

2. Erosion- and Sedimentation-Control Plan: Show compliance with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent for each construction phase.
3. Substrate Moisture Plan: For each installed substrate receiving finishes requiring a specific substrate moisture level, submit a narrative and schedule indicating measures that will be taken to ensure suitability of the substrates.

1.6. QUALITY ASSURANCE

A. Codes and Regulations: Comply with Federal, State, and Local regulations, and with utility company requirements.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

C. Accessible Temporary Egress: Comply with applicable provisions of the Americans with Disabilities Act (ADA).

2. PRODUCTS

Not Used

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. Comply with Federal, State, and local regulations.
2. Install work in neat and orderly manner.
3. Make structurally, mechanically and electrically sound throughout.
4. Maintain to give safe, continuous service, and to provide safe working conditions.
5. Provide each facility ready for use when needed to avoid delay.
6. Modify and extend systems as work progress requires.

B. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2. USE OF OWNER'S PERMANENT AND EXISTING SYSTEMS FOR CONSTRUCTION

A. General: Where Owner’s systems are indicated to be used for temporary purposes, the following items apply:

1. Do not overload system. When project requirements exceed system capacity, provide separate system to meet needs.
2. Connection, disconnection, and use of systems shall not disturb Owner’s operations.
3. Modify, supplement, and extend system to meet temporary utility requirements for project.
4. Maintain all components used for temporary systems, including lamps and ballasts.
5. Maintain strict supervision of use of temporary facilities.
6. Enforce conformance with Owner's regulations and all applicable codes and standards.
7. Use only designated facilities, systems or portions thereof.
8. Replace all components damaged by Contractor's use.
9. Ventilating: Provide temporary filters in ducts and furnace units. Replace with new filters immediately prior to final project acceptance. See “Protection of Installed Work” in this Section.

B. 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.

3.3. TEMPORARY UTILITY INSTALLATION - GENERAL

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 as directed by authorities having jurisdiction.

C. Sanitary Facilities:

1. Temporary Sanitary Facilities: Provide an adequate quantity of temporary toilets and handwashing facilities for all workers and authorized parties throughout construction period. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities. Clean and service as often as necessary to prevent accumulation of wastes, and creation of unsanitary conditions.

3.4. TEMPORARY ELECTRICITY

A. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use. Provide connections and extensions of services as required for construction operations. Maintain equipment in a condition acceptable to Owner.

1. Contractor may use service without metering and without payment of use charges.

B. Provide secondary power centers as needed and provide circuit protection for each circuit.

C. Provide service connections required for:

1. Temporary lighting.
2. Temporary heating and ventilating.
3. Testing and checking permanent mechanical and electrical equipment.

D. Contractors or subcontractors who require primary power, secondary power centers or service connections in excess of that specified: Make arrangements with the responsible Contractor and pay all costs thereof.

3.5. TEMPORARY LIGHTING

A. 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. Permanent building lighting may be utilized during construction. Clean and relamp fixtures at Substantial Completion.

3.6. TEMPORARY HEATING

A. Heating: Provide temporary heating 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.

B. Temporary Heating Equipment: Provide vented heaters with thermostatic control.

1. Select equipment that will not increase humidity levels and that will not have a harmful effect on completed installations or elements being installed.
2. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
3. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
4. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return-air grille

in system and remove at end of construction and clean HVAC system as required in Section 01 7700 - Closeout Procedures.

C. Heating Required. Provide specified heating in enclosed areas throughout construction period in order to:

1. Facilitate progress of work.
2. Protect work and products against dampness and cold.
3. Prevent moisture condensation on surfaces.
4. Provide specified ambient temperatures for installation and curing of finish materials.

D. Minimum heating temperatures required:

1. 24 hours a day: 50 degrees F.
2. 24 hours a day during placing, setting, and curing of cementitious materials: As required by specification Section for each product.
3. 24 hours a day, seven days prior to and during placing of interior finishes: As required by specification Section for each product.
4. 24 hours a day after application of interior finishes: 60 degrees F., except as otherwise specified.

3.7. TEMPORARY VENTILATION AND HUMIDITY CONTROL

A. 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.

B. Ventilate enclosed areas throughout construction period to:

1. Facilitate progress of work.
2. Protect work and products against dampness and heat.
3. Provide suitable ambient temperatures for installation and curing of finish materials.
4. Prevent hazardous accumulation of dusts, fumes, mists, vapors or gases in areas occupied during construction.

a. Provide local exhaust ventilating to prevent harmful dispersal of hazardous substances into atmosphere of occupied areas.
b. Dispose of exhaust materials in manner that will not result in harmful exposure to persons or property.

5. Dissipate humidity and prevent moisture condensation on surfaces.

3.8. TEMPORARY WATER SERVICE

A. Water and Sewer Services:

B. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use. Provide connections and extensions of services as required for construction

operations. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

1. Contractor may use service without metering and without payment of use charges.

C. Water Service requirements: Install water service and distribution piping in sizes and pressures adequate for construction.

1. Provide backflow preventers.
2. Provide insulation, or other means, to prevent pipes from freezing.
3. When necessary to maintain pressure, provide temporary pumps, tanks, and compressors.

3.9. SUPPORT FACILITIES INSTALLATION

A. General: Provide traffic directional signage, barricades and other traffic control measures per approved Site Logistics Plan for each construction phase.

B. Temporary Roads and Paved Areas: As needed, 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 nontracking. Reapply treatment as required to minimize dust.

C. Temporary Use of Existing and Permanent Roads and Paved Areas: Where existing and permanent roads and paved areas are used for construction, they shall be cleaned and repaired as required to return to condition prior to construction. The final appearance and condition shall be acceptable to the Architect.

D. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.

E. Parking and Material Staging: Utilize contractor parking and staging areas indicated on Drawings or arrange for temporary surface parking/staging areas to accommodate construction personnel and materials.

1. Contractor parking and material staging shall not encumber the site.
2. When available site space is not adequate, provide additional off-site parking.

F. Project Signs: Provide Project signs as indicated.

1. Temporary Signs: Provide other signs as indicated and as required for safety and to inform public and individuals seeking entrance to Project site.
2. Maintain and touchup signs so they are legible at all times.
3. No other signs are allowed without Owner permission except as otherwise required by law.

G. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
2. Remove snow and ice as required to minimize accumulations.

H. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in this Section.

3.10. FIELD OFFICES AND SHEDS

A. Field Offices: Provide a minimum of one field office for the General Contractor.

1. Field Office, at a minimum, shall consist of the following:

a. Prefabricated or mobile units with lockable entrances, serviceable finishes, temperature controls, and foundations adequate for normal loading.
b. Weather-tight, with operational lighting, electrical outlets, heating, cooling and ventilating equipment. Office shall be heated and air-conditioned.
c. Equipped with sturdy furniture including drawing rack, drawing display table, desk, 4-drawer file cabinet, and 2 chairs.
d. Contractor shall pay all costs for field office, including but not limited to, utility hookup and usage fees.

B. Project Meeting Space: [General Contractor’s Field Office shall include space for project meetings, with table and chairs to accommodate 10 persons.

C. Storage and Fabrication Sheds: When necessary, provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

D. Location:

1. Locate field offices and sheds a minimum distance of 30 feet from existing and new structures unless otherwise indicated by the Architect.
2. Store combustible materials apart from building.

3.11. SECURITY FACILITIES INSTALLATION

A. General: Provide security and facilities to protect Work, existing facilities and Owner's operations from unauthorized entry, vandalism, or theft.

1. Coordinate with Owner's security program.
2. 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.

B. Site Enclosure Fence: Before construction operations begin, furnish and install chain link site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates. Contractor to maintain fencing and provide repairs as required. Contractor shall remove fencing at project completion.

1. Mounting: Movable, no posts may penetrate paving/landscaping.
2. Chain-Link Fencing: Galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch-OD line posts and 2-7/8-inch-OD corner and pull posts.

3. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations. Fence and gate locations shall be as per approved Site Logistics Plan prepared by Contractor.
4. Keys: Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.

3.12. PROTECTION FACILITIES INSTALLATION

A. Protection, General: Protect vehicular traffic, stored materials, site and structures from damage.

1. Provide barriers, barricades, covered walkways, and appropriate warning signage and lighting to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from damage from construction operations and demolition.
2. Comply with requirements of governing authorities and public rights-of-way.
3. Existing Facilities: Protect existing vegetation, landscaping, 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.
4. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
5. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses.

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.

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 State and local regulations and as indicated elsewhere in the Contract Documents.

1. Grade site to drain properly at all times during construction. Protect site from puddling or running water.
2. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant- protection zones.
3. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established. Provide qualified person to inspect and maintain sedimentation control items.
4. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
5. Remove all erosion and sedimentation controls at project completion. Restore and stabilize areas disturbed during removal.

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

1. Provide and comply with SWPPP (Storm Water Pollution Prevention Plan) requirements where required.

E. Tree and Plant Protection: Install and maintain temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Equipment and materials may not be placed within the temporary vegetation protection areas. 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. Building Contents Protection: Provide all necessary protective means to insure that scientific, electronic, and other equipment and furnishings in the building are not stolen, damaged, or soiled by construction operations. Cooperate with the Owner regarding the removal, relocation and/or protection of all fixtures, furnishings, finishes, and equipment.

H. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

3.13. TEMPORARY PROTECTION ENCLOSURES

A. Exterior Enclosure: Provide temporary weathertight closure of exterior openings to accommodate acceptable working conditions and protection for products to allow for temporary maintenance of required ambient temperatures, including those identified in individual specification Sections, and to prevent entry of unauthorized persons.

3.14. PROTECTION OF INSTALLED WORK

A. General:

1. Provide temporary and removable protection for installed products. Control activity in immediate work area to minimize damage.
2. Provide protective coverings at wall, projections, jambs, sills, and soffits of openings.
3. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
4. Protect air-handling equipment.
5. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

B. Air handling and distribution:

1. Coordinate with related Division 23 Air Handling equipment, Duct and Duct Accessory specification Sections.
2. Air distribution systems must be aggressively protected from dust during the construction process. If air handling equipment is operated during the construction process for any reason (e.g. to provide temporary heat) for any length of time, special provisions must be made to provide adequate filtration to protect all air handling equipment, distribution and return ductwork from exposure to dust, with filters being changed on a regular and frequent basis.

    a. As a first option, all return ductwork shall be disconnected from the respective supply AHU and capped to prevent contamination. Filters of sufficient ASHRAE spot efficiency to prevent pass-through of construction dust are to be used at all AHU entrance(s) and normal filter sections in air handlers during construction use.

b. As an alternative, minimum 55% efficient Filters (ASHRAE spot efficiency) are to be used at all entrances for return ducting (or openings to plenum areas) and normal filter sections in air handlers during construction use.

3.15. MOISTURE AND MOLD CONTROL

A. Contractor's Moisture-Protection Plan: Contractor shall develop and maintain a 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 slabs, decks, and other horizontal surfaces.
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. As a result of work performed or not performed by the Contractor, mold that is found to be present in any material is to be immediately removed in accordance with both the EPA and OSHA guidelines. The Contractor will be required to provide a remediation plan, approved by the Owner. At a minimum, remediation work is to be performed by an appropriately qualified contractor who specializes in mold remediation and is to provide direct supervision of the mold remediation by a Certified Industrial Hygienist or an environmental consultant.

E. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:

1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
2. Use ventilation and dehumidification systems to control humidity.
3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.

a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective.
b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of

exposure and continuing daily for 48 hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.

c. Remove materials that cannot be completely restored to their manufactured moisture level within 48 hours.

3.16. PROGRESS CLEANING

A. Maintain all construction areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition at all times.

B. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

C. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

D. Remove waste materials, debris, and rubbish from site and dispose legally off-site.

E. Maintain streets and sidewalks around the Project site in a clean condition. Remove all spillage and tracking arising from the performance of the Work from such areas. Establish a regular maintenance program of sweeping and hosing to minimize accumulation of dirt and dust upon such areas at least daily.

3.17. 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.
2. Prevent water-filled piping from freezing.
3. Maintain markers for underground lines. Protect lines from damage during excavation operations.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until as directed by Architect and/or Owner.

D. 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. Remove temporary above grade or buried utilities, equipment, facilities, materials.
2. Remove underground installations to a minimum depth of 2 feet.
3. 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.

4. Materials and facilities that constitute temporary facilities are the property of the Contractor.
5. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Restore to original conditions. Comply with final cleaning requirements specified in Section 01 7700 - Closeout Procedures.
6. Contractor's personnel on-site after Substantial Completion shall be permitted to use the permanent facilities only under conditions acceptable to the Owner.

END 01 5000

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Temporary stormwater pollution controls.

1.2 PROJECT SITE LOCATION

A. Facility Name: Mehlville School District – Bus Transportation Facility
B. Address: 3100 Lemay Ferry Rd., St. Louis, MO 63125
C. County St. Louis

1.3 Project Site Evaluation

A. Property Data
   a. Total Property Area: 40.60 acres
B. Existing Site Features
   a. Describe existing use of property:
      1) Existing school athletic/support facilities, including an existing pool building, bus maintenance building, trailer offices, and associated parking and drives.
   b. Existing developed area:
      1) Existing pool building, bus maintenance building, trailer offices, and associated pavement.
C. Existing Vegetation Description
   a. The site generally includes existing parking lot, maintenance building, turf, landscaping, and scattered trees.
D. Proposed Project Site Features
   a. Describe proposed use of the property:
   b. New bus transportation facility, associated parking and site improvements, grading, storm sewer and utility installation, and a bio-retention basin with rip-rap forebay for stormwater management.
E. Proposed disturbed area:
   a. 10.77 acres
F. Receiving Waters:
   a. Unnamed tributary to Mehlville Creek, thence to Mehlville Creek, thence to Gravois Creek (750 ft enclosed storm sewer to the unnamed tributary; 3,000 ft in the unnamed tributary to Mehlville Creek; 4,200 ft in Mehlville Creek to Gravois Creek).
G. Description of Storm Sewer System:
   a. Closed piping system with area/curb inlets, storm manholes, and outlet structures; includes a bio-retention basin with rip-rap forebay.
H. Floodplain Data:
   a. FEMA Flood Insurance Rate Map No. 29189C0340K, effective date 2/4/2015.
   b. Site scales within Zone “X” (areas determined to be outside the 0.2% annual chance floodplain).
I. NRCS Soil Types:
   a. 60223 — Urban Land-Harvester Complex, Karst, 0 to 2 percent slopes.
   b. 60224 — Urban Land-Harvester Complex, Karst, 2 to 9 percent slopes.
   c. 60225 — Urban Land-Harvester Complex, Karst, 9 to 20 percent slopes.
J. Pervious / Impervious
   a. Total Project Property Area: 40.60 acres
   b. Total Disturbed Area: 10.77 acres
   c. Percentage impervious prior to Construction: 47%
   d. Percentage impervious after Construction: 58%

1.4 STORMWATER POLLUTION PREVENTION PLAN

A. The Stormwater Pollution Prevention Plan (SWPPP) is part of the Contract Documents and is bound into this Project Manual.

1.5 INFORMATIONAL SUBMITTALS

A. Stormwater Pollution Prevention (SWPP) Training Log: For each individual performing Work under the SWPPP.

B. Inspection reports to be submitted monthly.

1.6 QUALITY ASSURANCE

A. Stormwater Pollution Prevention Plan (SWPPP) Coordinator: Experienced individual or firm with a record of successful water pollution control management coordination of projects with similar requirements.

1. SWPPP Coordinator shall complete and finalize the SWPPP form.
2. SWPPP Coordinator shall be responsible for inspections and maintaining of all requirements of the SWPPP.

B. Installers: Trained as indicated in the SWPPP.

PART 2 - GENERAL REQUIREMENTS STIPULATED BY MDNR

A. The discharge of storm water from these facilities shall not cause a violation of the state water quality standards, 10 CSR 20 7.031, which states, in part, that no water contaminant, by itself or in combination with other substances, shall prevent the waters of the state from meeting the following conditions:

1. Waters shall be free from substances in sufficient amounts to cause the formation of putrescent, unsightly or harmful bottom deposits or prevent full maintenance of beneficial uses;
2. Waters shall be free from oil, scum and floating debris in sufficient amounts to be unsightly or prevent full maintenance of beneficial uses;
3. Waters shall be free from substances in sufficient amounts to cause unsightly color or turbidity, offensive odor or prevent full maintenance of beneficial uses;
4. Waters shall be free from substances or conditions in sufficient amounts to have a harmful effect on human, animal or aquatic life.
5. There shall be no significant human health hazard from incidental contact with the water;
6. There shall be no acute toxicity to livestock or wildlife watering;
7. Waters shall be free from physical, chemical or hydrologic changes that would impair the natural biological community;
8. Waters shall be free from used tires, car bodies, appliances, demolition debris, used vehicles, or equipment and solid waste as defined in Missouri's Solid Waste Law, Section 260.200, RSMo, except as the use of such materials is specifically permitted pursuant to Section 260.200 to 260.247 RSMO.

B. Good housekeeping practices shall be maintained on the site to keep solid waste from entry into waters of the state.

C. All fueling facilities present on the site shall adhere to applicable federal and state regulations concerning underground storage, above ground storage, and dispensers.

D. Hazardous wastes that are transported, stored, or used for maintenance, cleaning or repair shall be managed according to the provisions of the Missouri Hazardous Waste Laws and Regulations.

E. An individual shall be designated by the Contractor as responsible for environmental matters. The individual responsible for environmental matters shall have a thorough and demonstrable knowledge of the site's SWPPP and sediment and erosion control practices in general. The individual responsible for environmental matters or a designated inspector knowledgeable in erosion, sediment, and storm water control principles shall periodically inspect all structures that function to prevent pollution of waters of the state. These inspections shall be conducted in accordance with section 7.

F. All paint, solvents, petroleum products and petroleum waste products, and storage containers (such as drums, cans, or cartons) shall be stored according to Best Management Practices (BMPs). The materials exposed to precipitation shall be stored in watertight, structurally sound, enclosed containers. All containers shall be inspected for leaks or spillage during the once per week inspection of the Best Management Practices.

G. Disturbed Areas: Where soil disturbing activities cease in an area for 14 days or more, the Contractor shall construct BMPs to establish interim stabilization. Interim stabilization shall consist of well established and maintained BMPs that are reasonably certain to protect waters of the state from sediment pollution over an extended period of time. This may require adding more BMPs to an area than is normally used during daily operations. These BMPs used must be suited to the area disturbed, taking into account the number of acres exposed and the steepness of the slopes.

    1. If the slope of the area is greater than 3:1 (3 feet horizontal to 1 foot vertical) or if the slope is greater than 3% and greater than 150 feet in length, then the Contractor shall establish interim stabilization within 7 days of ceasing operations on that part of the site.

H. Installation: The contractor shall ensure the BMPs are properly installed at the locations and relative times specified in the SWPPP. Peripheral or border BMPs to control runoff from the disturbed areas shall be installed or marked for preservation before general site clearing is started. Storm water discharges form disturbed areas, which leave the site, shall pass through an appropriate impediment to sediment movement, such as sedimentation basin, sediment traps, silt fences, etc. prior to leaving the land disturbance site. A drainage course change shall be clearly marked on a site map and described in the SWPPP shall require the basin be maintained until final stabilization of the disturbed area served by the basin.

I. Dewatering: The SWPPP shall require a description of an anticipated dewatering methods, including the anticipated volume of water to be discharged and the anticipated maximum flow discharged from these dewatering activities, expressed in gallons per minute. Maximum flow may be stated in the SWPPP as an estimate based on the type and capacity of equipment being used for dewatering. The SWPPP shall call for specific BMPs designed to treat water pumped form excavations and in no case shall this water be pumped off site without being treated by the specified BMPs.

J. Roadways: Where applicable, upon installation of or connection to roadways, all efforts should be made to prevent the deposition of earth and sediment onto roadways through the use of proper BMPs. Where sediments present on roadways all storm water curb inlets shall have inlet protection. Where storm water will flow off the end of where a roadway terminates, a sediment catching BMP (ex. Gravel berm, silt fence, etc.) shall be provided. Roadways and curb inlets shall be cleaned weekly and following a rainfall that generates a run-off. Stabilized construction entrances shall be used to prevent sediment track-out.

K. Proper Operation and Maintenance: The Contractor shall at times maintain all pollution control measures and systems in good order to achieve compliance with the terms of this general permit.

L. Public Notification: The Contractor shall post a copy of the public notification sign described by the MDNR at the main entrance. The public notification sign must remain posted at the site until the permit has been terminated.

M. Change in discharge: In the event soil contamination or hazardous substances are discovered at the site during land disturbance activities, the Contractor shall notify the MDNR regional office by telephone as soon as practicable, and no later than 24 hours after discovery. The contractor must also notify the MDNR regional office in writing no later than 14 calendar days after the discovery.

N. Discharges shall not violate General Water Quality Standards 10 CSR 20 7.03(3).

O. Settleable solids shall not exceed a maximum of 2.5 ml/L/hr. for each storm water outfall.

PART 3 - EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICES

A. Construction Entrance / Exits

1. Physical Description:

a. A stabilized entrance to a construction site designed to minimize the amount of sediment tracked from the site on vehicles and equipment. Stabilization generally consists of aggregate over fabric. Mud and sediment fall of the tires as they travel along the stabilized entrance; however, additional measures in the form of a washdown area should also be included on site.

2. Location: See Plan Sheet C1.1

3. This BMP is Temporary

4. Site preparations for BMP:

a. Remove all vegetation and other unsuitable material from the foundation area, grade and crown for positive drainage.

5. Installation:

a. If slope towards the road exceeds 2%, construct a 6-8 inch high ridge with 3:1 side slopes across the foundation approximately 15 feet from the entrance to divert runoff away from the public road.
b. Install pipe under the pad if needed to maintain drainage ditches along public roads.
c. Place stone to dimensions and grade shown on plans. Leave surface smooth and sloped for drainage.
d. Divert all surface runoff and drainage from the stone pad to a sediment trap or basin.
e. If wet conditions are anticipated, place geotextile filter fabric on the graded foundation to improve stability.

6. Inspection and maintenance:

a. Reshape pad as needed for drainage and runoff control
b. Top-dress with clean 2 inch stone as needed.
c. Immediately remove mud and debris tracked or washed on to public road.

7. After construction is complete remove all temporary road materials form areas where permanent vegetation will be established.

8. See Detail: 02-C7.0

B. Silt Fence

1. Physical Description:

a. A fence constructed of woven filter fabric and wire mesh stretched between posts and entrenched in the ground designed to pond stormwater runoff and cause sediment to settle out.

2. Location: See Plan Sheet C1.1

3. This BMP is Temporary

4. BMP conditions for effective use:

a. Type of flow: Sheet flow only.

5. Site preparations for BMP:

a. Determine exact location of underground utilities.
b. Grade alignment of fence as needed to provide broad, nearly level area upstream of fence.

6. Inspection and maintenance:

a. Inspect sediment fences at least once a week and after each rainfall. Make any required repairs immediately.
b. Should the fabric of a sediment fence collapse, tear, decompose or become ineffective, replace it promptly.
c. Remove sediment deposits as necessary to provide adequate storage volume for the next rain and to reduce pressure on the fence. Take care to avoid damaging or undermining the fence during cleanout.

7. After permanent vegetation of slope is established. Remove fence, re-grade trench area and vegetate.
8. See Detail: 01-C7.0

C. Fiber Rolls & Filter Rolls

1. Physical Description:

a. A fiber roll, also known as a wattle, consists of straw, flax coconut fiber (coir), rice straw or other similar materials bound in a tight photodegradable or biodegradable tubular roll or filter sock. A Filter roll consists of biodegradable, coarse composted or filter material bound in a tight photodegradable or biodegradable tubular roll or filter sock. They intercept runoff, reduce flow velocity, remove sediment from the runoff, and reduce soil erosion. Fiber rolls and filter rolls must be prefabricated.

2. This BMP is Temporary
3. BMP conditions for effective use:

a. Type of Flow: Sheet flow and concentrated flow.

1) Contributing Slope: for slopes use the following row spacing:

a) 2:1 or steeper; 10 feet.

2) Between 2:1 and 4:1; 15 feet

a) 4:1 or flatter: 20 feet.

4. Construction of the BMP:

a. Calculate required roll diameter, length and row spacing based on the slope and the manufactures recommendations.
b. Dig trench to required depth for fiber rolls (filter rolls do not require trench).
c. Place fiber rolls in trench or filter rolls directly on slope.
d. Stake the fiber rolls or filter rolls per manufacturer's specifications.
e. Place excavated soil (fiber roll or filter roll material along the upside of rolls. Not to exceed ¼ of the roll diameter.

5. Inspection and maintenance:

a. Inspect every week and after storms.
b. Remove sediment buildup more than half of the roll height.
c. Replace or repair split, torn, unraveling, slumping, or damaged rolls.
d. Repair or replace unstable or broken wood stakes.
e. Stabilize any areas susceptible to undermining.
f. Extend rows or add additional rows if necessary to provide adequate protection.

6. What site conditions must be met before removal of the BMP, if not Permanent.

a. After permanent vegetation of slope is established, remove rolls, collect and dispose of sediment accumulation, regrade trench area to blend with adjacent ground, and vegetate. Rolls do not have to be removed if approved construction or grading plans call for rolls to permanently be left in place (must be fully biodegradable).

D. Interim Seeding & Permanent Seeding

1. Physical Description:

a. Establishment of vegetation by spreading grass seed designed to protect exposed soil from erosion by eliminating direct impact of precipitation and slowing overland flow rates. Once established, the vegetative cover will also filter pollutants from the runoff.

2. This BMP is Temporary / Permanent

a. Type of Flow: Sheet flow
b. Contributing slope length:
    1) 30 foot maximum for 3:1 slopes
    2) 50 foot maximum for slope between 3:1 and 10:1
    3) 100 foot maximum for slopes under 10%

3. Site preparations for BMP:

a. Seedbed preparation is essential for the seed to germinate and grow.
b. For broadcast seeding and drilling, loosen the soil to a depth of approximately 3 inches.
c. For no-till drilling, the soil surface does not need to be loosened unless the site has surface compaction.
d. Use a disk, ripper, chisel, harrow, or other acceptable tillage equipment to loosen compacted, hard or crusted soil surfaces.
e. Avoid preparing the seedbed under excessively wet conditions.
f. Install upstream BMPs to protect area to be seeded.

4. Installation:

a. Mix soil amendments (lime, fertilizer, etc.) into top 3-6 inches of soil as needed.
b. Plant seed ¼ - ½ inches deep.
c. Roll lightly to firm surface.
d. Cover seeded area with mulch.

5. Inspection and maintenance:

a. Inspect every week and after every storm.
b. Reseed areas that have not sprouted within 21 days of planting.
c. Protect area from vehicular and foot traffic.
d. Do not mow until 4 inches of growth occurs.
e. During the first 4 months, mow no more than 1/3 the grass height.
f. Re-fertilize during 2nd growing season.

E. Mulching

1. Physical Description:

a. A layer of organic material designed to protect exposed soil or freshly seeded areas from erosion by eliminating direct impact of precipitation and slowing overland flow rates. Mulch materials may include, but are not limited to, grass, hay, straw, wood chips, wood fibers, and shredded bark.

2. This BMP is Temporary / Permanent

3. BMP conditions for effective use:

a. Type of Flow: Sheet flow only.

4. Site preparations for BMP:

a. If area is to be seeded follow requirements of seeding BMP.
b. Divert runoff water from areas above the site that will be mulched.
c. Remove stumps, roots, and other debris from the construction area.
d. Grade area as needed to permit the use of equipment for seeding mulching and maintenance. Shape area so that it is relatively smooth.

5. Installation:

a. Spread straw or cereal grain mulch uniformly over the area with a power blower, hydroseeder or by hand. No more than 5% of the ground surface should be visible after spreading.

6. Inspection and maintenance:

a. Inspect every week and after every storm until adequate vegetation is established; annually for permanent mulch.
b. Protect from vehicular and foot traffic.
c. Repair damaged, degraded or eroded areas – reseed as needed and replace mulch.

F. Erosion Control Blankets

1. Physical Description:

a. An erosion control blanket is a preformed protective blanket of plastic fibers, straw or other plant residue designed to protect soil from the impact of precipitation and overland flow, and retain moisture to facilitate establishment of vegetation.

2. Location: See Plan Sheet C1.2

3. This BMP is Permanent

4. Site preparations for BMP:

a. Grade the site in accordance with the approved design to a smooth and uniform surface, free of debris.

b. Add and incorporate topsoil where needed.

5. Blanket Installation:

a. Erosion control products should be installed in accordance with the manufactures' recommendations and specifications including check slots and stapling materials.

b. Anchor product so that a continuous, firm contact (no tenting) with the soil surface/seed bed is maintained.

c. Bio-degradable staples or stakes are to be used when installing erosion control blankets.

6. Inspection and maintenance:

a. Inspect after storm events, until vegetation is established, for erosion or undermining beneath the blankets. If any area shows erosion, pull back that portion of the blanket, add tamped soil and reseed; then re-secure the blankets.

b. If blankets should become dislocated or damaged, repair or replace immediately.

G. Inlet Protection – Fabric Drop

1. Physical Description:

a. A woven fabric barrier braced around an area inlet designed to prevent sediment from entering the storm sewer. Shallow temporary ponding during and after rainfall should be expected.

2. Locations: At all inlets.

3. This BMP is Temporary

4. BMP conditions for effective use:

a. Type of Flow: Shallow sheet flow.

5. Inlet protection installation:

a. Space stakes evenly around the perimeter of the inlet a maximum of 3 feet apart, and securely drive them into the ground, approximately 18 inches deep.

b. To provide needed stability to the installation, frame with 2 X 4 inch wood strips or other suitable materials around the crest of the overflow area at a maximum of 18 inches above the drop inlet crest.

c. If possible, cut fabric securely to the stakes and frame. Joints should be overlapped to the next stake.

d. The top of the frame and fabric must be well below the ground elevation downslope from the drop inlet to keep runoff from bypassing the inlet. It may be necessary to build a temporary berm on the downslope side of the structure to prevent bypass flow.

e. Wire fence may be used to support the fabric. The wire should be 14-guage minimum with maximum mesh spacing of 6 inches. The top of the fence should be level and the bottom should be buried at least 6 inches below the ground surface.

f. Straw bales may be used in lieu of fabric. Bales should be set back 12-24 inches from the inlet.

6. Inspection and maintenance:

a. Inspect fabric barrier after each rainfall event and make needed repairs immediately.

b. Remove sediment from the pool area as necessary to provide adequate storage volume for the next rain. Take care not to damage or undercut the fabric during the sediment removal.

c. Repair any erosion or settlement of temporary berm downstream of inlet.

7. When the contributing drainage area has been adequately stabilized, remove all materials and unstable sediment and

dispose of properly. Bring the disturbed area to the grade of the drop inlet; smooth and compact it.

8. See Detail: 03-C7.0

H. Sedimentation Basin:

1. Physical Description:

a. A temporary pond constructed to contain sediment-laden storm water for an extended period of time prior to the storm water discharging from the basin. A sediment basin is temporary and should be removed or retrofitted prior to any final construction activities that would make these features a permanent detention or retention pond, after the entire contributing drainage area is stabilized.

2. Locations: See Plans.

3. This BMP is Temporary

4. BMP conditions for effective use:

a. Type of Flow: Shallow sheet flow.

5. Sedimentation Basin / Rock Dam installation:

a. Dispose of trees, limbs, logs and other debris.
b. Scarify the foundation of the dam before placing fill.
c. Construct the dam of with a maximum slope of 3:1
d. Dam to minimum of 6' wide.
e. Constructed of D50 9" stone, and top dressed with 1-2" drainage rock.
f. Install diversion dams and berms to control water flow upstream.

6. Inspection and maintenance:

a. Inspect the rock dam and basin after each storm event.
b. Remove sediment when it accumulates to half the design volume.
c. Check the dam and abutments for erosion or rock displacement and repair immediately.

7. When the contributing drainage area has been adequately stabilized, remove the structure and any unsuitable sediment. Water and sediment to be removed from basin prior to removing dam.

PART 4 - DEWATERING

A. Dewatering is the removal of ground or surface water from a construction site to allow construction to be done "in the dry" (as opposed to under wet conditions). Water is usually removed using well points and power driven pumps. Dewatering of cofferdams and trenches is a common practice during the construction of bridges, culverts and public utilities.

B. Proper dewatering techniques need to be done in order to prevent pollutants from entering into lakes, streams, etc.

C. Dewatering is often implemented in conjunction with Watercourse Crossing. Sediment Basins and Filters should be considered to help filter the dewatered water before it gets discharged to a surface water.

D. Specifications for Dewatering:

1. Dewatering must be done so that the velocity of the discharged water doesn't cause scouring of the receiving area. If the receiving area is a structural BMP (i.e. basin or sump), the design of the BMP should be based on the anticipated flow from the dewatered area.

2. Sediment-laden water from cofferdams, trenches and other areas which need dewatered, should be pumped through a geotextile material before the water is discharged into a watercourse.

E. Other Dewatering BMPs:

1. Weir Tanks:
    a. A weir tank separates water and waste by using wires. The configuration of the weirs maximizes the residence time in the tank and determines the waste to be removed from the water, such as oil, grease, and sediments.
    b. The tank removes trash, some Settleable solids (gravel, sand, and silt) some visible oil and grease, and some metals. To achieve high levels of flow, multiple tanks can be used in parallel.

F. Dewatering Tanks
    a. A dewatering tank removes debris and sediment. Flow enters the tank through the top, passes through a fabric filter, and is discharged through the bottom of the tank. The filter separates the solids from liquids.
    b. The tank removes trash, gravel, sand, and silt, some visible oil and grease, and some metals. To achieve high levels of flow, multiple tanks can be used in parallel.

G. Gravity Bag Filter
    a. A gravity bag filter, also referred to as a dewatering bag, is a square or rectangular bag made of non-woven geotextile fabric that collects sand, silt, and fines.
    b. Effective for the removal of sediments.

PART 5 - GOOD HOUSEKEEPING AND BEST MANAGEMENT PRACTICES (BMPs)

A. Some good housekeeping BMPs are as follows:
B. Solid and hazardous waste management including: providing trash containers and regular site cleanup for proper disposal of solid waste such as scrap building material, product/material shipping waste, food containers, and cups; and providing containers and proper disposal of waste paints, solvents, and cleaning compounds, etc.
C. No waste shall be buried on site.
D. Mixing, pumping, transferring or otherwise handling construction chemicals such as fertilizer, lime, asphalt, concrete drying compounds, and all other potentially hazardous materials shall be performed in an area away from any watercourse, ditch or storm drain.
E. Provision of portable toilets for proper disposal of sanitary sewage.
F. Storage of construction materials away from drainage courses and low areas.
G. Installation of containment berms and use of drip pans at petroleum product and liquid storage tanks and containers.
H. Post guidelines for proper handling, storage and disposal of materials, and emergency spill cleanup on site.
I. Designate Washout Areas:
    1. Describe locations and controls to eliminate the potential for discharges from washout areas for concrete mixers, paint, stucco, etc.
J. Control Equipment/Vehicle Washing
    1. Wash all vehicles in areas designed to collect and hold wash water before its discharge to the sanitary sewer system. Normally, wastewater treatment regulations require wash water to be pretreated prior to its discharge to the treatment plant. Contact your sewer authority to ensure that all requirements are met before designing, building, and operating the wash rack.
    2. Avoid detergents whenever possible. If detergents are necessary, a phosphate-free, non-toxic, biodegradable soap is recommended. Detergents should be avoided if an oil/water separator is used for pretreatment prior to discharge to the sanitary sewer.

3. Municipal facilities that store vehicles should stencil their storm drains to remind employees to wash vehicles within the designated wash area. Signage can also be posted with this message.

K. Equipment fueling and maintenance, oil changing, etc. shall be performed only in an area designated for that purpose. The designated area is equipped for recycling oil and catching spills.

L. Concrete wash water shall not be allowed to flow directly into storm sewers, streams, ditches, lakes, etc. without being treated. A sump or pit shall be constructed to contain concrete wash water, contractor to determine suitable location, that will not interfere with construction.

M. If substances such as oil, diesel fuel, hydraulic fluid, antifreeze, etc. are spilled, leaked, or released onto the soil, the soil shall be dug up and disposed of at a licensed sanitary landfill (not a construction/demolition debris landfill). Spills on pavement shall be absorbed with sawdust, kitty litter or product designed for that propose and disposed of at a licensed sanitary landfill. Hazardous or industrial wastes such as most solvents, gasoline, oil based paints, and cement curing compounds require special handling. These materials will be removed from the site and recycled or disposed of in accordance with MODNR requirements.

N. State law requires the party responsible for a petroleum product spill in excess of 50 gallons to report the spill to MODNR (537-834-2436) as soon as practical after discovery. Federal law requires the party to report any release of oil if it reaches or threatens a sewer, lake, creek, stream, river, groundwater, wetland, or area like a road ditch that drains into one of the above.

O.

PART 6 - STATE INSPECTION REPORTS AND RESPONSIBILTY

A. Contractor Responsibility: The contractor is responsible for executing the Storm Water Pollution Prevention Plan and providing the necessary measures to comply with all state and local regulations pertaining to Water Quality Protection.

B. Site Inspection Reports: The Contractor (or representative of the Contractor) shall conduct regularly scheduled inspections at least once per seven calendar days. These inspections shall be conducted by the person responsible for environmental matters at the site, or a person trained by and directly supervised by the person responsible for environmental matters at the site. For disturbed areas that have not been finally stabilized, all installed BMPs and other pollution control measures shall be inspected for proper installation, operation and maintenance. All storm water outfalls shall be inspected for evidence of erosion or sediment deposition. Any structural or maintenance problem shall be noted ion an inspection report a corrected within seven calendar days of the inspection. If a rainfall event results in storm water runoff on site, the BMPs must be inspected within a reasonable time period (not to exceed 48 hours) after the rainfall event has ceased. The SWPPP must explain how the person responsible for erosion control, will be notified when the storm water runoff occurs. If weather conditions make it impossible to correct the problem within seven days, a detailed report, including pictures, must be filed with the regular inspection reports. The Contractor shall correct the BMP problem as soon as weather conditions allow. Parts of the site that have been finally stabilized must be inspected at least once per month.

C. A log of each inspection and copy of the inspection report must be retained on the construction site while on-site construction workers are present, and made available to the department upon request. The inspection report is to include the following minimum information: inspector's name, date of inspection, observations relative to the effectiveness of the BMPs, actions taken or necessary to correct the observed problem, and listing of areas where land disturbance operations have permanently or temporarily stopped. The inspection report shall be signed by the person designated in the SWPPP to conduct the inspection.

D. See the end of this section for an example of the SWPPP Survey Checklist.

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PART 7 - EXECUTION

A. Comply with all best management practices, general requirements, performance requirements, reporting requirements, and all other requirements included in the SWPPP.

B. Locate stormwater pollution controls in accordance with the SWPPP.

C. Conduct construction as required to comply with the SWPPP and that minimize possible contamination or pollution or other undesirable effects.

D. Inspect, repair, and maintain SWPPP controls during construction.

E. <u>Inspect all SWPPP controls not less than every seven days, and after each occurrence of a storm event, as outlined in the SWPPP.</u>

F. Remove SWPPP controls at completion of construction and restore and stabilize areas disturbed during construction.

G. See next page for Survey Checklist and Log Page.

SWPPP SURVEY CHECKLIST

Project No.:	Inspection Date:
Project Name:	Owner (Contractor):
Project Location:	Civil Engineer:
Superintendent:	NPDES Permit No.:

A SWPPP Survey was conducted on the project identified above. The following observations were noted during this survey.

☐ Weekly Inspection ☐ Storm Event Inspection (>0.5 inches of rain) Rainfall (inches) _____

Storm Water Pollution Prevention Plan: ☐ Part of Grading Plans ☐ Separate Document	
SWPPP in Project Office: ☐ **Yes** ☐ **No**	Operator Inspection Form and Log: ☐ **Yes** ☐ **No**
Copy of Permit & Conditions in Office: ☐ **Yes** ☐ **No**	Site Area (in acres):
Name of Receiving Waters or Streams:	
Grading Contractor: ☐ Subcontractor ☐ Contracted Direct to Owner	

No.	I. Best Management Practices Inspection	Acceptable Condition	Action Taken
1.	Stabilized Construction Entrance	☐ Yes ☐ No ☐ N/A	
2.	Public Street Clean at Construction Entry	☐ Yes ☐ No ☐ N/A	
3.	Truck Wash Down Area	☐ Yes ☐ No ☐ N/A	
4.	Fabric Silt Fence	☐ Yes ☐ No ☐ N/A	
5.	Inlet Protection	☐ Yes ☐ No ☐ N/A	
6.	Sediment Basin	☐ Yes ☐ No ☐ N/A	
7.	Retention Basin	☐ Yes ☐ No ☐ N/A	
8.	Temporary Seeding or Mulching	☐ Yes ☐ No ☐ N/A	
9.	Erosion Control Mats	☐ Yes ☐ No ☐ N/A	
10.	Drainage Swales	☐ Yes ☐ No ☐ N/A	
11.		☐ Yes ☐ No ☐ N/A	
12.		☐ Yes ☐ No ☐ N/A	
13.		☐ Yes ☐ No ☐ N/A	
14.		☐ Yes ☐ No ☐ N/A	
15.		☐ Yes ☐ No ☐ N/A	
16.		☐ Yes ☐ No ☐ N/A	
17.		☐ Yes ☐ No ☐ N/A	
18.		☐ Yes ☐ No ☐ N/A	
19.		☐ Yes ☐ No ☐ N/A	
20.			

No.	II. General Condition Questions/Checklist	Acceptable Condition	Comments
1.	Are BMP's Completed per the SWPPP?	☐ Yes ☐ No ☐ N/A	
2.	Are BMP's routinely maintained?	☐ Yes ☐ No ☐ N/A	
3.	Are good site housekeeping practices observed?	☐ Yes ☐ No ☐ N/A	
4.	Is sediment form erosion being retained on site?	☐ Yes ☐ No ☐ N/A	
5.	Solid waste prohibited from being buried on site?	☐ Yes ☐ No ☐ N/A	
6.	Hazardous waste and paint removed from site?	☐ Yes ☐ No ☐ N/A	
7.	Has any disturbed site area been inactive > 14 days?	☐ Yes ☐ No ☐ N/A	

Report Prepared by: _____ ☐ Carbon Copy to: _____
See Continuation Page: ☐ Yes ☐ No**,** END OF REPORT

END OF SECTION 015723

1. GENERAL

1.1. WORK INCLUDES

A. Specified materials and equipment.

B. Transportation and delivery.

C. Equipment and personnel at site.

D. Storage for materials and equipment to be installed in Project.

E. Protection and security for stored materials and equipment, on and off site.

F. Substitutions and Product options

1. Base all bids on providing all products exactly as specified.
2. For products specified only by reference or performance standards, select any product which meets or exceeds standards, by any manufacturer, subject to the Architect's acceptance.
3. For products specified by naming several products or manufacturers, select any product and manufacturer named.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 1000 - Project Summary
2. Section 01 3100 - Project Coordination
3. Section 01 3300 - Submittal Procedures
4. Section 01 5000 - Temporary Facilities and Controls
5. Section 01 7329 - Cutting and Patching
6. Section 01 7700 - Closeout Procedures
7. Respective Specification Sections

1.3. MANUFACTURER'S INSTRUCTIONS

A. When Contract Documents specify that installation shall comply with manufacturer's printed instructions, obtain and distribute copies of such instructions to all parties involved in the installation, including four copies to the Architect.

B. Maintain one set of complete instructions at the jobsite during installation and until completion, then file with the Project Record Documents.

1.4. OFF-SITE STORAGE AUTHORIZATION

A. Off-site storage will be permitted only with Owner's prior written authorization in accordance with the conditions of the contract.

1.5. SUBMITTALS

A. In accordance with Section 01 3300, submit:

1. Request for allocation of storage space.
2. List of materials and equipment to be stored.
3. Proposed location for storage.
4. Special storage requirements.
5. Schedule of anticipated storage dates.

1.6. SUBSTITUTIONS, BIDDER/CONTRACTOR OPTIONS

A. Prior to Bid Opening: The Architect will consider written requests to amend the bidding documents to add products not specified provided such requests are received at least seven (7) calendar days prior to bid opening date. Requests received after that time will not be considered. If a request is approved, the Architect will issue an appropriate addendum.

B. After Award of Contract: No substitutions will be considered after Notice of Award except under one or more of the following conditions:

1. Substitutions required for compliance with final interpretations of code requirements or insurance regulations.
2. Unavailability of specified products, through no fault of Contractor.
3. Subsequent information discloses inability of specified product to perform properly or to fit in designated space.
4. Manufacturer/Fabricator refusal to certify or guarantee performance of specified product as required.
5. When a substitution would be substantially in the Owner's best interest.

1.7. SUBSTITUTION REQUIREMENTS

A. Complete Substitution Request Form included in this section.

B. Submit not less than four copies of each request for substitution. Include in request:

1. Complete data substantiating compliance of proposed substitution with Contract Documents.
2. For Products:

a. Product identification, including manufacturer's name and address.
b. Manufacturer's literature.

1) Product description.
2) Performance and test data.
3) Reference standards.

c. Samples.
d. Name and address of similar projects on which product was used and date of installation.

3. Itemized comparison of proposed substitution with product or method specified.
4. Data relating to changes in construction schedule.
5. Identify:

a. Other contracts affected.
b. Changes or coordination required.

6. Accurate cost data on proposed substitution in comparison with product or method specified.

C. In making request for substitution, bidder/contractor represents:

1. It has personally investigated proposed product or method and determined that substitution is equal or superior in all respects to that specified.
2. It will provide the same guarantee for substitution as for product or method specified.
3. It will coordinate installation of accepted substitutions into work, making all such changes as may be required for work to be complete in all respects.
4. Cost data is complete and includes all related costs under its contract, but excludes:

a. Costs under separate contracts.
b. Architect's redesign.
c. Administrative costs of Architect.

5. It will assume all additional costs and expenses for Owner, Architect, and other contractors.

D. Substitutions will not be considered if:

1. They are indicated or implied on shop drawings or product data submittals without formal request submitted in accordance with requirements specified herein.
2. Acceptance will require substantial revision of Contract Documents.

2. PRODUCTS

2.1. REUSE OF EXISTING MATERIALS

A. Except as specifically indicated or specified, do not use materials or equipment removed from the existing buildings.

B. For material and equipment specifically indicated or specified to be reused in the work:

1. Use special care in removal, handling, storage, and reinstallation to assure proper function in the completed work.
2. Arrange for storage and handling of products requiring restoration or renovation. Pay all costs for such work.

2.2. MATERIALS AND EQUIPMENT INCORPORATED INTO THE WORK

A. Conform to project specifications and standards.

B. Comply with size, make, type, and quality specified.

C. Manufactured and fabricated products:

1. Design, fabricate, and assemble in accord with best engineering and shop practices.
2. Manufacture like parts of duplicate units to standard sizes and gages, to be interchangeable.
3. Two or more items of the same kind shall be identical from the same manufacturer.
4. All parts of systems shall be from the same manufacturer to the greatest extent practicable.

5. Adhere to equipment capacities, sizes and dimensions shown or specified unless variations are specifically approved by Change Order.

2.3. STORAGE MATERIALS; EQUIPMENT

A. May be new or used, but shall be serviceable, adequate for required purpose, and shall not create unsafe conditions nor violate specified codes.

2.4. STORAGE SHEDS

A. Basic Requirements:

1. Number: To meet requirements of construction needs, and as acceptable to Architect.
2. Dimensions: To storage requirements of products.
3. Ventilation: To meet specified and code requirements for all products stored.
4. Heating: Maintain temperatures specified in respective specification sections for products stored.

B. Construction:

1. Structurally sound foundation and superstructure.
2. Weathertight, with raised floors; compatible with storage requirements.
3. Temperature transmission resistance: Compatible with storage requirements.
4. Do not use storage sheds for living quarters.

2.5. PROTECTIVE MATERIALS

A. For duration of storage period, provide materials which will provide proper protection against the elements or other harmful environmental conditions. Materials may be new or used at Contractor's option, but shall be:

1. Of sufficient strength and durability for intended use.
2. Recommended by manufacturer of products or equipment to be protected.
3. Non-staining.
4. Non-hazardous.

3. EXECUTION

3.1. TRANSPORTATION, DELIVERY & HANDLING

A. Arrange for transportation and deliveries of materials and equipment in accord with approved current construction schedules and in ample time to facilitate inspection prior to installation.

B. Coordinate deliveries to avoid conflict with work and conditions at site including the following:

1. Work of other contractors or Owner, or their use of premises.
2. Limitations of storage space.
3. Availability of equipment and personnel for handling products.

C. Deliver products in undamaged condition in original containers or packaging, with identifying labels intact and legible.

D. Clearly mark partial deliveries of component parts of assemblies or equipment to permit easy identification of parts and to facilitate assembly.

E. Immediately on delivery, inspect shipment to assure:

1. Product complies with Contract Documents and Architect reviewed submittals.
2. Quantities are correct.
3. Containers and packages are intact, labels are legible.
4. Products are properly protected and undamaged.

F. Provide equipment and personnel to handle products and equipment, including those furnished by the Owner. Prevent damage to products or packaging.

G. Provide additional protection during handling to prevent scraping, marring or otherwise damaging products, equipment or surrounding surfaces.

H. Handle products and equipment in a manner to prevent bending or over-stressing.

I. Lift packages, equipment or components only at designated lift points.

3.2. LOCATION OF STORAGE

A. Where authorized and acceptable to the Owner. General Contractor will resolve conflicts in storage requirements of all contractors.

3.3. PREPARATION FOR STORAGE

A. Fill and grade sites for temporary storage sheds to provide drainage.

3.4. INSTALLATION OF STORAGE SHEDS

A. Construct storage sheds on adequate foundations, with connections for required utilities.

1. Raise portable buildings, if used.
2. Provide steps, landings or ramps at entrances.

B. Mount fire extinguishers in prominent locations with clear access for use.

C. Mount identifying signs adjacent to entrance doors, in conspicuous locations.

3.5. LIMITATIONS

A. Do not exceed capacity of structure.

B. Do not inhibit use of:

1. Fire lanes.
2. Parking.
3. Work of other contractors.

C. Store combustible materials in accordance with applicable regulations.

3.6. PROTECTION

A. Protect all products and equipment from damage.

B. Methods:

1. Store moisture or water vulnerable materials off grade.
2. Store finished products and equipment in an enclosed building, on or off site.
3. Maintain integrity of shipping cartons until ready for installation.
4. Provide separate storage for combustible and noncombustible products.
5. Follow storage recommendations of product and equipment manufacturers.
6. Other methods shall be subject to Architect's acceptance.

3.7. MAINTENANCE AND CLEANING

A. Provide continuous maintenance for all temporary structures.

B. Repair or refinish damaged or weathered portions of structure as required to maintain in specified condition.

C. Repair or replace defective utility connections.

D. Clean storage shed or areas at least once a week.

3.8. REMOVAL

A. Remove all temporary storage sheds, contents and utilities, at completion of construction activities, or as indicated by the Architect.

B. Remove foundations and debris; grade to required elevations and clean area.

ATTACHMENTS TO THIS SECTION: PRODUCT SUBSTITUTION REQUEST FORM

END 01 6000

Product Substitution Request Form

PROJECT NAME: Mehlville School District - Bus Transportation Facility PROJECT No: 257EX18.400
SPECIFIED ITEM: Section # _____ Page # _____ Paragraph # _____

Description: _____

The Undersigned requests consideration of the following:

PROPOSED SUBSTITUTION: _____

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

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

The undersigned states that the following paragraphs, unless modified on attachments are correct:

1. The proposed substitution does not affect dimensions shown on drawings.
2. The proposed substitution will have no adverse affect on other trades, the construction schedule, or specified warranty requirements.
3. Maintenance and service parts will be locally available for the proposed substitution.

The undersigned further states that the function, appearance, and quality of the proposed substitution are equivalent or superior to the specified item and will assume all additional costs and expenses for Owner, Architect, and other contractors.

Submitted by: _____

Signature: _____

Printed Name: _____

E-Mail Address: _____

Company Name: _____

Company Address: _____

_____

Company Phone: _____

Company Fax: _____

Date: _____

1. GENERAL

1.1. WORK INCLUDES

A. Requirements and limitations for cutting and patching of work.

1. Execute cutting, filling, or patching of work, required to:

a. Make several parts fit properly.
b. Uncover work to provide for installation of ill-timed work.
c. Remove and replace defective work.
d. Remove and replace work not conforming to contract requirements.
e. Install specified work in existing construction.

2. In addition to contract requirements, upon written request of Architect:

a. Uncover work to provide for observation of covered work.
b. Remove samples of installed materials for testing.
c. Remove work to provide for alteration of existing work.

3. Do not endanger work by cutting or altering work or any part thereof.
4. Do not cut or alter work of another contractor without written consent of Architect.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 1000 - Project Summary
2. Section 01 3300 - Submittal Procedures
3. Section 07 8413 – Penetration Firestopping
4. Individual Product Specification Sections:

a. Cutting and patching incidental to work of the Sections.
b. Advance notification to other Sections of openings required in work of those Sections.
c. Limitations on cutting structural members.

1.3. SUBMITTALS

A. Submit written request in advance of cutting or alteration which affects:

1. Structural integrity of any element of Project.
2. Integrity of weather-exposed or moisture-resistant element.
3. Efficiency, maintenance, or safety of any operational element.
4. Visual qualities of sight exposed elements.

B. Include in request:

1. Identification of Project.
2. Location and description of affected work.
3. Necessity for cutting or alterations.
4. Description of proposed work, and Products to be used.

5. Alternatives to cutting and patching.
6. Date and time that work will be executed.

C. Prior to cutting and patching done on request of Architect, submit cost estimate.

D. Should conditions of work, or schedule, indicate change of materials or methods, submit recommendation to Architect, including:

1. Condition indicating change.
2. Recommendation for alternative materials or methods.
3. Submittals required for substitutions.

E. Submit written notice to Architect designating time when work will be uncovered, to provide for observation.

1.4. PAYMENT FOR COSTS

A. Costs caused by ill-timed or defective work, or work not conforming to contract documents, including costs for additional services of Architect: Party responsible for ill-timed, rejected, or non-conforming work.

B. Work done on request of Architect, in addition to the contract requirements, other than defective or non-conforming work: Owner.

C. Cutting and patching of all major holes in existing materials in remodeling work for the penetration of any contractor's work shall be installed by the General Contractor. Cost of cutting and patching of these holes, as well as costs for lintels, sleeves, or other associated construction, shall be borne by the trade requiring the holes.

D. Cost of cutting of minor holes in existing materials in remodeling work, and cost of cutting of new materials installed in remodeling work shall be the responsibility of the trade requiring the cutting. Patching shall be done by the trade normally involved with that type of work at the cost of the trade requiring the cutting.

E. Major holes shall be defined as any opening 8" x 8" or 8" in diameter, or larger, in surface area by depth as required. Minor holes shall be defined as any opening smaller than a major hole.

2. PRODUCTS

2.1. MATERIALS

A. Primary Products: Those required for original installation.

B. Product Substitution: For any proposed change in materials, submit request for substitution under provisions of the Contract Documents.

3. EXECUTION

3.1. EXAMINATION

A. Inspect existing conditions prior to commencing Work, including elements subject to damage or movement during cutting and patching.

B. After uncovering existing Work, inspect conditions affecting performance of work.

C. Beginning of cutting or patching means acceptance of existing conditions.

3.2. PREPARATION

A. Provide temporary supports to ensure structural integrity of the Work. Provide devices and methods to protect other portions of Project from damage.

B. Provide protection from elements for areas which may be exposed by uncovering work.

3.3. CUTTING AND PATCHING

A. Execute cutting, fitting, and patching including excavation and fill to complete work.

B. Fit products together, to integrate with other work.

C. Uncover work to install ill-timed work.

D. Remove and replace defective or non-conforming work.

E. Provide openings in the Work for penetration of mechanical and electrical work.

3.4. PERFORMANCE

A. Execute work by methods to avoid damage to other Work, and which will provide appropriate surfaces to receive patching and finishing.

B. Employ original installer to perform cutting and patching for weather exposed and moisture resistant elements, and sight-exposed surfaces.

C. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior acceptance.

D. Restore work with new products in accordance with requirements of Contract Documents.

E. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

F. At penetrations of fire-rated construction, completely seal voids with an appropriate through-penetration firestop system. Refer to Section 07 8413 – Penetration Firestopping.

G. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.

END 01 7329

1. GENERAL

1.1. WORK INCLUDES

A. Substantial Completion procedures.

B. Final Completion procedures.

C. Warranties.

D. Operation and Maintenance data.

E. Project Record Documents.

F. Final cleaning.

G. Repair and adjustment of the Work.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 3300 – Submittal Procedures
2. Section 01 5000 - Temporary Facilities and Controls: Progress Cleaning.

1.3. SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of 5 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request:

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
2. Submit closeout submittals, including project Record Documents, Operation and Maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Owner. Label with manufacturer's name and model number where applicable.

    a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Owner’s and Architect's signature on letters of transmittal to indicate receipt of submittals.

5. Submit test/adjust/balance records.
6. Submit attendance records for all demonstration and training sessions. Submit demonstration and training video recordings, transcripts, and instructional materials where required.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of 5 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Advise Owner of pending insurance changeover requirements.
2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
3. Complete startup and testing of systems and equipment.
4. Perform preventive maintenance on equipment used prior to Substantial Completion.
5. Demonstration and Training: Where required in other Sections, instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.
6. Advise Owner of changeover in heat and other utilities.
7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
9. Complete final cleaning requirements, including touchup painting.
10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 5 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.

1.4. FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following.

1. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.
2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

C. See 01 7700 - Appendix A (attached) for additional project closeout requirements.

1.5. SUBMITTAL OF PROJECT WARRANTIES

A. Warranties begin at the date of Substantial Completion, including items that were used during construction.

1. For items of Work delayed beyond date of Substantial Completion, provide updated submittal within ten days after acceptance, listing date of acceptance as start of warranty period.

B. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.

1. PDF Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
2. Paper Submittal: Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.

a. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
b. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor

C. Make additional copies of each warranty to include in Operation and Maintenance manuals.

1.6. OPERATIONS AND MAINTENANCE DATA

A. Format: Submit operations and maintenance manuals in the following format:

1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect.

a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.

1) File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of

contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

b. Enable inserted reviewer comments on draft submittals.
c. Refer to Section 01 3300 – Submittal Procedures for additional requirements for electronic submittals.

2. Paper Submittal: Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves.

a. Binders: Heavy-duty, three-ring, vinyl-covered binders, 4" maximum width, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents. Provide multiple volumes as needed.

1) If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
2) Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.

b. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
c. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
d. Drawings: If oversize drawings are necessary, fold drawings to same size as text pages and use as fold-outs. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes into binder.
e. Number of copies:

1) Initial Manual Submittal: Two copies; Architect will return one with review comments.
2) Final Manual Submittal: Three

B. Initial Manual Submittal: Submit draft copy of each manual at least 10 days before commencing demonstration and training. Architect will comment on whether general scope and content of manual are acceptable.

C. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 10 days before commencing demonstration and training. Architect will return copy with comments.

1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 10 days of receipt of Architect's comments and prior to commencing demonstration and training.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

1. Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
2. For each item, list each Contractor's and subcontractor's name, address, phone, email, individual contact, and emergency contact information.
3. Divide each Specification Section by piece of equipment and identify it using the equipment identification, such as "AHU-1".
4. Include copies of letters of transmittal for all spare parts, keys, operating tools, and maintenance materials.
5. Include copies of warranty documents.

E. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system.

1. Each manual shall contain the following materials, in the order listed:

a. Title page.
b. Table of contents.
c. Manual contents.

2. Title Page: Include the following information:

a. Subject matter included in manual.
b. Name and address of Project.
c. Name and address of Owner.
d. Date of submittal.
e. Name and contact information for Contractor.
f. Name and contact information for Architect.
g. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
h. Cross-reference to related systems in other operation and maintenance manuals.

3. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

a. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

1.7. PROJECT RECORD DOCUMENTS

A. General:

1. Delete Architect/Engineer title blocks and seals from all documents.
2. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

a. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location. All marks shall be photo-reproducible.

3. Maintenance of Record Documents: Store record documents in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.
4. Submittal: Submit Record Documents to Architect at Substantial Completion for review and comment. Resubmit completed Record Documents at or before Final Completion.

B. Record Drawings: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.

1. Preparation: Mark record drawings to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record drawings.

a. Give particular attention to information regarding concealed elements that would be difficult to identify or measure and record later.
b. Accurately record information in an acceptable drawing technique.
c. Record data as soon as possible after obtaining it.
d. Record and check the markup before enclosing concealed installations.
e. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record drawings.
f. Mark important additional information that was either shown schematically or omitted from original Drawings.
g. Note Construction Change Directive numbers, Alternate numbers, Change Order numbers, and similar identification, where applicable.

2. Content: Types of items requiring marking include, but are not limited to, the following:

a. Dimensional changes to Drawings.
b. Revisions to details shown on Drawings.
c. Depths of foundations below first floor datum.
d. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
e. Revisions to routing of piping and conduits.
f. Revisions to electrical circuitry.
g. Actual equipment locations.
h. Actual duct size and routing.
i. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
j. Changes made by Addenda, Change Orders, Architect’s Supplemental Instructions, and Construction Change Directives.
k. Alternates utilized.
l. Clarifications made via RFI.

3. Format: Paper submittal: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

a. Organize record drawings and newly prepared Record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.

C. Record Specifications:

1. Preparation: Mark specifications to indicate the actual product installation where installation varies from that indicated in specifications, addenda, and contract modifications.

a. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
b. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
c. Note related Change Orders and Record Drawings where applicable.

2. Format: Submit Record Specifications as an annotated PDF electronic file.

D. Miscellaneous Record Submittals:

1. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.
2. Format: Submit miscellaneous record submittals as a PDF electronic file.

a. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

2. PRODUCTS

Not Used

3. EXECUTION

3.1. FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:

a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.

c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
d. Remove tools, construction equipment, machinery, and surplus material from Project site.
e. Remove temporary barriers and protective coatings.
f. Remove snow and ice to provide safe access to building.
g. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, fingerprints, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
h. Remove debris and surface dust from limited access spaces, including plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
i. Remove debris from roofs, gutters, downspouts, and drainage systems.
j. Sweep concrete floors broom clean in unoccupied spaces.
k. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
l. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
m. Remove labels that are not permanent.
n. Wipe surfaces of mechanical and electrical equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
o. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
p. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grilles.
q. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.
r. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
s. Clean resilient floors thoroughly with a well rinsed mop containing only enough moisture to clean off any surface dirt or dust and buff dry by machine to bring the surfaces to sheen.
t. Leave Project clean and ready for occupancy.

3.2. REPAIR AND ADJUSTMENT OF THE WORK

A. Complete repair and adjustment operations before requesting inspection for determination of Substantial Completion.

B. Adjust operating products and equipment to ensure smooth and unhindered operation.

C. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.

a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.

3. Replace parts subjected to operating conditions during construction that may impede operation or reduce longevity.
4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

ATTACHMENTS TO THIS SECTION: APPENDIX A

END 01 7700

SECTION 01 7700 - APPENDIX A

PROJECT CLOSEOUT CHECKLIST

I. ARCHITECT PREPARE FOR EXECUTION:

A. Final Punch List
B. Certificate of Substantial Completion

II. CONTRACTOR PREPARE FOR EXECUTION AND SUBMITTAL:

A. Final Application for Payment
B. Contractor's Affidavit of Payment of Debts and Claims (AIA G706)
C. Contractor's Affidavit of Release of Liens (AIA G706A)

1. Final Waivers of Lien from:

a. Subcontractors
b. Suppliers

2. Contractor's Final Waiver of Lien in the full amount of the contract.

D. Contractor's Certification of Completion in compliance with the Contract Documents (including all Punch List items).

III. CONTRACTOR PREPARE AND SUBMIT:

A. Written guarantees as required by the Contract Documents (co-executed by subcontractor/supplier as required).
B. Required Certifications of Equipment Start-up and Test & Balance results, including attendance records of all required demonstration and training sessions.
C. Project Record Documents.
D. Operating and Maintenance Manuals.

IV. CONTRACTOR OBTAIN FROM OTHERS AND SUBMIT:

A. Certificate of Occupancy
B. Consent of Surety to Final Payment

V. CONTRACTOR VERIFY THAT OWNER HAS RECEIVED (provide Architect with letters of transmittal signed by Owner’s project representative):

A. Spare Parts as required by the Contract Documents
B. Extra Stock as required by the Contract Documents
C. Equipment Operating Tools and Keys as required by the Contract Documents

1. GENERAL

1.1. WORK INCLUDES

A. Base Bid:

1. General Contractor provide:

a. Demolition and removal of buildings and site improvements.
b. Disconnecting, capping or sealing, and site utilities.
c. Underground piping.
d. Moving existing items for reuse by Owner.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 3300 - Submittal Procedures
2. Section 01 5000 - Temporary Facilities and Controls: Barricades, fences, and landscape protection and dust control.
3. Section 01 7700 - Closeout Procedures: Project record documents.
4. Section 02 4119 - Selective Structure Demolition
5. Section 31 1000 - Site Clearing.
6. Section 31 2000 - Earthwork: Backfill materials

1.3. DEFINITIONS

A. Remove: Remove and legally dispose of items except those indicated to be reinstalled, salvaged, or to remain the Owner's property.

B. Remove and Reinstall: Remove items indicated; clean, service, and otherwise prepare them for reuse; store and protect against damage. Reinstall items in locations indicated.

1.4. MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes the property of Contractor

1.5. SUBMITTALS

A. Submit in accordance with Section 01 3300:

1. Proposed Protection Measures: Submit informational 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.
2. Schedule of Building Demolition Activities: Indicate the following:

a. Detailed sequence of demolition work, with starting and ending dates for each activity.
b. Temporary interruption of utility services.
c. Shutoff and capping or re-routing of utility services.

3. Inventory: Reference drawings for existing equipment to be relocated from existing bus garage to new bus facility.
4. Predemolition Photographs: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by demolition operations.

B. Submit in accordance with Section 01 7700:

1. Record drawings at Project closeout.

a. Identify and accurately locate capped utilities and other subsurface structural, electrical, or mechanical conditions.

1.6. QUALITY ASSURANCE

A. Regulatory Requirements: Provide licensed or specialized workers where required by Federal, State, or local regulations for demolition or modification of indicated systems or elements.

B. EPA Regulatory Requirements: Comply with governing EPA notification regulations before beginning demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

C. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

D. Demolition Firm Qualification: Engage an experienced firm that has successfully completed demolition Work similar to that indicated for this Project.

1.7. PROJECT CONDITIONS

A. Buildings to be demolished will be vacated after completion of, and moving into, new bus facility.

B. Buildings immediately adjacent to demolition area will be occupied. Conduct building demolition so operations of occupied buildings will not be disrupted.

1. Provide not less than 72 hours' notice of activities that will affect operations of adjacent occupied buildings.
2. Maintain access to existing walkways, exits, and other facilities used by occupants of adjacent buildings.

a. Do not close or obstruct walkways, exits, or other facilities used by occupants of adjacent buildings without written permission from authorities having jurisdiction.

C. Owner assumes no responsibility for buildings and structures to be demolished.

1. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

D. Hazardous Materials:

1. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Owner. Hazardous materials will be removed by Owner and under and separate contract.

E. On-site storage or sale of removed items or materials is not permitted.

F. Provide, erect, and maintain temporary barriers and security devices.

G. Conduct operations with minimum interference to public or private thoroughfares. Maintain protected egress and access at all times.

H. Do not close or obstruct roadways sidewalks without permits.

1.8. COORDINATION

A. Arrange demolition schedule so as not to interfere with operations of adjacent occupied buildings.

1.9. PREINSTALLATION CONFERENCE

A. Predemolition Conference: Conduct conference at Project site to comply with pre-installation conference requirements of Section 01 3119 - Project Meetings.

1. Inspect and discuss condition of construction to be demolished.
2. Review structural load limitations of existing structures.
3. Review and finalize building demolition schedule and verify availability of demolition personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review and finalize protection requirements.
5. Review procedures for noise control and dust control.
6. Review procedures for protection of adjacent buildings.
7. Review items to be salvaged and returned to Owner.

2. PRODUCTS

2.1. SOIL MATERIALS

A. Satisfactory Soils: Comply with requirements in Section 31 2000 - Earthwork.

1. Obtain approved borrow soil materials off-site when sufficient satisfactory soil materials are not available on-site.

3. EXECUTION

3.1. EXAMINATION

A. Verify that utilities have been disconnected and capped before starting demolition operations.

B. Inventory and record the condition of items to be removed and salvaged. Provide photographs of conditions that might be misconstrued as damage caused by salvage operations.

C. Perform an engineering survey of the condition of the building to determine whether removing any element might result in a structural deficiency or unplanned collapse of any portion of the structure or adjacent structures during building demolition operations.

3.2. PREPARATION

A. Refrigerant: Remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction before starting demolition.

B. Existing Utilities: Locate, identify, disconnect, and seal or cap off indicated utilities serving buildings and structures to be demolished.

1. Arrange to shut off indicated utilities with the utility companies.
2. If removal, relocation, or abandonment of utility services will affect adjacent occupied buildings, then provide temporary utilities that bypass buildings and structures to be demolished and that maintain continuity of service to other buildings and structures.

C. Existing Utilities: See plumbing and electrical Sections for shutting off, disconnecting, removing, and sealing or capping utilities. Do not start demolition work until utility disconnecting and sealing have been completed and verified in writing.

D. Temporary Shoring: Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent unexpected movement or collapse of construction being demolished.

1. Strengthen or add new supports when required during progress of demolition.

E. Relocated existing equipment: Comply with the following:

1. Remove and relocate before demolition.
2. Clearly identify all pieces of equipment prior to moving.
3. Transport items to new bus facility as indicated on Drawings.
4. Protect items from damage during transport and installation.

3.3. PROTECTION

A. Existing Facilities: Protect adjacent walkways, parking lots, retaining walls, and other building facilities during demolition operations. Maintain exits from existing buildings and parking areas.

B. Existing Utilities: Maintain utility services to remain and protect from damage during demolition operations.

1. Do not interrupt existing utilities serving adjacent occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction.
2. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and authorities having jurisdiction.

a. Provide at least 72 hours' notice to occupants of affected buildings if shutdown of service is required during changeover.

C. Temporary Protection: Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction and as indicated. Comply with requirements in Section 01 5000 - Temporary Facilities and Controls.

1. Protect adjacent buildings and facilities from damage due to demolition activities.
2. Protect existing site improvements, appurtenances, and landscaping to remain.
3. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.

4. Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
5. Provide protection to ensure safe passage of people around building demolition area and to and from occupied portions of adjacent buildings and structures.
6. Protect walls, windows, roofs, and other adjacent exterior construction that are to remain and that are exposed to building demolition operations.
7. Erect and maintain dustproof partitions and temporary enclosures to limit dust, noise, and dirt migration to occupied portions of adjacent buildings.

D. Remove temporary barriers and protections where hazards no longer exist. Where open excavations or other hazardous conditions remain, leave temporary barriers and protections in place.

3.4. DEMOLITION, GENERAL

A. General: Demolish indicated buildings and site improvements completely. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Do not use cutting torches until work area is cleared of flammable materials. Maintain portable fire-suppression devices during flame-cutting operations.
2. Maintain fire watch after flame cutting operations.
3. Maintain adequate ventilation when using cutting torches.
4. Locate building demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.

B. Site Access and Temporary Controls: Conduct building demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
2. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations. Do not use water when it may damage adjacent construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.

C. Explosives: Use of explosives is not permitted.

3.5. DEMOLITION BY MECHANICAL MEANS

A. Proceed with demolition of structural framing members systematically, from higher to lower level. Complete building demolition operations above each floor or tier before disturbing supporting members on the next lower level.

B. Remove debris from elevated portions of the building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

1. Remove structural framing members and lower to ground by method suitable to minimize ground impact and dust generation.

C. Items to be removed and relocated are indicated on Drawings.

D. Below-Grade Construction: Demolish foundation walls and other below-grade construction.

1. Remove below-grade construction, including basements, foundation walls, and footings, completely.

E. Existing Utilities: Demolish or rework existing utilities and below-grade utility structures as required for new project scope. Demolish and remove what is not required for new buildings and site.

1. Piping: Disconnect piping at unions, flanges, valves, or fittings.
2. Wiring Ducts: Disassemble into unit lengths and remove plug-in and disconnecting devices.

3.6. SITE RESTORATION

A. Below-Grade Areas: Completely fill below-grade areas and voids resulting from building demolition operations with satisfactory soil material according to backfill requirements in Section 31 2000 "Earthwork."

B. Site Grading: Uniformly rough grade area of demolished construction to a smooth surface, free from irregular surface changes. Provide a smooth transition between adjacent existing grades and new grades.

3.7. REPAIRS

A. Promptly repair damage to adjacent structures and sitework caused by demolition operations.

3.8. DISPOSAL OF DEMOLISHED MATERIALS

Remove demolition waste materials from Project site and legally dispose of them in an EPA-approved landfill acceptable to authorities having jurisdiction.

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.

B. Do not burn demolished materials.

3.9. CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by building demolition operations. Return adjacent areas to condition existing before building demolition operations began.

1. Clean roadways of debris caused by debris transport.

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1. GENERAL

1.1. WORK INCLUDES

A. Contractor provide:

1. Cast-In-Place concrete work associated with building foundation and floor slab systems, including:

   a. Foundation walls and retaining walls.
   b. Footings.
   c. Floor slabs on grade.

2. Concrete work associated with general building construction and site preparation, including:

   a. Concrete walks, drives, curbs.
   b. Concrete floor slabs on metal deck.
   c. Concrete fill for metal pan stairs.
   d. Base slabs and miscellaneous foundations for site appurtenances.

3. Formwork, shoring, bracing, and anchorage.
4. Concrete reinforcement and accessories.
5. Concrete materials and mix designs.
6. Concrete placement and finishing procedures.
7. Fiber reinforcement for cast-in-place concrete.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 3300 - Submittal Procedures
2. Section 01 4000 – Quality Requirements: Testing responsibility.
3. Section 05 1200 - Structural Steel.
4. Section 05 3100 - Steel Deck.
5. Section 05 5000 - Metal Fabrications
6. Section 07 2100 - Building Insulation.
7. Section 07 9200 - Joint Sealants.
8. Section 31 2000 - Earthwork

1.3. DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans; subject to compliance with requirements.

B. Water/ Cement Ration (w/cm): The ratio by weight of water to cementitious materials.

1.4. REFERENCES

A. Publication Dates: Comply with standards in effect as of the date of the Contract Documents unless otherwise indicated.

B. ACI Standards:

1. ACI 301 - Specifications of Structural Concrete for Buildings.
2. ACI 304 - Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete.
3. ACI 305 - Hot Weather Concreting.
4. ACI 306 - Cold Weather Concreting.
5. ACI SP-66 - ACI Detailing Manual.
6. ACI 318 - Building Code Requirements for Reinforced Concrete.
7. ACI 347 - Guide to Formwork for Concrete.
8. ACI 360 - Slabs on Ground.
9. ACI 315 - Details and Detailing of Concrete Reinforcement.
10. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials.
11. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.
12. ACI 302.1 - Guide for Concrete Floor and Slab Construction.

C. American Society for Testing and Materials (ASTM):

1. ASTM A82 - Steel Wire, Plain, Welded, for Concrete Reinforcement.
2. ASTM A185 - Steel Welded Wire, Fabric, Plain, for Concrete Reinforcement.
3. ASTM A497 - Steel Wire Fabric, Deformed, for Concrete Reinforcement.
4. ASTM A615 - Deformed and Plain Billet-Steel for Concrete Reinforcement.
5. ASTM A706 - Low Alloy Steel Deformed Bars for Concrete Reinforcement.
6. ASTM C31 - Making and Curing Concrete Test Specimens in the Field.
7. ASTM C33 - Concrete Aggregates.
8. ASTM C39 - Test Method for Compressive Strength of Cylindrical Concrete Specimens.
9. ASTM C94 - Ready-Mixed Concrete.
10. ASTM C143 - Test Method for Slump of Portland Cement Concrete.
11. ASTM C150 - Portland Cement.
12. ASTM C171 - Sheet Materials for Curing Concrete.
13. ASTM C231 - Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
14. ASTM C260 – Standard Specification Air Entraining Admixtures for Concrete
15. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete.
16. ASTM C494 - Chemical Admixtures for Concrete.
17. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
18. ASTM C1116 – Standard Specification for Fiber Reinforced Concrete
19. ASTM C1315 - Liquid Membrane - Forming Compounds Having Special Properties for Curing and Sealing.
20. ASTM D1752 - Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
21. ASTM E154 - Testing Materials for Use as Vapor Barriers Under Concrete Slabs and as Ground Cover in Crawl Spaces.
22. ASTM E329 - Recommended Practice for Inspection and Testing Agencies for Concrete, Steel and Bituminous Materials as used in Construction.
23. ASTM E1155 - Standard Test Method for Determining F_f Floor Flatness and F_L Floor Levelness Numbers.

1.5. ACTION SUBMITTALS

A. Submit in accordance with Section 01 3300:

1. Manufacturer's Data: Submit manufacturer's specifications with application and installation instructions for proprietary materials and items, including reinforcement and forming accessories, admixtures, fiber reinforcement, patching compounds, water stops, joint systems, chemical floor hardeners, bonding compounds, curing compounds, non-shrink grouts, release agents and others as requested by the Architect.

2. Steel Reinforcement Shop Drawings:

a. Submit shop drawings for fabrication, bending, and placement of concrete reinforcement.
b. Comply with ACI SP-66 and indicate bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangements, splices and laps, mechanical connections, tie spacing, hoop spacing and supports for concrete reinforcement.

3. Concrete Mix Design and Materials: Submit laboratory test reports for concrete materials and mix design tests in accordance with ACI 301.

a. Mixture identification.
b. Minimum 28-day compressive strength.
c. Maximum w/cm.
d. Slump limit
e. Air content.
f. Nominal maximum aggregate size.
g. Fiber reinforcement content.
h. Indicate amount of mixing water to be withheld for later addition at project site if permitted.
i. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results or other circumstances warrant adjustments.

4. Construction Joint Layout: Indicate proposed construction joints required to constructing the structure.

a. Location of construction joints is subject to approval of the Architect.

1.6. INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer, Manufacturer and Testing Agency.

B. Welding Certificates.

C. Material Certificates: For each of the following, from the manufacturer:

1. Aggregates.
2. Admixtures
3. Fiber reinforcement
4. Curing Compounds
5. Floor and slab treatments
6. Vapor retarders

D. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.

E. Field quality control reports.

1.7. QUALITY ASSURANCE

A. Correct concrete work which does not conform to the specified requirements, including strength, tolerance and finishes. Correct deficient concrete as directed by the Architect.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94 requirements for production facilities and equipment.

C. Testing Agency Qualifications: An independent agency, qualified according to ASTM C1077 and ASTM E329, with not less than three years documented experience in performing the tests and inspections specified herein and acceptable to the Architect.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade 1. Testing agency laboratory supervisor shall be ACI-certified Concrete Laboratory Testing Technician, Grade II.

D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from a single source and obtain admixtures from a single source from a single manufacturer.

E. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4, "Structural Welding Code – Reinforcing Steel."

F. ACI Publications: Comply with the following unless modified by requirements in the contract documents.

1. ACI 301, "Specifications for Structural Concrete."
2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

G. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

1. Design Mixes: A copy of all concrete mix proportions shall be on file at the concrete batch plant.

H. VOC Content: Products, including curing and sealing compounds, shall comply with VOC limits of authorities having jurisdiction.

1.8. DELIVERY, STORAGE AND HANDLING

A. Steel Reinforcement: Deliver, store and handle steel reinforcement to prevent bending and damage.

B. Water Stops: Store water stops under cover to protect from moisture, sunlight, dirt, oil and other contaminants.

2. PRODUCTS

2.1. CONCRETE, GENERAL

A. ACI Publications: Comply with ACI 301, unless modified by requirements in the contract documents.

2.2. FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. Plywood, metal or other approved panel materials.
2. Exterior grade plywood panels, suitable for concrete forms, complying with DOC PS 1 and as follows:

    a. High-density overlay, Class 1 or better.
    b. Medium density overlay, class 1 or better; mill-release agent treated and edge sealed.
    c. Structural 1, B-B or better; mill oiled and edge sealed.
    d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.

B. Chamfer Strips: Wood, metal, PVC, or rubber strips, ¾ by ¾ inch, minimum.

C. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

D. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
2. Furnish ties that, when removed. Will leave holes no larger than 1 inch in diameter in concrete surface.

2.3. STEEL REINFORCEMENT

A. Recycled content of Steel Products: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than 25 percent.
B. Reinforcing Bars: ASTM A615, Grade 60, deformed.
C. Low-Alloy Steel Reinforcing Bars: ASTM A706, deformed.
D. Welded Steel Wire Fabric: ANSI/ASTM A185, plain type, in flat sheets, uncoated finish.
E. Steel Bar Mats: ASTM A184, fabricated from ASTM A615, Grade 60, deformed bars and wire tied or assembled with clips.
F. Plain Steel Wire: ASTM A82, as drawn.
G. Deformed Steel Wire: ASTM A496.
H. Fabricate steel reinforcing according to CRSI's "Manual of Standard Practice".

2.4. REINFORCEMENT ACCESSORIES

A. Bar Supports: Bolsters, chairs, spacers and other devices for spacing, supporting and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel, wire or plastic and complying with PS 7. Wood and brick devices will not be acceptable.

1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic protected steel wire or CRSI Class 2 stainless steel bar supports.

B. Joint Bar Dowels: ASTM A615, Grade 60, plain steel bars, cut true to length with square ends and free from burrs.

2.5. FIBER REINFORCEMENT

A. Blended Fiber: Macro Synthetic and Micro Synthetic blend, designed and engineered for use in concrete, complying with ASTM C1116, Type III.

1. Use in strct conformance with the manufacturer's recommendations, including batching and mixing requirements and the addition of water reducing admixtures to the concrete mix.
2. Products: Subject to compliance with requirements, provide products by one of the following:

a. Euclid Chemical Co.
b. BASF Corporation
c. Sika Corporation
d. Fabpro Polymers

B. The use of fiber reinforcing may cause an apparent loss in measured slump of concrete. This may be offset with the use of a water reducing admixture when necessary. Do not add additional mix water to increase concrete slump.

2.6. CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand and source, throughout the project:

1. Portland Cement: ASTM C595, Type IL , gray.
2. Fly Ash: ASTM C618 Class F or C.

B. Water and water used to make ice: ASTM C94, potable, clean and not detrimental to concrete.

C. Normal weight concrete aggregates: ASTM C33, coarse aggregate or better graded.

1. Provide aggregates from a single source for all exposed concrete.
2. Fine Aggregate: Clean, sharp, natural sand free from loam, clay, lumps, or other deleterious substances.
3. Coarse Aggregate: Clean, uncoated, processed aggregate containing no clay, mud, loam, frozen particles, cemented particles, or foreign matter as follows:

a. Crushed stone, processed from natural rock or stone.
b. Washed gravel, either natural or crushed. Use of pit or bankrun gravel is not permitted.

c. Maximum Aggregate Size: Not larger than 1/5 of the narrowest dimension between sides of forms, 1/3 of the depth of slabs, or ¾ of the minimum clear spacing between individual reinforcing bars or bundles of bars.

1) Footings: 1-1/2"
2) Slabs on Grade: 1"
3) Floor fill of metal deck: 1/2”

2.7. ADMIXTURES

A. Air Entrainment Admixture: ASTM C260.

B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete.

1. Water-Reducing Admixture: ASTM C494, Type A.
2. Retarding Admixture: ASTM C494, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C494, Type D.
4. High-Range, Water Reducing Admixture: ASTM C494, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C494, Type G.
6. Plasticizing and Retarding Admixture: ASTM C1017, Type II.

C. Calcium Chloride: Do not use calcium chloride or admixtures containing calcium chloride in concrete.

D. Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C494, Type C.

1. Products: Subject to compliance with requirements, provide one of the following:

a. W.R. Grace & Co. / GCP Applied Technologies
b. The Euclid Chemical Co.
c. SpecChem
d. Sika Corporation

E. Non-Set Accelerating Corrosion Inhibiting Admixture: Commercially formulated, non-set accelerating, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcing in concrete.

1. Products: Subject to compliance with requirements, provide one of the following:

a. W.R. Grace & Co. / GCP Applied Technologies
b. SpecChem
c. The Euclid Chemical Co.
d. Sika Corporation

2.8. VAPOR RETARDER

A. Sheet Vapor Retarder: ASTM E1745, Class A, not less than 15 mils thick, non-woven. Include manufacturer's recommended adhesive or pressure-sensitive tape.

1. Permeance of less than 0.030 Perms [grains/ ft²·hr·in Hg)] as tested in accordance with requirements of ASTM E96.
2. Product/Manufacturer:

a. Viper Vaporcheck II 15-Mil/ Insulation Solutions Inc.
b. VaporBlock VB15 / Viaflex Industries
c. Griffolyn Type-105 / Reef Industries
d. Stego Wrap Vapor Barrier (15 mil) / Stego Industries
e. Perminator 15 mil / W. R. Meadows

2.9. ACCESSORIES AND RELATED MATERIALS

A. Bonding Agent: ASTM C1059, Type II, Non-redispersible, acrylic emulsion or styrene butadiene.

B. Epoxy Bonding Adhesive: ASTM C881, two component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements and as follows:

1. Types I and II, non-load bearing; Types IV and V for load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

C. Non-Shrink Grout: Premixed compound with non-metallic aggregate, cement, water reducing and plasticizing agents; capable of minimum compressive strength of 7000 psi. at 28 days.

D. Expansion Joints: ASTM D1751, asphalt-saturated cellulosic fiber.

E. Foam Expansion/ Isolation Joint Filler: Flexible, lightweight, non-staining, polyethylene, closed cell expansion/ isolation joint filler which is a chemical-resistant, ultraviolet stable, non-absorbent, low-density compressible foam.

1. Acceptable Product/Manufacturer:

a. X-Foam / W. R. Meadows, Inc.
b. Nomaflex/ Nomaco.
c. Sika JointTex/ Sika Corporation.

F. Bond Breaker: Use 30 lb. felt to isolate interior floor slabs from all vertical surfaces where indicated.

G. Construction Joints and Load Plate Dowel Systems:

1. Provide construction joints manufactured from wood or other acceptable material and load plate dowel joint reinforcing system, including the sleeve pocket former, at all construction joints in the slab on grade.

a. Plate dowel system to be comprised of high density plastic sleeve pocket former and insert to properly position load plate dowel.
b. Steel load plate dowel fabricated from 1/4" hot rolled steel plate meeting ASTM A36 and of appropriate size and shape to match sleeve pocket.

c. Space load plate dowels at 18” o.c.

2. Acceptable Product/ Manufacturers:

a. Speed Plate/ Sika Corporation
b. Diamond Dowel System/ PNA Construction Technologies.
c. T28 Tapered Superior Plate Dowel/ Dayton Superior
d. Taper Dowel Plate Dowel/ SureBuilt

2.10. WATER STOPS

A. Flexible Rubber Water Stops: CE CRD-C 513, for embedding in concrete to prevent the passage of fluids through the joints. Factory fabricate the corners, intersections and directional changes.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Sika Greenstreak.
b. Williams Products, Inc.

2. Profile: Flat, dumbbell with center bulb.
3. Dimensions: 6 inches by 3/8 inch thick.

B. Flexible PVC Water Stops: CE CRD-C 572, for embedding in concrete to prevent the passage of fluids through the joints. Factory fabricate the corners, intersections and directional changes.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. BoMetals, Inc.
b. Sika Greenstreak.
c. Paul Murphy Plastics Company.
d. Vinylex Corp.

2. Profile: Flat, dumbbell with center bulb.
3. Dimensions: 6 inches by 3/16 inch thick.

C. Self-expanding Butyl Strip Water Stops: Manufactured rectangular or trapezoidal strip, butyl rubber with sodium bentonite or other hydrophilic polymers, for adhesive bonding to concrete, ¾ inch by 1 inch.

1. Products: Subject to compliance with requirements, provide one of the following:

a. MiraSTOP/ Carlise Coatings and Waterproofing, Inc.
b. Volclay Waterstop-RX/ CETCO.
c. Conseal CS-231/ Concrete Sealants Inc.
d. Swellstop/ Sika Greenstreak.

2.11. CURING MATERIALS

A. Water: Clean, potable and not detrimental to concrete.

B. Moisture-Retaining Cover: Subject to compliance with requirements, provide one of the following:

1. Waterproof Paper: ASTM C171, Type 1 or Type 2.
2. Polyethylene Sheeting: AASHO M171; ASTM D2103.
3. Absorptive Cover: AASHTO M182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq.yd. when dry.

C. Evaporation Retarder:

1. Waterborne, monomolecular film forming, manufactured for application to fresh concrete awaiting finishing in hot, dry and/ or windy conditions.
2. Products: Subject to compliance with requirements, provide one of the following:

    a. Eucobar/ Euclid Chemical Company
    b. Sure Film (J-74)/ Dayton Superior Corporation
    c. Evapre/ W.R. Meadows
    d. E-Con/ L&M Construction Chemicals
    e. SpecFilm/ SpecChem, LLC

3. Provide when placing concrete slabs when the atmospheric temperature is 80° F. and above, or during other climatic conditions, such as days with high winds or low relative humidity, which will cause too rapid drying of the concrete surface.

D. Curing Compounds:

1. Clear, waterborne, membrane forming, dissipating curing compound; ASTM C309, Type 1, Class B.
2. Products: Subject to compliance with requirements, provide one of the following:

    a. Kurex DR Vox / Euclid Chemical Company
    b. Day-Chem Rez Cure (J-11-W) / Dayton Superior Corporation
    c. 1100-Clear / W.R. Meadows
    d. L&M Cure R/ L&M Construction Chemicals
    e. Spec Rez Clear / SpecChem, LLC.
    f. MasterKure HD 200 WB / Master Builders.

3. Provide curing compound to all interior concrete surfaces which will later receive a floor covering directly adhered to the concrete surface.

    a. Floors to receive additional coatings, sealing and coverings must be cleaned thoroughly prior to installation of the surfacing material to ensure complete removal of curing compound.

E. Concrete Curing and Sealing Compounds (Water Based-High Solids):

1. Clear, waterborne, membrane-forming curing and sealing compound: ASTM C1315, Type 1, Class A, 18 to 30 percent solids, non-dissipating.
2. Products: Subject to compliance with requirements, provide one of the following:

    a. Super Diamond Clear VOX / Euclid Chemical Company
    b. Cure & Seal 30% (J23WB) / Dayton Superior Corporation
    c. Vocomp-30 / W.R. Meadows

d. Dress & Seal WB 30 / L&M Construction Chemicals
e. Cure and Seal WB 25 / SpecChem, LLC

3. Provide curing and sealing compound at floor areas indicated on Drawings.

a. Do not apply curing and sealing compound to concrete floors that will receive a floor covering directly adhered to the concrete surface.

F. Water-Repellant Penetrating Sealers (100% Silane):

1. Breathable, colorless, non-yellowing, deep penetrating, 100% silane sealer designed to seal and protect concrete from water intrusion, chloride ions and acid chemicals.

2. Acceptable Products/ Manufacturers:

a. Baracade Silane 100 C/ Euclid Chemical Company
b. Weather Worker S-100 (J-29-A)/ Dayton Superior Corporation
c. MasterProtect H 1000/ Master Builders Solutions
d. SpecSilane 100/ SpecChem, LLC

3. Provide water-repellant penetrating sealer to all concrete floors which will be exposed to salts, moisture, weathering and/ or freeze damage and as indicated on Drawings

2.12. LIQUID FLOOR TREATMENTS

A. Penetrating Liquid Floor Hardener: Clear, chemically reactive, solution materials and proprietary components; odorless; that penetrates, hardens and densifies concrete surfaces.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Diamond Hard/ Euclid Chemical Company
b. Sure Hard J17/ Dayton Superior Corporation
c. MasterKure HD 210 WB/ BASF Master Builders
d. Liqui-Hard/ W.R. Meadows
e. SpecHard/ SpecChem, LLC
f. Sikafloor CureHard 24/ Sika

B. Concrete Finish Protectant/ Enhancer: Chemical floor protectant designed to add protection to concrete floors from staining and to enhance the appearance of the concrete surface.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Bellatrix/ W.R. Meadows
b. UltraGuard/ Euclid Chemical Company
c. All Shield/ SpecChem
d. Pentra-Hard Guard/ Dayton Superior Corporation

2.13. CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Cementitious Materials: Use fly ash as needed to reduce the total amount of portland cement, which would otherwise be used. Limit percentage, by weight, of cementitious materials other than Portland cement in concrete as follows:

1. Fly Ash: 20 percent.

C. Limit water-soluble, chloride-ion content in hardened concrete to the following percentage by weight of cement:

1. 0.30 for concrete that will not protected from moisture.
2. 1.00 for concrete that will be protected from moisture.

D. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing, high range water reducing or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete for industrial slabs, concrete required to be watertight and in concrete with a water-cementitious materials ratio below 0.50.
4. Use corrosion-inhibiting admixture in concrete mixtures where indicated on the drawings.

2.14. CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Footings and Foundation Walls: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Maximum Water-Cementitious Material Ratio: 0.55
3. Maximum slump at point of placement: 4 inches, plus or minus 1 inch.
4. Maximum slump for concrete containing high-range water-reducing or plasticizing admixture: 8 inches for concrete with verified slump of 2 to 4 inches before addition of admixtures, plus or minus 1 inch.
5. Air Content: 3.0 percent, plus or minus 1.5 percent at point of delivery.

B. Exterior Slab-on-Grade: Proportion normal-weight concrete mix as follows:

1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Maximum Water-Cementitious Material Ratio: 0.45
3. Maximum slump at point of placement: 4 inches, plus or minus 1 inch.
4. Air Content: 5.5 percent, plus or minus 1.5 percent at point of delivery.

C. Interior Slab-on-Grade: Proportion normal-weight concrete mix as follows:

1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Maximum Water-Cementitious Material Ratio: 0.50
3. Maximum slump at point of placement: 4 inches, plus or minus 1 inch.
4. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.
5. Synthetic Blended Fiber reinforcing: Uniformly disperse in concrete mixture at manufacture's recommended rate, but not less than 4 lb/ cu. yd of macro synthetic fiber and 1 lb/ cu. yd of micro synthetic fiber.

D. Slabs on Metal Deck: Proportion normal-weight concrete mix as follows:

1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Maximum Water-Cementitious Material Ratio: 0.50
3. Maximum slump at point of placement: 4 inches, plus or minus 1 inch.
4. Maximum slump for concrete containing high-range water-reducing or plasticizing admixture: 8 inches for concrete with verified slump of 2 to 4 inches before addition of admixtures, plus or minus 1 inch.
5. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.

E. Adjustment to Concrete Mixes: Mix design adjustments may be requested by the Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, subject to prior written approval by the Architect. Laboratory test data for revised mix designs and strength results shall be submitted to and reviewed by the Architect before incorporating within the work.

2.15. CONCRETE MIXING

A. Ready-Mix Concrete: Measure, batch, mix and deliver concrete according to ASTM C94 and furnish batch ticket information. Delete the references for allowing the addition of water to the batch for material with insufficient slump. Addition of water to the batch after the truck leaves the batch plant will only be permitted with authorization by the Architect.

B. During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C94 may be allowed.

1. When the air temperature is between 85 degrees F. and 90 degrees F., reduce the mixing and delivery time from 90 minutes to 75 minutes; when the air temperature is above 90 degrees F., reduce the mixing and delivery time to 60 minutes.

3. EXECUTION

3.1. FORMWORK

A. Design, erect, shore, brace and maintain formwork, according to ACI 301, to support vertical, lateral, static, dynamic and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:

1. Class A, 1/8 inch for smooth-formed finished surfaces.
2. Class B, 1/4 inch for rough-formed finished surfaces.

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

1. Install keyways, reglets, recesses and the like for easy removal.
2. Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Provide temporary opening for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary opening in forms at inconspicuous locations.

H. Chamfer exterior corners of permanently exposed concrete.

I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt and other debris just before placing concrete.

K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2. EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions and directions furnished with items to be embedded.

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

3.3. REMOVING AND REUSING FORMS

A. General: Formwork for sides of beams, walls, columns and similar parts of the Work that does not support the weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 48 hours after placing concrete. Concrete has to be hard enough to not be damaged by form removal operations and curing and protection operations need to be maintained.

B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminate or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance and tighten to close joints. Align and secure joints to avoid offsets. Do not used patched forms for exposed concrete surfaces unless approved by Architect.

3.4. VAPOR RETARDER

A. Sheet Vapor Retarder: Place, protect and repair sheet vapor retarder according to ASTM E1643 and manufacturer's written instructions.

1. Unroll vapor retarder with the longest dimension parallel with the direction of the pour.
2. Overlap joints 6" and seal with manufacturer's recommended tape.
3. Turn vapor retarder 4" up foundation wall and seal with manufacturer's recommended tape.
4. No penetration of the vapor retarder is allowed except for reinforcing steel and permanent utilities.
5. Construct pipe boots from vapor retarder material and pressure-sensitive tape or vapor retarder manufacturer's vapor proofing mastic with a perm rating to match or be less than the rating for the vapor retarder.
6. Repair damaged areas by cutting patches of vapor retarder, overlapping damaged area 6" and sealing entire perimeter with tape.

3.5. STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal prior to placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice and other foreign materials that would reduce bond to concrete.

C. Accurately position, support and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

1. Weld reinforcing bars according to AWS D1.4, where indicated.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.6. SYNTHETIC FIBER REINFORCEMENT

A. Synthetic macrofiber or blended fiber reinforcing may be used as a replacement for welded wire fabric in concrete slabs on grade. Minimum dosage of macrofiber or macrofiber portion of blended fiber reinforcing shall be 4.0 lbs per cubic yard of concrete. Provide dosage as recommended by manufacture, but not less than the dosage indicated in specifications or drawings.

3.7. JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints in Slabs-on-Grade: Locate and install construction joints, which are not shown on the Drawings, so strength and appearance of concrete are not impaired.

1. Install plate dowel system according to the manufacturer's written installation instructions at the spacing and depth indicated at all construction joints.
2. Insert load plate dowel into sleeve pocket prior to placing and finishing adjacent slab.
3. Protect the load plate dowel system from damage and displacement until concrete placement is complete.

C. Construction Joints, General: Install so strength and appearance of concrete are not impaired, at locations indicated or approved by Architect.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across constructions joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floor and slabs.
2. Form keyed joints as indicated. Embed keys at least 1 1/2 inches into concrete.
3. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners and in concealed locations where possible when concrete is exposed to view.
4. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

D. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete smaller areas. Construct contraction joints for a depth equal to at least 1/4 of concrete thickness as follows:

1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8 inch wide joints into concrete when cutting action will not tear, abrade or otherwise damage surface and before concrete develops random contraction cracks.

E. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams and other locations, as indicated.

1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants are indicated.
3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

3.8. WATER STOPS

A. Flexible Water stops: Install in construction joints and at other joints indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed water stops during progress of the Work. Field fabricate joints in water stops according to manufacturer's written instructions.

B. Self-Expanding Strip Water stops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions. Install in longest lengths practicable by adhesive bonding, mechanically fastening and firmly pressing into place. Install in longest lengths practicable.

3.9. CONCRETE PLACEMENT

A. Notify Architect minimum 24 hours prior to commencement of concreting operations.

B. Comply with ACI 304, and as herein specified.

C. Pre-Placement Inspection: Before placing concrete, inspect and complete the formwork installation, reinforcing steel, and items to be embedded or cast-in. Notify other crafts to permit the installation of their work; cooperate with other contractors in setting such work. Thoroughly wet wood forms immediately before placing concrete where form coatings are not used.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

E. Deposit and consolidate concrete floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not disturb slab surfaces before starting finishing operations.

F. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F for three consecutive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Don not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

G. Hot Weather Placement: Comply with ACI 301 and as follows:

1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots or dry areas.

3.10. FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form facing material, arranged in an orderly and symmetrical manner with a minimum number of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to public view.

C. Related Unformed Surfaces: At tops of walls, horizontal offsets and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.11. FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms or rakes to produce a profile amplitude of 1/4 inch in one direction.

1. Apply scratch finish to surfaces indicated and to surfaces which receive a mortar setting bed for bonded cementitious floor finishes.

C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats. Restraighten, cut down high spots and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces indicated and to surfaces which receive a trowel finish.

D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply trowel finish to surfaces indicated or to surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint or another thin film finish coating system.
2. Finish surfaces to the following tolerances according to ASTM E1155, for randomly trafficked floor surface.

a. Typical floors:

1) SOV Ff 25 / FL 20
2) MLV Ff 17 / FL 15

b. Areas to receive thin floor coverings:

1) SOV Ff 30 / FL 20
2) MLV Ff 24 / FL 15

c. Areas to receive thin film floor coverings:

1) SOV Ff 35 / FL 25
2) MLV Ff 24 / FL 17

d. Definitions:

1) SOV: Specified Overall Values
2) MLV: Minimum Local Values

E. Trowel and Fine Broom Finish: Apply a first trowel finish to surfaces indicated. While concrete is still plastic, slightly scarify surface with a fine broom.

1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

F. Broom Finish: Apply broom finish to exterior concrete platforms, steps, ramps and elsewhere indicated.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.12. CONCRETE CURING AND PROTECTION

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed surfaces, including underside of beams, supported slabs and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings and other surfaces.

E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture curing: Keep surfaces continuously moist for not less than seven days with the following materials:

a. Water.
b. Continuous water-fog spray.
c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12 inch lap over adjacent absorptive covers.

2. Moisture Retaining Cover Curing: Cover concrete surfaces with moisture retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

a. Moisture cure or use moisture retaining covers to cure concrete surfaces to receive floor coverings.
b. Cure concrete surfaces to receive floor coverings with either a moisture retaining cover or curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on the project.
c. Do not use a moisture retaining cover on slabs that will be exposed to view in the finished Work.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer.

4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.13. LIQUID FLOOR TREATMENTS

A. Penetrating Liquid Floor Treatment: Prepare, apply and finish penetrating liquid floor treatment according to manufacturer's written instructions.

1. Remove curing compounds, sealers, oil, dirt, laitance and other contaminants and complete surface repairs.

2. Do not apply to concrete that is less than 28 days old.
3. Apply liquid until surface is saturated, scrubbing into surface until gel forms; rewet and repeat brooming or scrubbing. Rinse with water and remove excess material until surface is dry. Apply a second coat in a similar manner.

B. Sealing / Protection/ Surface Enhancer Coat: Uniformly apply a continuous sealing coat of concrete finish protectant/ enhancer to hardened concrete by power spray or roller according to manufacturer's written instructions. Apply to exposed concrete areas prior to substantial completion.

3.14. JOINT FILLING

A. Prepare, clean and install joint filler according to manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least one month. Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds and sealers from all joints. Leave contact faces of joint clean and dry.

C. Install semi-rigid joint filler full depth in saw cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.15. MISCELLANEOUS CONCRETE ITEMS

A. Filling-In: Fill-in holes and openings left in concrete structures for passage of work by other crafts, unless otherwise shown or directed. Mix, place and cure concrete as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the work.

B. Equipment Bases and Foundations:

1. Coordinate sizes and locations of concrete bases with actual equipment provided.
2. Construct concrete bases 4 inches high unless otherwise indicated; and extend base not less than 6 inches in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated or unless required for seismic anchor support.
3. Minimum compressive strength: 4000 psi at 28 days.
4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18 inch centers around the full perimeter of concrete base.
5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete substrate.
6. Prior to pouring concrete, place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions and directions furnished with items to be embedded.
7. Cast anchor-bolt insert into base. Install anchor bolts to elevations required for proper attachment to supported equipment.

C. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in safety inserts and accessories as shown on Drawings. Screed, tamp, and trowel finish concrete surfaces.

E. Isolation Joints in Slabs-on-Grade: Construct isolation joints in slabs on grade at all points of contact between slabs on ground and vertical surfaces, such as building walls, and elsewhere as indicated.

3.16. CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part Portland cement to two and one-half parts fine aggregate passing a No.16 sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets and voids more than 1 inch in any dimension to solid concrete. Limit cut depth to 1 1/2 inch. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white Portland cement and standard Portland cement so that, when dry, patching mortar will match the surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than the surrounding surface.
3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane and level surface. Feather edges to match adjacent floor elevations.

E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.17. FIELD QUALITY CONTROL

A. Testing and Inspecting: Engage a qualified special inspector and testing and inspecting agency to perform field tests, inspections and to prepare and submit test reports.

B. Special Inspections: Special inspections and verifications for concrete construction at the frequency required by IBC Section 1704.4, including:

1. Steel reinforcement placement.
2. Steel reinforcement welding.
3. Headed bolts and studs.
4. Verifications of use of required design mixture.
5. Concrete placement, including conveying and depositing.
6. Curing procedures and maintenance of curing temperature.
7. Inspection of formwork shape, location and dimensions.

C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C172 shall be performed according to the following requirements.

1. Testing Frequency: Obtain at least one composite sample for each 50 cu. yd. or fraction thereof of each concrete mixture placed each day.

    a. When frequency of testing will provide fewer than five compressive strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM C143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
5. Compression Test Specimens: ASTM C31.

    a. Cast and laboratory cure two sets of standard cylinder specimens for each composite sample.

6. Compressive-Strength Tests: ASTM C39; test one set of two laboratory cured specimens at 7 days and one set of two specimens at 28 days.
7. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive strength tests equals or exceeds specified compressive strength and no compressive strength test value falls below specified compressive strength by more than 500 psi.
8. Test results shall be reported in writing to the Architect, concrete manufacturer and Contractor within 48 hours of testing. Reports of compressive strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength and type of break for both 7- and 28-day tests.

9. Nondestructive Testing: Impact hammer, sonoscope or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
10. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42 or by other methods as directed by Architect.
11. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
12. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

D. Measure floor and slab flatness and levelness according to ASTM E1155 within 24 hours of finishing.

3.18. PROTECTION OF LIQUID FLOOR TREATMENTS

A. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.

END 03 3000

1. GENERAL

1.1. WORK INCLUDES

A. Unit masonry work shown on the drawings and in schedules.

B. Mortar, grout, reinforcing, anchorage, and accessories for unit masonry work.

C. Cavity wall insulation.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 3300 - Submittal Procedures
2. Section 01 4000 – Quality Requirements: Testing responsibility.
3. Section 03 3000 – Concrete
4. Section 05 1200 - Structural Steel: Steel lintels and shelf angles.
5. Section 05 5000 - Metal Fabrications: Steel lintels and shelf angles.
6. Section 07 2100 - Building Insulation
7. Section 07 2713 – Sheet Membrane Air Barrier
8. Section 07 2726 – Fluid-Applied Membrane Air Barrier
9. Section 07 6200 - Sheet Metal Flashing and Trim: Counterflashings and reglets.
10. Section 07 9200 - Joint Sealants
11. Section 08 1100 - Metal Doors and Frames

1.3. REFERENCES

A. Publication Dates: Comply with standards in effect as of the date of the Contract Documents except for those having different revision dates as referenced in the codes indicated on the Drawings, or unless otherwise indicated.

B. American Society for Testing and Materials (ASTM):

1. ASTM A36 - Standard Specification for Carbon Structural Steel.
2. ASTM A82 - Cold-Drawn Steel Wire for Concrete Reinforcement.
3. ASTM A123 - Specification for Zinc (hot-dip galvanized) Coating on Iron and Steel Products.
4. ASTM A153 - Specification for Zinc Coating (hot-dip) on Iron and Steel Hardware.
5. ASTM A615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement.
6. ASTM A641 - Standard Specification for Zinc–Coated (Galvanized) Carbon Steel Wire.
7. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
8. ASTM A706 - Low-Alloy Steel Deformed Bars for Concrete Reinforcement.
9. ASTM A951 – Standard Specification for Steel Wire for Masonry Joint Reinforcement.
10. 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.
11. ASTM C67 - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile.
12. ASTM C90 - Specification for Hollow Load Bearing Concrete Masonry Units.
13. ASTM C91 - Standard Specification for Masonry Cement.

14. ASTM C109 - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or Cube Specimens).
15. ASTM C114 - Standard Test Methods for Chemical Analysis of Hydraulic Cement.
16. ASTM C129 - Specification for Hollow Non-Load-Bearing Concrete Masonry Units.
17. ASTM C140 - Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.
18. ASTM C143 - Standard Test Method for Slump of Hydraulic-Cement Concrete.
19. ASTM C144 - Specification for Aggregate for Masonry Mortar.
20. ASTM C150 - Specification for Portland Cement.
21. ASTM C207 - Specification for Hydrated Lime for Masonry Purposes.
22. ASTM C216 - Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale).
23. ASTM C270 - Specification for Mortar for Unit Masonry.
24. ASTM C404 - Standard Specification for Aggregates for Masonry Grout.
25. ASTM C476 - Specification for Grout for Reinforced and Non-Reinforced Masonry.
26. ASTM C494 - Standard Specification for Chemical Admixtures for Concrete.
27. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
28. ASTM C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.
29. ASTM C979 - Standard Specification for Pigments for Integrally Colored Concrete.
30. ASTM C1019 - Standard Test Method for Sampling and Testing Grout.
31. ASTM C1314 - Standard Test Method for Compressive Strength of Masonry Prisms.
32. ASTM C1506 - Standard Test Method for Water Retention of Hydraulic Cement-Based Mortars and Plasters.
33. ASTM C1714 – Specification for Preblended Dry Mortar Mix for Unit Masonry.
34. ASTM D226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
35. ASTM D1056 - Standard Specification for Flexible Cellular Materials—Sponge or Expanded Rubber.
36. ASTM D2000 - Standard Classification System for Rubber Products in Automotive Applications.
37. ASTM D2287 - Standard Specification for Nonrigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds.
38. ASTM E514 - Standard Test Method for Water Penetration and Leakage Through Masonry.

C. IBC: Refers to International Building Code; refer to Drawings for edition.

D. Masonry Standards Joint Committee (MSJC):

1. ACI 216.1/TMS-0216 - Code Requirements for Determining Fire Resistance of Concrete and Masonry Construction Assemblies.
2. TMS 402 /ACI 530/ASCE 5 – Building Code Requirements for Masonry Structures.
3. TMS 602/ACI 530.1/ASCE 6 - Standard Specification for Masonry Construction.

1.4. DEFINITIONS

A. CMU(s): Concrete masonry unit(s).

B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.5. SUBMITTALS

A. Submit in accordance with Section 01 3300:

1. Product data: For each type of product, including the following:

a. Masonry units.
b. Mortar.
c. Grout.
d. Admixtures.
e. Accessories.
f. Flashings.
g. Anchors and ties.
h. Horizontal joint reinforcing.
i. Insulation.
j. Masonry cleaner.
k. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

2. Shop Drawings: For the following:

   a. Masonry Units: Show actual/specified sizes, profiles, coursing, and locations of special shapes.

      1) The masonry unit manufacturer shall produce and approve all drawings of special masonry shapes.]

   b. Reinforcing Steel: Detail lap splice lengths, bending, and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement." Show elevations of reinforced walls.

3. Samples:

   a. Brick: Provide not less than five individual bricks of each type as samples, representing the full range of variations of color and texture of the proposed brick

4. Certificates: Prior to delivery, submit to Architect certificates attesting compliance with the project specifications for grades, types, or classes included in these specifications, for each type and size, including the following:

   a. Masonry units.

      1) Include data on material properties and material test reports substantiating compliance with requirements.
      2) For brick, include size-variation data verifying that actual range of sizes falls within specified tolerances.
      3) For exposed brick, include test report for efflorescence according to ASTM C67.
      4) For masonry units used in structural masonry, include data and calculations establishing average net-area compressive strength of units.

   b. Integral water repellent used in CMUs.
   c. Cementitious materials. Include name of manufacturer, brand name, and type.
   d. Mortar admixtures.
   e. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
   f. Grout mixes. Include description of type and proportions of ingredients.
   g. Reinforcing bars.
   h. Joint reinforcement.
   i. Anchors, ties, and metal accessories.

j. Submit certifications from masonry and mortar materials manufacturers that the selected masonry cleaner is acceptable for use on their products.

5. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

a. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C109 for compressive strength, ASTM C1506 for water retention, and ASTM C9 for air content.
b. Include test reports, according to ASTM C1019, for grout mixes required to comply with compressive strength requirement.

6. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to TMS 602/ACI 530.1/ASCE 6.
7. Cold-Weather[and Hot-Weather] Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

B. Submit in accordance with Section 01 7700:

1. Project Record Documents:

a. Include all authorized changes in drawings and specifications.
b. Include location of all items passing through masonry work.

1.6. QUALITY ASSURANCE

A. Qualifications of Installer:

1. Not less than ten years documented experience in construction of masonry projects of similar scope and complexity.
2. Not less than ten years of documented experience in the construction of multi-wythe cavity walls.

B. Sample Panels: Build sample panels to verify selections made under sample submittals and to demonstrate aesthetic effects. Comply with requirements in Section 01 4000 "Quality Requirements" for mockups.

1. Build sample panels for each type of exposed unit masonry construction. Sample panel shall be approximately 4' long x 4’ high showing the proposed color range, texture, bond, and mortar.

a. Sample panel shall be approved by Architect in writing prior to ordering brick colored mortar.
b. Include a sealant-filled vertical joint at least 24 inches long in each exterior wall mockup.
c. Clean one half of the panel as indicated in this Section and allow a minimum of 7 days curing/drying prior to review by Architect.
d. Approval of sample panels is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; and other material and construction qualities specifically approved by Architect in writing.

1) Approval of sample panels does not constitute approval of deviations from the Contract Documents contained in sample panels unless such deviations are specifically approved by Architect in writing.

e. Use panel as standard of comparison for all masonry work built of same material.
f. Do not destroy or move panel until all work is completed and accepted by the Architect.

C. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. At location indicated by the Architect, erect an in-place mockup cavity wall panel approximately 4' long x 4' high showing the proposed color range, texture, bond, mortar and workmanship.

a. Mockup shall be approved by Architect in writing prior to installation of masonry materials.
b. Include a sealant-filled vertical joint at least 24 inches long in each exterior wall mockup.
c. Include lower corner of window opening in exterior wall mockup.
d. Include through-wall flashing and weeps at base of mockup.
e. Include cavity drainage material, insulation, air and vapor barriers, reinforcing, anchors, and all other components.
f. Clean one half of the panel as indicated in this Section and allow a minimum of 7 days curing/drying prior to review by Architect.
g. Approval of mockup is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; and other material and construction qualities specifically approved by Architect in writing.

1) Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless such deviations are specifically approved by Architect in writing.

h. Use panel as standard of comparison for all masonry work built of same material.
i. Do not destroy or move panel until all work is completed and accepted by the Architect.
j. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7. DELIVERY, STORAGE, AND HANDLING

A. Deliver all materials in sufficient quantity and time to maintain approved construction schedule. Deliver all packaged materials in manufacturer's original containers, with all labels and markings intact and legible. Remove damaged materials and containers immediately from the site.

B. Deliver preblended, dry mortar and grout mixes in moisture-resistant containers designed for lifting and emptying into dispensing silo. Store preblended, dry mortar and grout mixes in delivery containers on elevated platforms, under cover, and in a dry location or in a metal dispensing silo with weatherproof cover.

C. Store all products in a secure, dry location, out of way of construction operations. Store materials on pallets, a minimum of 4" off of the ground. Prevent intermixing of granular materials. Cover all products to protect them from the elements.

D. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

F. Handle materials in a manner to prevent damage to the materials, to other stored products, to existing construction and project work. Follow product manufacturer's instructions.

1.8. PROJECT CONDITIONS

A. Protect partially completed masonry against weather, when work is not in progress, by covering top of walls with strong, waterproof, nonstaining membrane. Extend membrane at least 24" down both sides of walls and anchor securely in place.

B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.

C. Stain Protection: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Remove grout, mortar, and soil that come in contact with masonry immediately.

1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
2. Protect sills, ledges, and projections and aluminum materials from mortar.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

D. Cold Weather Requirements: Implement when ambient temperature is below 40 degrees F.

1. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

a. Material Temperatures: Flashings, sealants, and other accessories and their substrates that are temperature-sensitive shall be maintained and utilized at temperatures and conditions acceptable to the manufacturers.
b. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 degrees F and above and will remain so until masonry has dried, but not less than 7 days after completing cleaning.

E. Hot Weather Requirements:

1. Hot Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

1.9. SEQUENCING/SCHEDULING

A. Schedule all work in a manner to maintain the approved construction schedule. Cooperate and coordinate with other contractors to ensure timely completion and to eliminate interferences.

1.10. PRE-INSTALLATION CONFERENCE

A. Contractor will convene a pre-installation conference a minimum of one week prior to commencing work of this Section. Conference shall be attended by all parties directly affecting work of this Section, including the Testing Agency. Review conditions of installation, procedures, testing/inspections, and coordination required with related work.

2. PRODUCTS

2.1. MANUFACTURERS

A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.

B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

2.2. PERFORMANCE REQUIREMENTS

A. Provide structural unit masonry that develops indicated net-area compressive strengths at 28 days.

1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to TMS 602/ACI 530.1/ASCE 6.
2. Determine net-area compressive strength of masonry by testing masonry prisms according to ASTM C1314.

B. Fire-Resistance Ratings: Where indicated, provide materials and construction as required to meet the UL listed designs indicated or meet the fire ratings using equivalent thickness calculations if no UL design is indicated.

2.3. MASONRY UNITS, GENERAL

A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6 unless modified by requirements in the Contract Documents.

B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to exceed tolerances and to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects, including dimensions that vary from specified dimensions by more than stated tolerances, will be exposed in the completed Work or will impair the quality of completed masonry.

2.4. CONCRETE MASONRY UNITS (CMU)

A. General: Obtain masonry units from one manufacturer, of uniform texture and color for each kind specified, for each continuous area and visually related areas.

1. All exposed CMU shall be free of iron deposits.

B. Standard Units:

1. Type: Provide units complying with ASTM C90.

    a. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2,150 psi.
    b. Density Classification: Normal weight, unless otherwise indicated.
    c. Fire Rating: Provide UL-rated units where UL designs are indicated on Drawings, or provide in accordance with ACI 216.1/TMS-0216 as follows:

        1) 1 Hour Fire Rating: Calcareous or siliceous gravel aggregate, 2.8 inches equivalent wall thickness.
        2) 2 Hour Fire Rating: Calcareous or siliceous gravel aggregate, 4.2 inches equivalent wall thickness.

2. Size: Manufacturer's standard units with nominal face dimensions of 16" long x 8" high (15 5/8" x 7 5/8" actual), unless otherwise shown. Manufactured to dimensions 3/8 inch less than nominal dimensions.
3. Shapes:

    a. Provide special shapes as required that are shown and for: corners, jambs, bond beams, and other special conditions.
    b. At the Contractor's option, provide special shapes for lintels, corners, base, jambs, bonding and other special conditions.
    c. Masonry units in walls with horizontal reinforcing bars shall have webs notched to receive reinforcing bars to permit normal bed joints.
    d. Provide bullnosed block for corners, jambs, and as indicated on Drawings.

2.5. BRICK

A. Face Brick: Provide brick complying with ASTM C216, Grade SW, Type FBS. No cracked brick shall be installed.

1. Initial Rate of Absorption: Less than 30 g/30 sq. in. per minute when tested per ASTM C67.
2. Efflorescence: Provide brick that has been tested according to ASTM C67 and is rated “Not effloresced.”
3. Size (Actual Dimensions): Modular: 3-5/8 inches wide by 2-1/4 inches high by 7-5/8 inches long.
4. Color and Texture:

    a. Brick Type 'A':

        1) Manufacturer: Glen-Gery

            a) 80% Red Desert Velour
            b) 20% Savannah Tudor

    b. Brick Type 'B':

        1) Manufacturer: Glen-Gery

            a) 100% Savannah Tudor

B. Shapes: Provide the shapes indicated on Drawings and as indicated below:

1. For ends of sills, caps, corners, recessed and projecting belt courses, and for similar applications that would otherwise expose unfinished brick surfaces, provide 100% solid units without cores or frogs and with exposed surfaces finished.
2. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
3. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.

2.6. MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

B. Hydrated Lime: ASTM C207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C150, Type I or Type III, and hydrated lime complying with ASTM C207, Type S.

D. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C979. Use only pigments with a record of satisfactory performance in masonry mortar.

1. Acceptable Products:

a. Davis Colors / True Tone Mortar Colors.
b. Lanxess Coproation / Bayferrox Iron Oxide Pigments.
c. Solomon Colors, Inc. / SGS Mortar Color.

2. Color: Solomon Colors: SGS 94 Iron Black

E. Aggregate for Mortar: ASTM C144, sand shall be washed clean and graded from fine to coarse of color necessary to produce required mortar color.

F. Aggregate for Grout: Comply with ASTM C404.

G. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C494, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated. Acceptable products:

1. Addiment Incorporated / Mortar Kick.
2. Euclid Chemical Company / Accelguard 80.
3. W.R. Grace & Co. / Morset.
4. Sonneborn, Div. of ChemRex / Trimix-NCA.

H. Water: Potable.

2.7. MORTAR AND GROUT MIXES

A. General: All mortars and grouts shall be pre-blended.

1. Preblended, Dry Mortar Mix: Comply with ASTM C1714 and the requirements of this Section. Furnish dry mortar ingredients in the form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
2. Preblended, Dry Grout Mix: Comply with ASTM C476 and the requirements of this Section. Furnish dry grout ingredients in the form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

    a. Batch Plant Grout Mix: Grout that is batched, hydrated and mixed at a batch plant and transported to the site in concrete mixing trucks is acceptable. Submit batch tickets.

3. Do not use any admixtures, including pigments, air-entraining agents, accelerators, retarders, and chlorides unless they have been reviewed and approved in writing by the Architect. Admixtures shall be designated by their manufacturer as designed specifically for use in mortar and/or grout, as appropriate.

    a. Do not use water-repellent agents, antifreeze compounds, or similar admixtures.
    b. Do not use any chlorides in mortar or grout.
    c. Limit cementitious materials in mortar to portland cement, lime, and fly ash.
    d. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
    e. Do not use admixtures that lower the freezing temperature of grout.

B. Mortar for Unit Masonry: Comply with ASTM C270, Property Specification. Provide the following type of mortar for applications stated unless another type is indicated or needed to provide required compressive strength of masonry.

    1. For masonry below grade or in contact with earth, use Type S.
    2. For reinforced load-bearing concrete masonry unit (CMU) walls, use Type N.
    3. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls, use Type S.
    4. For interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.

C. Pigmented Mortar: Select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products.

    1. Pigments shall not exceed 10 percent of portland cement by weight.
    2. Pigments shall not exceed 5 percent of mortar cement by weight.

D. Grout for Unit Masonry: Comply with ASTM C476.

    1. Type: Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Grout Space Table in ACI 530/ASCE 5/TMS 402 for dimensions of grout spaces and pour height.
    2. Slump: Provide grout with a slump of 8 to 11 inches as measured according to ASTM C143.
    3. Strength: Unless indicated otherwise, grout shall provide a 28-day minimum compressive strength of 2,000 psi.

2.8. MASONRY REINFORCING AND ANCHORAGE ACCESSORIES

A. General: Ties and anchors shall extend at least 1-1/2 inches into veneer but with at least a 5/8-inch cover on outside face.

B. General Wire Reinforcing for Masonry: Provide welded wire units complying with ASTM A951 and prefabricated in straight lengths of not less than 10', with matching corner and tee units. Fabricate from cold drawn steel wire complying with ASTM A82, with deformed continuous side rods and plain crossrods. Units shall have at least 5/8" cover on the outside face of masonry.

1. Materials: Provide wire reinforcing made from materials that comply with the following unless otherwise indicated:

a. Mill-Galvanized, Carbon-Steel Wire: ASTM A82; with ASTM A641, Class 1 coating.
b. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A82; with ASTM A153, Class B-2 coating. Products shall be galvanized after fabrication unless noted otherwise.
c. Stainless-Steel Wire: ASTM A580.

C. Multi-wythe Cavity Wall Horizontal Wire Reinforcing:

1. Construction: Ladder type reinforcing with U-shaped anchors welded every 16" on center and extending into the cavity of the two wythe wall; 9 gauge side rods with 9 gauge in cross ties and 9 gauge anchors; complete with 9 gauge rectangular hooked box tie. The U-shaped anchor shall have a restraint bar or other device attached to it to prevent transverse movement of the two wythes.
2. Finish: Hot-dip galvanized.
3. Acceptable manufacturers/products:

a. Dur-O-Wal / DA3600
b. Hohmann & Barnard / Ladder-Box-Mesh #265
c. Wire-Bond / Cavity Adjustable Tab, Series 600

D. Single-wythe Wall Horizontal Wire Reinforcing: Truss type fabricated with single pair of 9 ga. side rods and 9 ga. continuous diagonal cross rods, spaced not more than 16" o.c. vertically.

1. Exterior Walls: Fabricated from hot-dip galvanized wire.
2. Interior Walls: Fabricated from mill galvanized wire.

E. Anchoring Devices for Masonry:

1. General:

a. Provide straps, bars, bolts and rods fabricated from not less than 16 ga. sheet metal or 3/16" diameter rod stock, unless otherwise indicated.
b. For interior work, including devices that extend only into interior wythes of exterior masonry, fabricate from steel with mill galvanized or hot dip coating.
c. For devices which extend into exterior wythe, fabricate from hot-dip galvanized steel.

2. Structural Steel Substrate: Where masonry is shown or specified to be anchored to structural framework with flexible anchors, provide nominal 1/8" x 1 1/2" x 8" channel-slot anchors which will provide lateral restraint. Acceptable manufacturers/products:

a. Dur-O-Wal / DA901 and DA918

b. Heckmann / 130 and 316
c. Hohmann & Barnard / 360 and 363
d. Wire-Bond / 1302 and 1401

3. Metal/Wood Stud Substrate: Designed to attach to studs through insulation and sheathing. Coordinate length of anchor with thickness of insulation and sheathing. Acceptable manufacturers/products:

a. Heckmann / Pos-I-Tie and Pintle Wire Tie
b. Hohmann & Barnard / 2-Seal Tie and VBT
c. Wire-Bond / Sure Tie and 4510

4. Concrete/Existing Masonry Substrate: Acceptable manufacturers/products:

a. Dur-O-Wal / DA5213 and DA700
b. Heckmann / Pos-I-Tie and Pintle Wire Tie
c. Hohmann & Barnard / HB-200
d. Wire-Bond / Sure Tie and 4510

5. Partition Top Anchors:

a. For anchoring tops of masonry walls to underside of structural members or metal deck where joint **will not** be visible: Channel anchors shall be 12 gauge hot-dipped galvanized steel; 8" long with 3" legs; spaced at 32" o.c. maximum. Acceptable manufacturers/products:

1) Heckmann / 420
2) Hohmann & Barnard / PTA-422
3) Substitutions: Under provisions of Section 01 6000.

b. For anchoring tops of masonry walls to underside of structural members or metal deck where the joint will be visible: Rod anchors hot-dipped galvanized steel; 3/8" diameter x 6" long with plastic tube sleeve; spaced at 32" o.c. maximum, set in sash block grooves. Acceptable manufacturers/products:

1) Heckmann / 419
2) Hohmann & Barnard /PTA-420
3) Substitutions: Under provisions of Section 01 6000.

F. Reinforcing Bars: Deformed steel, ASTM A615, Grade 60 except where rebar is to be welded, use Deformed Steel, ASTM A706, Grade 60, of the sizes shown on the Drawings.

G. Rebar Positioners: Provide Z-shape wire rebar positioners for all vertical reinforcing. Fabricate from steel with mill galvanized or hot-dip galvanized. Acceptable manufacturers/products:

1. Dur-O-Wal / DA817
2. Heckmann / 376
3. Hohmann & Barnard / RB

2.9. MASONRY FLASHING MATERIALS

A. General: Unless indicated otherwise, all masonry flashings shall be metal.

B. Two-Piece Flashing: Flashing shall consist of two pieces: Elastomeric membrane with sheet metal drip edge.

1. Sheet metal "drip edge" portion:

a. Stainless Steel: ASTM A240, Type 304, 20 gage.

1) Solder for Stainless Steel: ASTM B32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.
2) Elastomeric Sealant for Stainless Steel: ASTM C920, chemically curing urethane, polysulfide, or silicone sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

b. Metal "drip edge" shall be approximately 3" deep.
c. Fabricate continuous flashings in sections 96 inches long minimum, but not exceeding 12 feet. Lap joints 4" minimum. Provide two beads of sealant parallel to joint at lap joint
d. Fabricate through-wall flashing with snaplock receiver on exterior face where indicated to receive counterflashing. Refer to Section 07 6200 – Sheet Metal Flashing and Trim for counterflashing.
e. Fabricate through-wall flashing with drip edge, unless otherwise indicated. Fabricate by extending flashing ½ inch out from wall, with outer edge bent down 30 degrees.

2. Elastomeric membrane portion:

a. Shall comply with the Elastomeric Membrane Flashing requirements specified in this Section.
b. Shall lap over the top of the sheet metal portion and extend to within 3/4" of the face of wall. Seal the membrane to the sheet metal portion as recommended by the membrane manufacturer.

3. End Dams: Provide end dams at all flashing terminations. End dams shall have a minimum height of 2". The front edge of end dams shall be cut back at 30 degree angle from vertical to prevent the vertical edge of the end dams showing in the finished masonry work. The remainder of the end dam shall be fabricated by one of the following methods:

a. Sheet Metal Flashing. End dams shall have welded/soldered joints; joints shall not be dependent upon sealant for watertightness. The completed end dam shall be watertight.

C. Elastomeric Membrane: Use the following only as indicated in this Section and on Drawings. It shall only be used in conjunction with metal flashings and metal drip edges:

1. Rubberized-Asphalt Flashing: Self-adhesive, composite flashing product consisting of a pliable, adhesive rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.040 inch.

a. Acceptable Manufacturer/Product:

1) Carlisle Coatings & Waterproofing / CCW-705-TWF Thru-Wall Flashing.
2) W. R. Grace Co. / Perm-A-Barrier Wall Flashing
3) Heckmann / No. 82 Rubberized-Asphalt Thru-Wall Flashing.

4) Hohmann & Barnard / Textroflash.

b. Upper edge of flashing must be secured and sealed as recommended by manufacturer. Securement of terminations shall not be solely dependent upon the self-adhesive qualities of the flashing. At a minimum, a termination bar, mastic and/or sealant shall be applied as recommended by manufacturer.
c. Provide primers, liquid membrane, sealants, mastics, tapes, termination bars, or other accessories as required for manufacturer for indicated applications.

D. Miscellaneous:

1. Elastomeric Sealants: Refer to Section 07 9200 – Joint Sealants.
2. Termination Bars: Extruded aluminum with 45 degree sealant lip and pre-drilled anchor holes.

2.10. CAVITY WALL INSULATION

A. Rock Wool Insulation:

1. Unfaced, Rock Wool Insulation: Compliant with ASTM C612; water repellent, synthetic vitreous fiber, semi-rigid, blanket insulation manufactured from predominantly basalt rock and physically forming it into fibers.

a. Fire Performance: Insulation shall be Class A, with maximum flame-spread and smoke-developed indexes of 5 and 0, respectively, per ASTM E84.
b. Water Vapor Permeance: 16 perms minimum per ASTM E96.
c. Moisture Resistance: 0.07% maximum absorption by volume per ASTM C1104.
d. Density: 4 psf – 6 psf nominal per ASTM C612.
e. Thermal Resistance: R-value of 4.2 per inch minimum per ASTM C518.
f. Identification: Each piece of insulation shall receive an R-value identification mark applied by the manufacturer.

2. Acceptable Products and Manufacturers: The following products and manufacturers, provided they comply with requirements of the Contract Documents, are considered acceptable:

a. CWB / Fibrex Insulations, Inc.
b. MinWool-1200 / Johns Manville
c. CavityRock DD / Roxul Inc.
d. RainBarrier / Thermafiber

3. Accessories:

a. Fasteners: Plastic fasteners and/or impaling pins designed to secure the insulation to the substrate.

1) Products shall be recommended in writing by the insulation manufacturer and compatible with the insulation, air barriers, and other adjacent construction.

2.11. MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D1056, Grade 2A1; compressible a minimum of 35 percent; of width and thickness indicated; formulated from neoprene, urethane, or PVC.

B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D2000, Designation M2AA-805 or PVC, complying with ASTM D2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as required for joints sizes indicated.

C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D226, Type I (No. 15) and Type II (No. 30).

D. Cavity Wall Weephole Vents:

1. Acceptable Manufacturer/Product:

a. Advanced Building Products Inc. / Mortar Maze weep vent
b. Heckmann / No. 85 Cell Vent.
c. Hohmann & Barnard / #QV, Quadro-Vent.

2. Color: To be selected by Architect from manufacturer's full range of colors.

E. Mortar Guard: Woven strips of high density polyethylene (HDPE) or polyester strands, full-depth of cavity and 10 inches wide, with dovetail shaped notches 7 inches deep. Provide thickness appropriate to cavity space to protect weeps and vents from being plugged by mortar.

1. Acceptable Manufacturer/Product:

a. Advanced Building / Mortar Break DT.
b. Hohmann & Barnard / Mortar Trap.
c. Mortar Net USA, Ltd. / Mortar Net.

2.12. MASONRY CLEANERS

A. Proprietary Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer. Product must be approved in writing by manufacturer(s) of masonry materials and mortar being cleaned.

3. EXECUTION

3.1. EXAMINATION

A. Examine the areas and conditions under which masonry is to be installed and notify the Architect in writing of conditions detrimental to the proper and timely completion of the work.

1. Verify that foundations are within tolerances specified.
2. Verify that reinforcing dowels are properly placed.
3. Do not proceed with the work until unsatisfactory conditions have been corrected. Beginning of installation means acceptance of existing conditions by Installer.

3.2. MORTAR AND GROUT

A. All mortar and grout shall be installed in accordance with mortar/grout manufacturer's requirements and this Section.

1. Do not lower the freezing point of mortar or grout by use of admixtures or antifreeze agents unless approved via submittal prior to application.
2. Do not use calcium chloride in mortar or grout.

B. Batch Control:

1. Pre-blended mortars and grout must be mixed in accordance with manufacturer’s written instructions.
2. Mix mortar with the maximum amount of water consistent with workability to provide maximum tensile bond strength within the capacity of the mortar.
3. Mix mortar ingredients for a minimum of five minutes in a mechanical batch mixer. Use water clean and free of deleterious materials which would impair the work. Do not use mortar which has begun to set, or if more than 2-1/2 hours has elapsed since initial mixing. Retemper mortar during 2-1/2 hour period as required to restore workability.

a. Do not retemper pigmented mortar.

3.3. INSTALLATION, GENERAL

A. Thickness: Build masonry construction to the full thickness shown, except single-wythe walls which shall be built to the actual thickness of the masonry units, using units of nominal thickness shown or specified.

B. Build chases and recesses as shown and as required for the work of other contractors.

C. CMU Partitions/Walls: At CMU construction that is scheduled to receive applied base materials, provide square corner/jamb units for the first course. All corner/jamb units above the first shall be bullnosed.

D. Cutting: Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.

F. Frozen materials and work: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen work. Remove and replace masonry work damaged by frost or freezing.

G. Pattern Bond:

1. Lay exposed masonry in a running bond pattern, or as otherwise indicated.
2. Lay concealed masonry in a running bond pattern.
3. Lay Brick Type 'B' in a stacked bond pattern.

H. Layout walls in advance for accurate spacing of surface bond patterns, with uniform joint widths and to properly locate openings, movement type joints, return and offsets. Avoid the use of less than half size units at corners, jambs and wherever possible at other locations.

I. Lay up walls plumb and true with courses level, accurately spaced and coordinated with other work.

J. Built In Work: As the work progresses, build in items specified under this and other sections of the Project Manual. Fill in solidly with masonry around built in items.

1. Where built in items are to be embedded in cores of hollow masonry units, place a layer of metal lath in the joint below and rod mortar or grout into core.

K. Non-Bearing Interior Partition Walls: Build full height of story to underside of structure above, unless otherwise indicated.

1. Fasten partition top anchors to structure above and build into top of partition. Space anchors 32 inches o.c., unless otherwise indicated.
2. Install compressible filler in joint between top of partition and underside of structure above.

a. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Division 07 Section "Fire-Resistive Joint Systems".

L. Fill cores in hollow concrete masonry units with grout full-height under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated. Provide vertical reinforcing where indicated.

M. Remove masonry units disturbed after laying; clean and relay in fresh mortar. Do not pound corners at jambs to fit stretcher units which have been set in position. If adjustments are required, remove units, clean off mortar, and reset in fresh mortar.

N. Stopping and Resuming Work: Stop work at expansion joints or control joints, or by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet masonry if required before laying fresh masonry.

O. Protection of Masonry: During construction, cover tops of walls, cavities, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

1. Extend cover a minimum of 24 inches down both sides of walls and hold cover securely in place.
2. Where one wythe of multi-wythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe and hold cover in place.

3.4. JOINTS

A. All head and bed joints shall be filled as solid as possible with mortar.

1. Collar joints in solid, multi-wythe masonry shall be filled as solid as possible with mortar or grout.

B. Maintain joint widths shown, except for minor variations required to maintain bond alignment. If not shown, lay walls with 3/8" joints.

C. Exposed interior mortar joints in the masonry walls are to be neatly tooled with long rod tool to form a neat joint with surface densely packed and uniform in thickness and texture.

1. Joints shall be standard concave joints, where exposed.
2. Joints shall be struck flush where applied finish materials (other than paint) or applied air barriers are indicated.
3. Joints shall be raked at exposed interior brick.

D. Exposed interior joints shall be rubbed with a stone to remove all burrs and projections of mortar, prior to painting.

3.5. HORIZONTAL JOINT REINFORCING

A. Provide continuous horizontal joint reinforcing as shown and specified. Fully embed longitudinal side rods in mortar for their entire length with a minimum cover of 5/8" on exterior side of walls and 1/2" at other locations. Lap joint reinforcement a minimum of 6”.

1. Space continuous horizontal reinforcing 16" o.c. vertically.
2. Do not bridge control and expansion joints with reinforcing except at wall openings.
3. Provide continuity at corners and wall intersections by use of prefabricated "L" and "T" sections.
4. Cut and bend units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures and other special conditions.

a. Prior to installation, repair cuts and abrasions of galvanized components with a suitable galvanizing coating.

B. Unless indicated otherwise, reinforce masonry openings greater than 1'-0" wide, with horizontal joint reinforcing placed in two horizontal joints approximately 8" apart, both immediately above the lintel and immediately below the sill. Extend reinforcing a minimum of 2'-0" beyond jambs of the opening, bridging control joints where provided.

3.6. ANCHORING MASONRY TO STRUCTURAL MEMBERS

A. Provide anchoring devices of the type shown and as specified. If not shown or specified, provide standard type for facing and backup involved. Anchor masonry to structural members where masonry abuts or faces such members to comply with the following:

1. Provide an open space not less than 1/2" in width between masonry and structural members, unless otherwise indicated. Keep open space free of mortar or other rigid materials.
2. Anchor masonry to structural members with channel-slot anchors embedded in masonry joints and welded to structure. Provide anchors with adjustable tie sections, unless otherwise shown.
3. Space anchors as shown, but not more than 48" o.c. vertically and 36" o.c. horizontally. Provide anchors at top course of interior wythe of cavity walls and secured to horizontal steel structural member where shown on the drawings.

3.7. ANCHORING MASONRY VENEERS

A. Anchor masonry veneers to substrates with masonry-veneer anchors to comply with the following requirements:

1. Fasten screw-attached anchors [through sheathing to wall framing and masonry backup with metal fasteners of type indicated. Fasten per manufacturer's written instructions.
2. Space anchors as indicated, but not more than 16 inches o.c. vertically and 24 inches o.c. horizontally, with not less than 1 anchor for each 4 sq. ft. of wall area.

a. Expansion Joints: Install additional anchors within 12 inches of expansion joint edges and at intervals, not exceeding 16 inches, along the height of expansion joints.
b. Openings: Install additional anchors within 12 inches of openings and at intervals, not exceeding 16 inches, around perimeter of openings.

B. Masonry Veneer at Masonry Backup with Veneer Anchor Horizontal Reinforcing: Tie exterior wythe to masonry backup with ties at 16" o.c. hooked to continuous horizontal reinforcing embedded in mortar joints at not more than 16" o.c. vertically.

3.8. CAVITY WALLS

A. Keep cavity clean of mortar during construction. Strike flush the joints facing into the cavity. Maintain minimum 1" clear open air space in cavity.

B. Install air barrier over supporting substrate as specified in Section 07 2726.

3.9. CAVITY INSULATION

A. Basic Requirements:

1. Comply with manufacturer's instructions for the particular conditions of installation in each case. When printed instructions are not available or do not apply to the project conditions, consult the manufacturer's technical representative for specific recommendations before proceeding with the work.
2. Extend insulation full thickness as shown over entire area to be insulated. Cut and fit tightly around obstructions, and fill voids with insulation. Remove projections which interfere with placement.
3. Apply a single layer of insulation of the specified thickness, unless otherwise shown or required to make up the total thickness.
4. Place insulation in a method to maximize contact bedding. Stagger end joints. Butt edges and ends tight to adjacent insulation and to protrusions. Insulation shall be secured tight to substrates. Attach with plastic fasteners designed for this purpose.

B. Joints/Gaps: Seal or tape joints between insulation units and fill cracks and open gaps in insulation as recommended by insulation manufacturer.

3.10. CONTROL AND EXPANSION JOINTS

A. General: Install control and expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.

1. Locations: Locate control and expansion joints where indicated on Drawings. Where not indicated, provide control and expansion joints as follows:

    a. General Spacing: Maximum of 20 feet apart.
    b. Outside Corners: Maximum of 2 feet from at least one side of outside corners.
    c. Inside Corners: Provide control and expansion joints at all inside corners.
    d. Openings less than 6 feet wide: Provide control and expansion joints on one side of opening.
    e. Openings 6 feet wide or greater: Provide control and expansion joints on both sides of opening.
    f. Changes in wall height: Provide control and expansion joints at all wall height changes.
    g. Coordinate exact locations with Architect prior to installation.

2. Sealants: Install sealant, primers, bond breakers, and backer rod specified in Section 07 9200 – Joint Sealants.

B. Control Joints in Concrete Masonry:

1. Single-wythe and backup wythe in multi-wythe construction: Form control joints using one of the following methods unless indicated otherwise:

    a. Fit bond-breaker strips into hollow contour in ends of concrete masonry units on one side of control joint. Fill resultant core with grout and rake out joints in exposed faces for application of sealant.
    b. Install preformed control-joint gaskets designed to fit standard sash block.
    c. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar or rake out joint for application of sealant.

2. Veneer wythe: Install temporary foam-plastic filler in head joints and remove filler when unit masonry is complete for application of sealant.

C. Expansion Joints in Brick Masonry: Form expansion joints in brick made from clay or shale as follows unless noted otherwise:

1. Form open joint full depth of brick wythe and of width indicated, but not less than 3/8 inch width. Joint shall be completely free of mortar and debris.
2. Build in compressible joint fillers full depth of brick wythe as masonry is erected, not less than 3/8 inch width.

D. Horizontal Control Joints in Walls of mixed Concrete Masonry and Brick Masonry: Install a bond breaker, minimum No. 30 asphalt felt, between courses of concrete masonry and brick masonry. Do not leave edges of bond breaker exposed.

E. At Shelf Angles: Provide horizontal, pressure-relieving joints by either leaving an air space or inserting a compressible filler of width required for installing sealant and backer rod specified in Section 07 9200 – Joint Sealants, but not less than 3/8 inch.

1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.

3.11. LINTELS AND BOND BEAMS

A. Install loose lintels of steel as specified in Section 05 1200 – Structural Steel and as indicated on the Drawings.

B. Provide masonry lintels and bond beams where indicated. Wherever openings of more than 1'-0" are shown without structural steel or other supporting lintels provide precast or formed in place masonry lintels. Thoroughly cure precast lintels before handling and installation. Temporarily support formed-in-place lintels until cured.

1. Unless otherwise shown, provide one reinforcing bar for each 4" of wall thickness and a size number not less than the number of feet of the opening width.
2. For hollow masonry unit walls, use specially formed "U" shaped lintel units with reinforcing bars placed as shown and filled with grout.

C. Provide minimum bearing at each jamb of 8", or as indicated on the Drawings.

3.12. FLASHING OF MASONRY WORK

A. General: Provide flashings in masonry work at or above all lintels, shelf angles, ledges and other obstructions to the downward flow of water in the wall to divert water to the exterior.

1. Flashings shall be level or sloped slightly to the exterior.
2. Flexible flashings shall be continuously supported as required for positive drainage.
3. Flash and seal flashings to air barrier as recommended by air barrier manufacturer.
4. Provide end dams as indicated in Part 2 of this Section at all flashing terminations.

B. Install flashing as follows, unless indicated otherwise:

1. Prepare masonry surfaces smooth and free from projections that could puncture flashings.
2. When using elastomeric flashings, prime substrate surfaces if suggested by flashing manufacturer.
3. Outer edge of flashing shall be bedded in sealant.
4. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall and adhere flexible flashing to top of metal drip edge.
5. Lap joints 4" minimum and seal with mastic, tapes, or sealants as indicated under Part 2 of this Section.
6. Before covering flashing with mortar or masonry, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
7. Extend flashing through veneer, across air space behind veneer, and up face of sheathing/substrate at least 8 inches.

    a. Two-Piece Flashings: Terminate the top edge of the membrane flashing as recommended by the manufacturer.

8. At lintels and shelf angles:

    a. Extend flashing a minimum of 4 inches into masonry at each end.
    b. At heads and sills, extend flashing 4 inches at ends and turn up not less than 2 inches to form end dams.

C. Install mortar guard in masonry cavities immediately above all locations of thru-wall flashing.

D. Install weep holes in head joints in exterior wythes of first course of masonry immediately above thru-wall flashing and as follows:

1. Use specified weep vent products to form weep holes.
2. Unless indicated otherwise, space weep holes 24 inches o.c. maximum, with a minimum of two weeps above every wall opening.

3.13. GROUTING REINFORCED CONCRETE BLOCK WALLS

A. Space reinforcing bars as indicated. Grout masonry cores containing bars completely solid, filling all voids solid with grout. Grout is as specified herein. Do NOT use mortar for grouting.

1. Provide rebar positioners for all vertical reinforcing.
2. Comply with requirements in ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.

3.14. SLUSHING OF HOLLOW METAL DOOR FRAMES

A. Slush hollow metal frame jambs and head where frames are set in masonry and where frame “grouting” is indicated on Drawings. Use Type "N" or “S” mortar. Verify grouting procedure with Architect.

B. Hollow metal frames installed in existing masonry construction are not required to be slushed.

3.15. TOLERANCES

A. Comply with construction tolerances in ACI 530.1/ASCE 6/TMS 602 and with the following:

1. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/4 inch in 10 feet, 1/2 inch in 20 feet, and 1/2 inch maximum in distances greater than 20 feet.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/4 inch in 10 feet, 1/2 inch in 20 feet, and 1/2 inch maximum in distances greater than 20 feet.
3. For exposed bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch. Do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
4. For exposed head joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.
5. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.

3.16. FIELD QUALITY CONTROL

A. The Testing Agency shall prepare and submit test and inspection reports, noting all deficiencies, corrective actions, and retest results.

B. Additional Tests: Testing and inspecting agency shall make additional tests when test results indicate that requirements have not been satisfied. This additional testing will be at the Contractor’s expense.

1. Masonry will be considered defective if it does not pass tests and inspections.

3.17. REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units which are loose, chipped, broken, stained or otherwise damaged, or when units do not match adjoining units. Provide new units to match adjoining units and install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids or holes, except weep holes, and completely fill them with mortar. Point all joints at corners, openings and adjacent work to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Clean exterior masonry units with specified cleaning solution to remove excess mortar, dirt, stains, etc. Apply in accordance with manufacturer's recommendations.

    a. Test cleaning methods on sample wall panel or areas not normally exposed to view and not near entrances; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
    b. Protect all surfaces recommended by cleaning solution manufacturer.
    c. Protect all metals, including flashings. Protect all adjacent or adjoining work such as louvers, windows, curtain wall, etc.

E. Waste Removal: Remove all waste from site and legally dispose of off Owner's property.

END 04 2000

1. GENERAL

1.1. WORK INCLUDES

A. Contractor provide:

1. Fabrication and erection of structural steel shown on the drawings. Structural steel consists of framing members and related items that support floor decks, walls, roofs, mechanical and electrical equipment.
2. Baseplates, anchor bolts, plates, and rods.
3. Shrinkage-resistant grout under baseplates and bearing plates.
4. Welding and bolting of connections.
5. Loose lintels
6. Galvanizing of steel components.
7. Shop Painting
8. Shear stud connectors.
9. Steel framing and supports for overhead doors.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 3300 - Submittal Procedures
2. Section 01 4000 – Quality Requirements: Testing responsibility.
3. Section 01 6000 - Product Requirements
4. Section 03 3000 - Concrete
5. Section 04 2000 - Unit Masonry
6. Section 05 2100 - Steel Joists
7. Section 05 3100 - Steel Deck
8. Section 05 5000 - Metal Fabrications
9. Section 09 9100 - Paint and Coatings

1.3. REFERENCES

A. Publication Dates: Comply with standards in effect as of the date of the Contract Documents unless otherwise indicated.

B. American Society for Testing and Materials (ASTM):

1. ASTM A36 - Structural Steel
2. ASTM A53 - Hot-Dipped, Zinc-coated Welded and Seamless Steel Pipe
3. ASTM A27 - Standard Specification for Steel Castings, Carbon, for General Application
4. ASTM A108 - Steel Bars, Carbon, Cold-Finished, Standard Quality
5. ASTM A123 - Zinc (Hot Dipped Galvanized) Coatings on Iron and Steel Products
6. ASTM A153 - Zinc Coating (Hot Dip) on Iron and Steel Hardware
7. ASTM A307 - Carbon Steel Externally Threaded Standard Fasteners
8. ASTM A325 - High Strength Bolts for Structural Steel Joints
9. ASTM A490 - Quenched and Tempered Alloy Steel Bolts for Structural Steel Joints
10. ASTM A500 – Cold-Formed Welded and Seamless Carbon Steel Structural Tubing
11. ASTM A501 - Hot-Formed Welded and Seamless Carbon Steel Structural Tubing
12. ASTM A992 – Structural Steel

13. ASTM A1085 – Cold-Formed Welded Carbon Steel Hollow Structural Sections (HSS)
14. ASTM F1554 – Anchor Rods

C. AWS A2.0 - Standard Welding Symbols

D. AWS D1.1 - Structural Welding Code

E. AISC - Specification for the Design, Fabrication and Erection of Structural Steel for Buildings

F. SSPC - Steel Structures Painting Council

1.4. SYSTEM DESCRIPTION

A. General: Unless otherwise specifically approved in writing, furnish exact sections, weights, and kinds of materials specified, using details and dimensions shown.

1. Not all connections are detailed; similar details apply to similar conditions, unless otherwise indicated. Contact the Architect promptly to verify design of members or connections in any situation where design requirements are unclear.

1.5. SUBMITTALS

A. Submit in accordance with Section 01 3300:

B. Action Submittals:

1. Shop Drawings: Show fabrication of structural-steel components.

a. Submit shop drawings showing complete details and schedules for the fabrication, shop assembly and erection of members, including information on locations, type, and size of all bolts and welds, distinguishing between those made in the shop and those made in the field.
b. Indicate profiles, sizes, spacing, and locations of structural members, openings, attachments, fasteners, connections, etc.
c. Include embedment drawings.
d. Indicate welded connections with AWS welding symbols, distinguishing between shop and field welds. Indicate size, length and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
e. Indicate members not to be shop primed.
f. Prepare complete shop drawings and erection drawings based on current AISC Specifications.
g. Shop drawings shall show size, shapes, locations, quantities, and materials. Drawings shall also indicate methods of connection, anchoring, fastening, and bracing (all clearly distinguishing field welding and bolting from shop work).
h. Where field dimensions are possible to obtain before shop drawings are made, those dimensions shall be shown on the drawings and noted as having been verified in the field.
i. All steel members shall be match marked on the erection drawings.
j. Delegated Design Submittal - Connections: For structural steel connections not designed or detailed on the construction documents, provide design, details and analysis date signed and sealed by the qualified professional engineer responsible for their preparation.

k. Delegated Design Submittal – General: For structural steel fabrications indicated on Drawings to comply with design loads, include analysis, details and analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

2. Product Data:

a. High Strength bolt-nut-washer assemblies
b. Shear stud connectors
c. Anchor rods
d. Threaded rods
e. Shop primer
f. Galvanized steel primer
g. Shrinkage resistant grout

C. Informational Submittals.

1. Statement of Qualifications:

a. Welding Certificates.
b. Fabricators: Submit a written description of fabrication ability including facilities, personnel and list of similar completed projects.
c. Erectors: Submit a written description of structural steel erection ability including equipment, personnel and a list of similar completed projects.

2. Product Test Reports: Provide product test reports for the following:

a. Mill test reports for structural steel, including chemical and physical properties.
b. Paint Compatibility Reports: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
c. Bolts, nuts, and washers, including mechanical properties and chemical analysis
d. Direct-tension indicators
e. Tension-control, high strength bolt-nut-washer assemblies
f. Shear stud connectors
g. Shop primers
h. Non-shrink grout

1.6. QUALITY ASSURANCE

A. Codes and Standards: Comply with the provisions of the following:

1. AISC 360
2. AISC 303
3. RCSC's Specifications for Structural Joints using ASTM A325 or A490 Bolts
4. SSPC - Steel Structure Painting Council specifications.

B. Qualifications for Welding Work:

1. Qualify welding procedures and welding personnel in accordance with the AWS D1.1 "Structural Welding Code - Steel".
2. When recertification of welders is required, retesting will be the Contractor's responsibility.

3. Shear connector welds shall be inspected and tested according to the requirements of AWS D1.1 for steel welding and as follows:

    a. Shear connector welds shall be visually inspected.
    b. Bond tests shall be performed when visual inspections reveal less than a continuous 360° flash or welding repairs to any shear connector.

C. Design of Members and Connections:

1. Provide members and connections as shown.
2. Where connections are not shown, design connections in accord with AISC specifications.
3. Promptly notify the Architect whenever design of members, connections, and design loads for any portion of the structure are not clearly indicated.
4. Design connections not detailed on the Drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State of Missouri.

D. Fabrication:

1. All workmanship must be first class in all respects, and any members not representing a finished and workmanlike appearance will be rejected. All finished members shall be free from twists, bends, other distortions, and open joints.
2. Verify all dimensions given on the drawings and make such field measurements as are necessary to lay out the work properly. The Contractor shall be fully responsible for accuracy of all measurements and layout of the work.
3. Use care in storing, handling, and erecting all material and support properly at all times to insure that no piece will be bent, twisted, or otherwise damaged. Material damage shall be corrected at the Contractor's expense, to the approval of the Architect before final acceptance.
4. There shall be no "burning" in the field without the express consent of the Architect. If consent is given, the burned members shall be finished to an acceptable appearance, which shall be the equal of a sheared finish. Burning of holes will not be permitted either in the shop or in the field.

E. Qualifications of:

1. Steel Fabricator: A qualified fabricator that participates in the AISC Quality Certification Program and is designated as AISC-Certified plant, Category BU with not less than five years documented experience in the fabrication of structural steel components or a qualified fabricator who has established and maintains a quality control procedure plan and provides inspections to insure that their work is performed in full compliance with the Specification for Structural Steel Buildings, chapter N and IBC section 1704.
2. Steel Erector: A qualified installer with no less than five years documented experience in the erection of structural steel projects of similar size and complexity.
3. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.1

1.7. DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the site at such intervals to insure uninterrupted progress of the work.

B. Deliver anchor rods and anchorage devices, which are to be embedded in cast-in-place concrete or masonry, in ample time to not delay that work.

C. Store materials to permit easy access for inspection and identification. Keep steel members off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.

1. Do not store materials on the structure in a manner that might cause distortion or damage to the members of the supporting structures. Repair or replace damaged materials or structures as directed.

D. Deliver and store fasteners in a protected place in sealed containers with manufacturer's labels intact.

1. Clean and relubricate bolts and nuts that have become dry or rusty before use.
2. Comply with manufacturer's recommendations for cleaning and lubricating ASTM F3125, Grade 1852 bolt assemblies and for retesting bolt assemblies after lubrication.
3. Fasteners may be repackaged provided testing agency observes repackaging and seals containers.

1.8. COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions and directions for installation.

1.9. FIELD MEASUREMENTS

A. Verify that field measurements are as shown on drawings.

2. PRODUCTS

2.1. PERFORMANCE REQUIREMENTS

A. Comply with applicable provisions of the following specifications and documents.

1. ANSI/AISC 303.
2. ANSI/AISC 341
3. ANSI/AISC 360
4. RCSC's "Specification for Structural Joints Using High-Strength Bolts."

B. Connection Design Information:

1. Design connections and final configuration of member reinforcement at connections which is required, in accordance with ANSI/AISC 303 by fabricator's qualified professional engineer.
   a. Use Allowable Stress Design; data given at service load level.
2. Moment Connections: Type PR; partially restrained.

2.2. MATERIALS-STRUCTURAL STEEL

A. Structural Steel Members, W-Shapes: ASTM A992.
B. Channels, Angles, M Shapes, S Shapes, Plate and Bar: ASTM A36.

C. Cold Formed Hollow Structural Sections:

1. ASTM A1085, structural tubing.
2. ASTM A500 Grade B, structural tubing in rounds and shapes.

2.3. MATERIALS – BOLTS, CONNECTORS, RODS AND ANCHORS

A. Shear Stud Connectors: ASTM A108, Grade 1015 through 1020, cold finished carbon steel, AWS D1.1, type B.

B. High-Strength Bolts, Nuts and Washers:

1. High Strength Bolts: ASTM F3125, Grade A325 or Grade A490, Type 1, heavy-hex steel structural bolts.
2. Nuts: ASTM A 563, Grade DH, heavy-hex carbon-steel nuts.
3. Washers: ASTM F 436, Type 1, hardened carbon-steel.

a. Washers for Slotted Holes: When slotted holes occur in the outer ply of a connection, an ASTM F 436 washer or 5/16" thick common plate washer shall be used as required to completely cover the hole.
b. Washers for Sloping Surfaces: When the outer face of a joint has a slope that is greater than 1:20 with respect to a plane that is normal to the bolt axis, an ASTM F436 beveled washer shall be used to compensate for the lack parallelism.

4. Finish: Plain

C. Tension Controlled, High Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, Heavy-hex or round head assemblies consisting if steel structural bolts with splined ends, heavy-hex carbon steel nuts, and hardened carbon steel washers. Use at contractor's option for field connections requiring high-strength bolts.

1. Finish: Plain

D. Headed Anchor Rods: ASTM F1554, Grade 36, straight.

1. Nuts: ASTM A 563 heavy-hex carbon-steel nuts.
2. Plate Washers: ASTM A 36 carbon steel.
3. Washers: ASTM F 436, Type 1, hardened carbon steel.
4. Finish: Plain

E. Welding Materials: Comply with AWS Code requirements.

F. Threaded Rods: ASTM A36.

1. Nuts: ASTM A63 hex carbon steel.
2. Washers: ASTM F436, Type 1, hardened carbon steel.
3. Finish: Plain

2.4. MATERIALS - MISCELLANEOUS

A. Shrinkage Resistant Grout:

1. Metallic, Shrinkage Resistant Grout: ASTM C 1107, factory-packaged, metallic aggregate grout, mixed with water to consistency suitable for application and a 30-minute working time.

2. Non-metallic, Shrinkage Resistant Grout: ASTM C 1107, factory-packaged, non-metallic aggregate grout, noncorrosive and non-staining, mixed with water to a consistency suitable for application and a 30-minute working time.

a. For use under baseplates at the exterior of the building and under baseplates where non-staining grout is required.

2.5. FABRICATION

A. Shop Assembly - General: Fabricate according to AISC 303 "Code of Standard Practice for Steel Building and Bridges" and AISC 360 and as indicated on the final shop drawings. Shop fabricate and assemble to greatest extent possible.

1. Identify high-strength structural steel according to ASTM A6 and maintain markings until structural steel has been erected.
2. Mark and match-mark materials for field assembly.
3. Fabricate beams with rolling camber up.
4. Complete structural-steel assemblies, including welding of units, before starting shop priming operations.

B. Cleaning: Clean and prepare steel surfaces that are to remain unpainted.

C. Loose Steel Lintels:

1. Provide loose structural steel lintels for all openings and recesses in masonry walls and partitions, including openings required by mechanical equipment, as detailed or indicated in the lintel schedule.
2. When the lintel is not indicated or detailed on the structural drawings, coordinate the lintel required from the lintel schedule based on the opening width and the wall thickness.
3. Weld adjoining members together to form a single unit where indicated.
4. Provide not less than 8" bearing at each side of openings, unless otherwise shown, scheduled or specified.
5. Paint interior lintels.
6. Galvanize all exterior lintels.

D. Shear Stud Connectors:

1. Space shear stud connectors equally along length of beam, unless indicated otherwise.
2. Prepare steel surfaces as recommended by manufacturer of shear connectors.
3. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer's written instructions.

E. Grind welds smooth when they are exposed in the finished work or the weld is detailed.

F. Connections:

1. Combinations of bolts and welds in the same connections are not permitted, unless otherwise detailed on the drawings.
2. Weld or bolt shop connections.
3. Bolt field connections, except where welded connections or other connections are indicated on the drawings.
4. Provide high-strength bolts and nuts where shown.

    a. Bolting: Complying with requirements of AISC "Specification for Structural Joints Using ASTM A325 or A490 Bolts".
    b. Joint Type: Snug tightened.

G. Welded Constructions:

1. Comply with AWS Code for procedures, appearance and quality of welds, and for methods used in correcting welding work.
2. Stress relieved welded assemblies by heat treatment.
3. Built-up Sections: Assemble and weld by methods that will produce aligned axes without warp.

H. Holes:

1. Baseplate Holes: Drill, mechanically thermal cut or punch holes perpendicular to the steel surface.
2. Provide holes required for securing other work to structural steel framing, and for the passage of other work through steel framing members as indicated.
3. Cut, drill, or punch holes perpendicular to metal surfaces. Do not thermally cut holes or enlarge holes by burning.
4. Weld threaded nuts to framing and other specialty items indicated to receive other work.

I. Thermal Cutting: Perform all thermal cutting by machine. Plane thermally cut edges that are to be welded to comply with requirements in AWS D1.1.

J. Finishing: Accurately mill ends of columns and other members that must transmit loads in bearing. Provide bearing plates under beams and columns resting on piers, foundations, walls, etc. Attach bearing plates to items being supported by welding.

2.6. SHOP PREPARATION AND PRIMING

A. Shop prime all structural steel members except for the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2”.
2. Surfaces to field welded.
3. Surfaces to be high-strength bolted with slip critical connections.
4. Galvanized surfaces.

B. Surface Preparation:

1. Clean surfaces to be painted. Remove rust and mill scale and splatter, slag or flux deposits. Prepare surfaces according to the following specifications and standards.

    a. SSPC - SP2, “Hand-tool Cleaning”.

b. SSPC - SP3, “Power-tool Cleaning”.
c. SSPC – SP7, “Brush-off Blast Cleaning”.

C. Structural Steel Primer:

1. Fabricator’s standard lead and chromate free, non-asphaltic, rust-inhibiting primer and compatible with the topcoat.
2. Application: Immediately after surface preparation, apply structural steel primer in accordance with manufacturer's written instructions and at a rate recommended by SPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that will result in full coverage of joints, corners, edges, and all exposed surfaces.

a. Stripe paint corners, crevices, bolts, welds and sharp edges.
b. Apply two coats of paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from the first.

D. Shop Painting:

1. Application: Prepare steel and apply a one coat, non-asphaltic primer complying with SSPC-PS Guide 7.00, “Painting System Guide 7.00: Guide for Selecting One-Coat Shop Painting Systems,” to provide a dry film thickness of not less than 1.5 mils.

2.7. GALVANIZING

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot dip process to structural steel according to ASTM A123.

1. Galvanize all lintels and shelf angles located in exterior walls.

B. Galvanizing Repair Paint: SSPC-Paint 20.

2.8. SOURCE QUALITY CONTROL

A. The Testing Agency shall perform the following tests and inspections.

1. Special Inspections: Verify and inspect the structural steel in accordance with IBC Section 1704.3, including field welds and high-strength bolted connections, and as indicated below:

a. Bolted Connections: Bolted connections will be inspected according to RCSC’s “Specification for Structural Joints Using ASTM A325 or ASTM A490 Bolts”.
b. Welded Connections: Field welds will be visually inspected according to AWS D1.1.

2. Fabricator shall provide Testing Agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
3. In addition to visual inspection, test and inspect shop-welded shear connectors according to requirements in AWS D1.1 for stud welding as follows:

a. Perform bend tests if visual inspections reveal either a less than continuous 360-degree flash or welding repairs to any shear connector.
b. Conduct tests according to requirements in AWS D1.1 on additional shear connectors if weld fracture occurs on shear connectors already tested.

B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

3. EXECUTION

3.1. EXAMINATION

A. Examine the areas and conditions under which structural steel work is to be installed.

1. Verify elevations of concrete and masonry bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with construction documents.
2. Notify the Architect in writing of conditions detrimental to the proper and timely completion of the work.
3. Do not proceed with the work until unsatisfactory conditions have been corrected.

B. Beginning of installation means erector accepts existing conditions.

3.2. PREPARATION

A. Temporary Shoring and Bracing: Provide temporary shores, guys, braces and other supports during erection with connections of sufficient strength to bear imposed loads. Remove temporary members and connections when permanent members are in place and final connections are made. Provide temporary guy lines to achieve proper alignment of the structures as erection proceeds.

3.3. ERECTION

A. Erect structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.

B. Allow for erection loads, and for sufficient temporary bracing to maintain structure safe, plumb, and in true alignment until completion of erection and installation of permanent bracing.

C. Do not field cut or alter structural members without approval of Architect.

D. Comply with AISC Specifications and Code of Standard Practice, and as herein specified. Maintain work in a safe and stable condition during erection.

E. Anchor Rods:

1. Furnish anchor rods and other connectors for securing structural steel to foundations and other in-place work.
2. Furnish templates and other devices for presetting rods and other anchors to accurate locations.
3. Refer to Section 03 3000 for anchor rod installation in concrete.
4. Refer to Section 04 2000 for anchor rod installation in masonry.

F. Base Plates and Bearing Plates:

1. Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen surface to improve bond. Clean the bottom surface of base plate.
2. Set loose and attached base plates for structural members on wedges, shims, or other adjusting devices as required.
3. Weld plate washers to top of baseplates.

4. Tighten anchor rods after the supported members have been positioned and plumbed. Do not remove wedges or shims, but when protruding, cut off flush with the edge of the base plate prior to packing with grout.
5. Promptly pack grout solidly between bearing surfaces and bases or plates to ensure that no voids remain. Neatly finish exposed surfaces, protect installed materials, and allow to cure.

G. Bolting:

1. Install high strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A325 or A490 Bolts" for type of bolt and type of joint specified.
2. The bolts shall be tightened to the "Snug tight" condition.

H. Welding:

1. Comply with AWS D1.1 for tolerances, appearances, welding procedure specifications, weld quality and methods used in correcting welding work.
2. 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. Remove backing bars or runoff tabs when exposed in the finished structure, back gouge and grind steel smooth.
4. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC 303 "Code of Standard Practice for Steel Building and Bridges" for mill material.

I. Field Assembly:

1. Set structural members to the lines and elevations indicated. Align and adjust the various members that form a part of a complete frame or structure before permanently fastening. Clean bearing surfaces and other surfaces that will be in permanent contact with members before assembly. Adjust to compensate for discrepancies in elevations and alignment.

    a. Level and plumb individual members of structure
    b. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.

2. Splice members only where indicated.
3. Do not enlarge unfair holes in members by burning or by the use of drift pins, except in secondary bracing members. Ream holes that must be enlarged to admit bolts.
4. Do not use thermal cutting in the field for correcting fabrication errors in the structural framing. Cutting will be permitted only on secondary members that are not under stress, as acceptable to the Architect. Finish thermal cut sections within smoothness limits of AWS D1.1.

J. After erection, prime welds, abrasions and surfaces not shop primed, except surfaces to be in contact with concrete.

1. Touch-up paint field welds and abraded areas of the shop paint on structural steel after properly cleaning all areas to receive touch-up paint.
2. Clean all steel of dirt, mud, grease, and the like, leaving all steel in a condition to receive finish paint coats.
3. Paint to match shop paint.
4. Touch-up and cleaning shall be the erector's responsibility.

K. Grout under baseplates in accordance with Section 03 3000.

L. Shear Connectors: Prepare steel surfaces as recommended by manufacturer. Use automatic end welding of headed-stud connectors according to AWS D1.1 and manufacturer's written instructions.

3.4. ERECTION TOLERANCES

A. Maintain erection tolerances of structural steel within AISC 303 "Code of Standard practice for Steel Buildings and Bridges" or as stated below.

1. Maximum Variation from Plumb: 1/4" per story, non-cumulative.
2. Maximum Offset from True Alignment: 1/4".

3.5. FIELD QUALITY CONTROL

A. The Testing Agency shall perform the following tests and inspections:

1. Special Inspections: Verify and inspect the structural steel in accordance with IBC Section 1704.3, including field welds and high-strength bolted connections, and as indicated below:

a. Verify structural steel materials and inspect steel frame joint details.

b. Bolted Connections: Bolted connections will be inspected according to RCSC's "Specification for Structural Joints Using ASTM A325 or ASTM A490 Bolts".

c. Welded Connections: Field welds will be visually inspected according to AWS D1.1.

1) Verify weld materials and inspect high strength bolted connections.
2) Verify connection materials and inspect high-strength bolted connections
3) Provide continuous inspection of the following welded joints:

a) Complete and partial penetration groove welds.
b) Multi-pass fillet welds.
c) Single pass fillet welds > 5/16"
d) Plug and Slot Welds

4) In addition to visual inspection, test and inspect field welds according to AWS D1.1.

d. Field-welded Shear Connectors: Visually inspect and test field-welded shear connectors according to requirements in AWS D1.1 for stud welding and as follows:

1) Perform bend tests if visual inspections reveal either a less-than-continuous 360 degree flash or welding repairs to any shear connector.
2) Conduct tests on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1.

B. The Testing Agency shall prepare and submit test and inspection reports, noting all deficiencies, corrective actions, and retest results.

C. Additional Tests: Testing and inspecting agency shall make additional tests when test results indicate that requirements have not been satisfied. This additional testing will be at the Contractor's expense.

1. The Work will be considered defective if it does not pass tests and inspections. The Contractor will make all corrections at the Contractor's expense.

3.6. REPAIRS AND PROTECTION

A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A780.

B. Touchup Priming and Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA1 for touching up shop-painted surfaces.

1. Clean and prepare surfaces by SSPC-SP2 hand tool cleaning or SSPC-SP3 power-tool cleaning.

END 05 1200

1. GENERAL

1.1. WORK INCLUDES

A. Contractor provide:

1. Open web steel joists, with bridging, attached seats, anchors and extended ends where indicated.
2. Framing for openings greater than 12".
3. Joist accessories required for proper installation of steel joists.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 3300 - Submittal Procedures
2. Section 01 4000 – Quality Requirements: Testing responsibility.
3. Section 01 6000 - Product Requirements
4. Section 04 2000 - Unit Masonry
5. Section 05 1200 - Structural Steel
6. Section 05 3100 - Steel Deck
7. Section 05 5000 - Metal Fabrications
8. Section 09 9100 - Paint and Coatings

1.3. REFERENCES

A. Publication Dates: Comply with standards in effect as of the date of the Contract Documents unless otherwise indicated.

B. American Society for Testing and Materials (ASTM):

1. ASTM A108 - Steel Bars, Carbon, Cold-Finished, Standard Quality
2. ASTM A325 - High Strength Bolts for Structural Steel Joints
3. ASTM F1554 – Anchor Rods

C. AWS D1.1 - Structural Welding Code

D. SJI - Standard Specifications for Open Web Steel Joists

E. SSPC - Steel Structures Painting Council

1.4. DEFINITIONS

A. SJI Specifications: Steel Joist Institute's "Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders."

B. Special Joists (SP): Steel joists or joist girders requiring modification by manufacturer to support non-uniform, unequal or special loading conditions that invalidate load tables in SJI's "Specifications".

1.5. PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide special joists and connections capable of withstanding design loads indicated.

B. Design special joists to withstand design loads with live load deflections no greater than the following:

1. Roof Joists: Vertical deflections of l/240 of the span.

1.6. SUBMITTALS

A. Submit in accordance with Section 01 3300:

1. Action Submittals:

a. Shop Drawings:

1) Indicate standard designations, configuration, sizes, spacing, locations of joists, joist leg extensions, bridging, etc.
2) Submit detailed shop drawings showing layout of joist units, special connections, jointing, and accessories.

a) Include the mark, number, type, location, and spacing of joists and bridging.
b) Indicate locations and details of bearing plates to be embedded into other construction.

2. Informational Submittals:

a. Qualification Data.
b. Welding Certificates.
c. Manufacturer's Certificates.
d. Paint Compatibility Certificates: From manufacturers of topcoats applied over primers, certifying that shop primers are compatible with topcoats.
e. Mill Certificates: For each type of bolt.
f. Field quality control reports

1.7. QUALITY ASSURANCE

A. General: Provide joists fabricated as specified in the contract documents and which comply with the Steel Joist Institutes' (SJI) "Standard Specifications, Load Tables, and Weight Tables" for type of joists required.

1. Special Joists: Joists with non-standard or special loading conditions should be designed and fabricated to comply with the loading and performance requirements indicated.

B. Welding Qualifications: Qualify welding procedures and personnel in accordance with the American Welding Society's "Structural Welding Code, Steel" (AWS D1.1).

C. Manufacturer Qualifications: A manufacturer certified by SJI to manufacture joists complying with the applicable standard specifications and load tables in SJI's "Specifications".

1. Manufacturer's responsibilities include providing professional engineering services for designing special joists to comply with performance requirements.
2. Design connections not detailed on the Drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State of Missouri.

D. Erector: Company specializing in performing the work of this Section with minimum 5 years documented experience

1.8. DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site under provisions of Section 01 6000 and to SJI specifications.

B. Store and protect products under provisions of Section 01 6000 and to SJI specifications.

C. Protect joists from corrosion, deformation and other damage during delivery, storage and handling.

D. Damaged Joists: Repair or replace as directed by the Architect.

1.9. SEQUENCING

A. Deliver steel bearing plates to be built into cast in place concrete and masonry construction.

1.10. FIELD MEASUREMENTS

A. Verify that field measurements are as shown on Drawings and shop drawings prior to fabrication of joists.

2. PRODUCTS

2.1. PERFORMANCE REQUIREMENTS

A. Structural performance: Provide special joists, joist girders and connections capable of withstanding design loads, both standard and non-standard, indicated on the Drawings.

1. Use ASD; data are given at service load level.
2. Design special joists to withstand design loads with live load deflections no greater than the following:

a. Roof Joists: Vertical deflection of 1/240 of the span.

2.2. STEEL JOISTS

A. K-Series Steel Joist: Manufactured steel joists of type indicated according to "Standard Specification for Open Web Steel Joists, K-Series" in SJI's "Specifications" with steel angle top and bottom chord members, underslung ends and parallel top chord.

1. Joist Type: K-Series and KCS type K-Series steel joists.

2. K-Series Joist Substitutes: Manufacturer according to "Standard Specification for Open Web Steel Joists, K-Series" in SJI's "Specifications" with steel angle, tube to channel members.
3. Provide holes in chord members for connecting and securing other construction to joists.
4. Top Chord Extensions/ Extended Ends: Extend top chords of joists/ bearing ends of joists, with SJI's Type S or Type R extensions where indicated on drawings and details.
5. Camber joists according to SJI "Specifications".
6. Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes if joist slope exceeds 1/4 inch per 12 inches.

B. Long-Span Steel Joist: Manufacture steel joists according to "Standard Specification for Longspan Steel Joists, LH-Series and Deep Longspan Series, DLH-Series" in SJI's "Specifications", with steel angle top and bottom chord members, of joist type and end and top chord arrangement as follows:

1. Joist Type: LH-Series long span steel joists.
2. End Arrangement: Underslung.
3. Top Chord Arrangement: Parallel.
4. Provide holes in chord members for connection and securing other construction to joists.
5. Camber long span joists according to SJI's "Specifications".
6. Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes if joist slope exceeds 1/4 inch per 12 inches.

2.3. STEEL JOIST ACCESSORIES

A. Bridging:

1. Provide bridging anchors and number of rows of bridging, horizontal and/or diagonal, of material size and type as required by SJI's "Specifications" for type of joist, chord size, spacing and span. Furnish additional erection bridging if required for stability.
2. Coordinate location and relocation of joist bridging with other trades and provide additional bridging as necessary to avoid bridging conflict with floor/ roof openings, ductwork, mechanical equipment, etc.

B. Bearing Plates: Fabricate steel bearing plates from ASTM A 36 steel with integral anchorages of sizes and thickness indicated on Drawings. Shop prime paint bearing plates.

C. High Strength Bolts, Nuts and Washers: ASTM F3125, Grade A325 Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH heavy-hex carbon steel nuts; and ASTM F436, Type 1, hardened carbon steel washers.

1. Finish: Plain finish.

D. Welding Electrodes: Comply with AWS standards.

E. Furnish miscellaneous accessories, including splice plates and bolts required by joist manufacturer to complete joist assembly.

2.4. CLEANING AND SHOP PAINTING

A. Clean and remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories by hand-tool cleaning, SSPC-SP2 or power-tool cleaning, SSPC-SP3.

B. Apply one shop coat of shop primer to steel joists and accessories by spray, dipping, or other method to provide a continuous dry paint film thickness of not less than 1 mil.

3. EXECUTION

3.1. EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work. Examine supporting substrates, embedded bearing plates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance. Notify the Architect in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

B. Beginning of installation means erector accepts existing conditions.

3.2. ERECTION

A. General: Do not begin placement of steel joists until supporting work is in place and secured. Erect and bear joists on solid supports.

B. Install joists and accessories plumb, square and true to line; securely fasten to supporting construction according to SJI's "specifications", joist manufacturer's written instructions and requirements of this section.

1. Before installation, splice joists delivered to the project site in more than one piece.
2. Space, adjust and align joists accurately in location before permanently fastening to structure.
3. Install temporary bracing, erection bridging, connections and anchors to ensure that joists are stabilized during construction.
4. Delay rigidly connecting bottom chord extensions to columns or supports until dead loads have been applied.

C. Field weld joists to supporting steel bearing plates and framework. Coordinate welding sequence and procedure with placement of joists. Comply with AWS requirements and procedures for welding, appearance and quality of welds and methods used in correcting welding work.

D. Allow for erection loads. Provide sufficient temporary bracing to maintain framing safe, plumb, and in true alignment until completion of erection and installation of permanent bridging and bracing. Do not overload or exceed carrying capacity of any joist during construction period.

E. Provide bridging, connections, and anchors to ensure stability of structure during construction period. Do not remove bridging after construction is completed, unless specifically authorized to do so by the Architect.

1. Install bridging in accordance with SJI requirements.
2. Bridging installation shall proceed concurrently with joist erection and shall be completed before construction loads are applied to joists.
3. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams.

F. Position and field weld joist chord extensions and wall attachments where detailed.

G. Frame openings greater than 12" with supplementary framing.

H. Do not permit erection of decking until joists are braced, bridged, and secured.

I. Do not field cut or alter structural members without approval of joist fabricator.

3.3. FIELD QUALITY CONTROL

A. The Testing Agency shall perform the following tests and inspections:

1. Special Inspections: Verify and inspect the structural steel in accordance with IBC Section 1704.3, including field welds and high-strength bolted connections, and as indicated below:

a. Bolted Connections: Bolted connections will be inspected according to RCSC's "Specification for Structural Joints Using ASTM A325 or ASTM A490 Bolts".
b. Welded Connections: Field welds will be visually inspected according to AWS D1.1.

B. The Testing Agency shall prepare and submit test and inspection reports, noting all deficiencies, corrective actions, and retest results.

C. Additional Tests: Testing and inspecting agency shall make additional tests when test results indicate that requirements have not been satisfied. This additional testing will be at the Contractor's expense.

1. The Work will be considered defective if it does not pass tests and inspections. The Contractor will make all corrections at the Contractor's expense.

3.4. CLEANING, REPAIRS AND PROTECTION

A. Remove all excess materials and debris. Work shall be neat and clean and in satisfactory condition for installation of related work.

B. Repair damaged galvanized coatings on galvanized items with galvanizing repair paint in accordance with ASTM A780 and manufacturer's written instructions.

C. Touch-up Painting: After installation, promptly clean, prepare and prime or re-prime field connections, rust spots and abraded surfaces of primed joists, bearing plates and accessories.

1. Clean and prepare surfaces by hand-tool cleaning according to SSPC-SP2 or power-tool cleaning according to SSPC-SP3.
2. Apply a compatible primer of the same type as primer used on adjacent surfaces.

D. Provide final protection and maintain conditions in a manner acceptable to the manufacturer and installer, that ensure that joists and accessories are without damage or deterioration at time of substantial completion.

END 05 2100

1. GENERAL

1.1. WORK INCLUDES

A. Contractor provide:

1. Steel deck work, including basic layout, types and depth of deck units as shown on the drawings, including:

   a. Roof Deck
   b. Acoustical Roof Deck
   c. Composite Floor Deck

2. Framing for openings up to and including 12".
3. Formed steel and miscellaneous accessories.
4. Qualified independent Testing Agency to provide Field Quality Control testing specified herein.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 3300 - Submittal Procedures
2. Section 01 4000 – Quality Requirements: Testing responsibility.
3. Section 01 6000 - Product Requirements
4. Section 03 3000 - Concrete
5. Section 04 2000 - Unit Masonry
6. Section 05 1200 - Structural Steel
7. Section 05 2100 - Steel Joists
8. Section 07 2100 - Building Insulation
9. Section 09 9100 - Paint and Coatings

1.3. REFERENCES

A. Publication Dates: Comply with standards in effect as of the date of the Contract Documents unless otherwise indicated.

B. ANSI/AWS D1.1 - Structural Welding Code - Steel; American Welding Society.

C. ANSI/AWS D1.3 - Structural Welding Code - Sheet Steel; American Welding Society.

D. American Society for Testing and Materials (ASTM):

1. ASTM A653 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
2. ASTM A780 – Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
3. ASTM A992- Structural Steel
4. ASTM A1008 – Standard Specification for Steel, Sheet, Cold Rolled, Carbon, High-Strength Low Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.

5. ASTM E329 – Standard Specification for Agencies Engaged in Construction Inspection and/or Testing.

E. Publication No. 31 - Steel Deck Institute Design Manual for Composite Decks, Form Decks, Roof Decks and Cellular Metal Floor Deck with Electrical Distribution; Steel Deck Institute, Inc. (SDI).

F. Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute (AISI).

1.4. SUBMITTALS

A. Submit in accordance with Section 01 3300:

1. Product Data: Submit deck manufacturer's specifications and product information, indicating compliance with specified requirements.

a. Include deck profile characteristics and dimensions, structural properties, and finishes.
b. Include Steel Deck Institute certification of manufacturer's deck characteristics.
c. Include manufacturer's certification of deck characteristics.
d. Submit manufacturer's installation instructions, including specific installation sequence.
e. Submit manufacturer's data on mechanical fasteners.

2. Shop Drawings: Submit detailed drawings indicating layout and types of deck units, anchorage details, reinforcing framing members, pans, cut deck openings, special jointing, accessories, and attachment details to the supporting construction.

3. Calculations: Submit manufacturer's documentation of deck design loads, allowable spans, and section properties.

a. Prepare calculations under seal of a Structural Engineer registered Missouri.
b. Calculate to structural working stress design and maximum vertical deck deflection of l/240 of the span.

4. Welding Certificates.
5. Field Quality Control Reports.

1.5. QUALITY ASSURANCE

A. Codes and Standards: Comply with provisions of the following, except where exceeded by the contract documents or requirements of authorities having jurisdiction:

1. AISI "Specification for the Design of Cold-Formed Steel Structural Members".
2. AWS D1.3 "Structural Welding Code - Sheet Steel."
3. "Steel Deck Institute Design manual for Composite Decks, Form Decks, Roof Decks, and Cellular Metal Floor Deck with Electrical Distribution."

B. Qualifications:

1. Welding qualifications: Qualify procedures and personnel according to AWS D1.3 “Structural Welding Code – Sheet Steel”.

1.6. STORAGE AND HANDLING

A. Deliver products to site under provisions of Section 01 6000.

B. Store and protect products under provisions of Section 01 6000.

1. Protect steel deck from corrosion, deformation and other damage during delivery, storage and handling.

C. Storage: Cut plastic wrap to encourage ventilation. Separate sheets and store units on dry wood sleepers, sloped to promote drainage. Cover with waterproof material ventilated to avoid condensation.

D. Marking: Unless deck units are all of the same gauge and yield strength for the project, mark each unit clearly to identify differences.

2. PRODUCTS

2.1. PERFORMANCE REQUIREMENTS

A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Structural members".

2.2. MANUFACTURERS

A. Products of the following manufacturers, provided they comply with requirements of the contract documents, will be among those considered acceptable:

1. Consolidated Systems, Inc.
2. Vulcraft Division/Nucor Corporation
3. Wheeling Corrugating Company Division/Wheeling-Pittsburgh Steel Corporation
4. United Steel Deck, Inc.
5. CMC Joist and Deck
6. New Millennium Building Systems

2.3. FABRICATION - ROOF DECK

A. Roof Deck Units – RD1: Fabricate deck units without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following parameters:

1. Galvanized-Steel Sheet: ASTM A 653, Structural Steel (SS) Grade 33, G 60 zinc coating.
2. Deck Profile: Type WR, wide rib.
3. Profile Depth: 1 ½".
4. Design Uncoated-Steel Thickness: 0.0358 inch.
5. Span Condition, Minimum: Double Span.
6. Side Laps: Overlapped or interlocking seams at Contractor's option.

B. Roof Deck Units – RD2: Fabricate deck units without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following parameters:

1. Galvanized-Steel Sheet: ASTM A 653, Structural Steel (SS) Grade 33, G90 zinc coating.
2. Deck Profile: Type WR, wide rib.

3. Profile Depth: 2".
4. Design Uncoated-Steel Thickness: 0.0474 inch.
5. Span Condition, Minimum: Double Span.
6. Side Laps: Overlapped or interlocking seams at Contractor's option.

2.4. FABRICATION – ACOUSTICAL ROOF DECK

A. Acoustical Roof Deck Units – RD2A: Fabricate deck units without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following parameters:

1. Galvanized-Steel Sheet: ASTM A 653, Structural Steel (SS) Grade 33, G 60 zinc coating.
2. Deck Profile: Type WR, wide rib.
3. Profile Depth: 2".
4. Design Uncoated-Steel Thickness: 0.0474 inch.
5. Span Condition, Minimum: Double Span.
6. Side Laps: Overlapped or interlocking seams at Contractor's option.
7. Acoustical Perforations: Deck units with manufacturer's standard perforated vertical webs. Sound-Absorbing Insulation: Manufacturer's standard, pre-molded, roll or strip of glass fiber or mineral fiber.

2.5. FABRICATION – COMPOSITE FLOOR DECK

A. Composite Floor Deck Units – CD1: Fabricate panels with integrally embossed or raised pattern ribs and interlocking side laps to comply with "SDI Specifications and Commentary for Composite Steel Floor Deck," in SDI Publication No. 31, with the minimum section properties and following parameters indicated:

1. Galvanized-Steel Sheet: ASTM A 653, Structural Steel (SS), Grade 40, G60 zinc coating.
2. Profile Depth: 1 ½ inches.
3. Design Uncoated-Steel Thickness: 0.0358 inch.
4. Span Condition, Minimum: Double Span.
5. Minimum Section properties:

a. Ip = 0.201
b. In = 0.213
c. Sp = 0.224
d. Sn = 0.235

2.6. ACCESSORIES

A. General: Provide manufacturer's standard accessory materials for deck that comply with the requirements indicated.

B. Mechanical Fasteners:

1. Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners.
2. Corrosion-resistant, self-drilling, self-threading screws, No. 10 minimum size.

C. Side Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 8 minimum size.

D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.

E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359 inch design uncoated thickness of same material and finish as deck. Profile as indicated or required for application.

F. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi of same material and finish as deck and of thickness and profile recommended by SDI publication No. 31 for overhang and slab depth.

G. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet of same material, finish and thickness as deck unless otherwise indicated.

H. Weld Washers: Uncoated steel sheet, shaped to fit deck rib, 0.0598 inch thick, with factory-punched hole of 3/8 inch minimum diameter.

I. Flat Sump Plates: Single piece steel sheet, 0.0747 inch thick, of same material and finish as deck. For drains, cut holes in the field.

J. Recessed Sump Pans: Single piece steel sheet, 0.0747 inch thick, of same material and finish as deck, with 3 inch wide flanges and level [sloped] recessed pans of 1 1/2 inch minimum depth. For drains, cut holes in the field.

K. Galvanizing Repair Paint: Complying with ASTM A 780.

3. EXECUTION

3.1. EXAMINATION

A. Examine the supporting frame and field conditions where metal decking is to be installed for compliance with installation tolerance requirements and other conditions affecting performance.

1. Notify the Architect in writing of conditions detrimental to the proper and timely completion of the work.

B. Do not proceed with the work until all unsatisfactory conditions have been corrected.

3.2. INSTALLATION – GENERAL

A. Erect and attach metal decking in accordance with SDI Design Manual for Composite Decks, Form Decks, Roof Decks. Provide welding in accordance with SDI Specifications and AWS D1.1.

B. Locate deck bundles to prevent overloading of supporting structure.

C. Place deck units on supporting members and adjust to final position with ends accurately aligned and bearing on supporting structure before being permanently fastened. Do not stretch or contract side lap interlocks.

D. Place deck units flat and square. Fasten to supporting structure without warp or deflection.

E. Cut and neatly fit deck units and accessories around openings and other work projecting through or adjacent to deck.

F. Comply with AWS requirements and procedures for manual shielded metal arc-welding, appearance and quality of welds and methods used for correcting welding work.

1. Welds: Care shall be exercised in the selection of electrodes and amperage to provide positive welds and to prevent high amperage blowholes. Welds are made from the topside of the deck with the welder immediately following the placement crew. Puddle welds shall be at least 5/8" diameter or elongated welds with an equal perimeter. Fillet welds, when used, shall be at least 1" long. Weld metal shall penetrate all layers of deck material at end laps and side joints and shall have good fusion to the supporting members.

G. Mechanical fasteners may be used in lieu of welding to fasten deck units to structure. Located and install mechanical fasteners according to the deck manufacturer's written instructions.

1. Screws: The allowable load value per screw used to determine maximum fastener spacing for either self-drilling or standard metal type is based on support thickness of 0.06".
2. Powder-actuated or pneumatically-driven fasteners: The allowable load value per fastener used to determine the maximum fastener spacing is based on a minimum structural support thickness of not less than 1/8" and on the fastener providing a 5/16" diameter minimum bearing surface (fastener head size). Powder-actuated and pneumatically-driven fasteners are recognized as viable anchoring methods, providing the type and spacing of said fasteners satisfies the design criteria. Documentation in the form of test data, design calculations, or design charts shall be submitted by the fastener manufacturer as the basis for obtaining approval.

H. Reinforce all deck openings from 6" to 12" in size with 2" x 2" x 1/4" steel angles. Place angles perpendicular to flutes. Extend minimum two flutes each side of opening and weld to deck.

3.3. INSTALLATION-ROOF DECK

A. General: Install deck units and accessories in accordance with SDI specifications, with manufacturer's recommendations, and as specified herein.

1. Fasten deck units to supports promptly after placement and alignment.
2. Do not leave placed sheets unattached at end of working day.
3. Shop drawings: Comply with final shop drawings.

B. End Bearing: Install deck ends over supporting members with a minimum allowable bearing of 1 1/2 inch at steel supports and 4" at non-steel supports with end joints as follows:

1. End Joints: Lapped 2 inches minimum.

C. Fastening: Fasten roof deck units to supporting members as follows:

1. Weld Diameter: 5/8 inch.
2. Weld Spacing: Space welds 12 inches on center average, but not more than 18 inches apart and provide no fewer than two fasteners per deck unit at every support.
3. Weld Washers: Use weld washers when recommended by deck manufacturer and when deck metal thickness is less than 0.028 inch.
4. Mechanical Fasteners: Mechanical fasteners acceptable to the architect may be used in lieu of welds to fasten deck units to the supporting members.
5. Mechanical Fastener Spacing: Space mechanical fasteners 12 inches on center maximum parallel with the deck flute and at each transverse deck flute.

D. Side Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding 24 inches and as follows:

1. Mechanically fasten with self-drilling, No. 8 diameter or larger, carbon-steel screws.
2. Fasten with a minimum of 1 1/2 inch long welds.
3. Do not stretch or contract side lap interlocks.

E. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and mechanically fasten flanges to top of deck. Space fasteners not more than 12 inches apart with at least one fastener at each corner and a minimum two fasteners per side.

F. General Roof Openings:

1. Cut and neatly fit deck units and accessories around other work adjacent to or projecting through decks.
2. Provide additional metal reinforcement (2" x 2" x 1/4" steel angles, min.) and closure pieces as shown or as required for strength, continuity, and support of other work, at openings up to 12" in dimension.

G. Metal Roof Deck Accessories:

1. Fasten metal accessories securely to deck units, using mechanical fasteners as appropriate to conditions. Install accessories as indicated.
2. Install ridge and valley plates, finish strips, end closures and reinforcing channels according to the deck manufacturer’s written instructions. Mechanically fasten metal roof deck accessories to roof deck to provide a complete deck installation.
3. Install continuous 12 inch wide (minimum) sheet steel cover plates, of same thickness and material as deck units, where deck changes direction. Mechanically attach cover plate to deck at 12 inches on center, maximum spacing.

H. 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.

I. Sound Absorbing Insulation: Install sound absorbing insulation into topside ribs of perforated roof deck.

3.4. INSTALLATION - COMPOSITE DECK

A. General: Install deck units and accessories in accordance with SDI specifications, with manufacturer's recommendations, and as specified herein.

1. Fasten deck units to supports promptly after placement and alignment.
2. Do not leave placed sheets unattached at end of working day.
3. Shop drawings: Comply with final shop drawings.

B. End Bearing: Install deck ends over supporting members with a minimum allowable bearing of 1 1/2 inch at steel supports and 4" at non-steel supports with end joints as follows:

1. End Joints: Lapped 2 inches minimum.

C. Fastening: Fasten deck units to supporting members as follows:

1. Weld Diameter: 5/8 inch.
2. Weld Spacing: Space welds 12 inches on center average, but not more than 18 inches apart and provide no fewer than two fasteners per deck unit at every support.
3. Weld Washers: Use weld washers when recommended by deck manufacturer and when deck metal thickness is less than 0.028 inch.
4. Mechanical Fasteners: Mechanical fasteners acceptable to the architect may be used in lieu of welds to fasten deck units to the supporting members.
5. Mechanical Fastener Spacing: Space mechanical fasteners 12 inches on center maximum parallel with the deck flute and at each transverse deck flute.

D. Side Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding 24 inches and as follows:

1. Mechanically fasten with self-drilling, No. 8 diameter or larger, carbon-steel screws.
2. Fasten with a minimum of 1 1/2 inch long welds.
3. Do not stretch or contract side lap interlocks.

E. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder filler to supporting structure according to SDI recommendations unless otherwise indicated.

F. Floor Deck Closures: Weld steel sheet column closures and Z closures to deck, according to SDI recommendations to provide tight-fitting closures at open ends of ribs and sides of deck.

G. General Floor Openings:

1. Cut and neatly fit deck units and accessories around other work adjacent to or projecting through decks.
2. Provide additional metal reinforcement (2" x 2" x 1/4" steel angles, min.) and closure pieces as shown or as required for strength, continuity, and support of other work, at openings up to 12" in dimension.

H. Metal Deck Accessories: Fasten metal accessories securely to deck units and to supporting structure, using welding or mechanical fasteners as appropriate to conditions.

1. Attach steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations unless otherwise indicated.
2. Attach steel sheet column closures, cell closures and z closures to deck according to SDI recommendations to provide tight fitting closures at open ends of ribs and sides of deck.
3. Install steel sheet cover plates at butt joints with gap of more than 1/8".
4. Install steel sheet metal filler strips in voids between decking and other construction.
5. Install other steel sheet metal accessories as required to contain wet concrete.

I. 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.

3.5. FIELD QUALITY CONTROL

A. The Testing Agency shall perform the following tests and inspections:

1. Welded Connections: Field welds will be visually inspected according to AWS D1.1.

B. The Testing Agency shall prepare and submit test and inspection reports, noting all deficiencies, corrective actions, and retest results.

C. Additional Tests: Testing and inspecting agency shall make additional tests when test results indicate that requirements have not been satisfied. This additional testing will be at the Contractor's expense.

1. The Work will be considered defective if it does not pass tests and inspections. The Contractor will make all corrections at the Contractor's expense.

3.6. CLEANING, REPAIR AND PROTECTION

A. Galvanizing Repairs: Prepare and repair all damaged galvanized coating on both surfaces of deck and deck accessories with galvanizing repair paint according to ASTM A 780 and manufacturer's written instructions.

1. Wire brush and clean all rust spots, welds and weld burn marks, and abraded areas on metal deck units after installation.
2. Apply galvanizing repair paint to surfaces according to manufacturer's written instructions.

B. Clear all debris from deck before insulation or concrete is placed.

C. Upon completion of work, remove all rubbish, debris, and excess materials from project site.

D. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END 05 3100

1. GENERAL

1.1. WORK INCLUDES

A. Contractor provide:

1. Fabrication and erection of cold-formed metal framing systems shown on the drawings, including, but not limited to:

    a. Non-load bearing wall framing.
    b. Soffit framing.
    c. Parapet framing.
    d. Miscellaneous cold formed framing.

2. All accessories required for the proper installation of the cold-formed metal framing systems.
3. Bridging and bracing for wall or soffit framing systems.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 3300 – Submittal Procedures
2. Section 01 6000 – Product Requirements
3. Section 03 3000 – Concrete
4. Section 04 2000 – Unit Masonry
5. Section 05 3100 – Steel Deck
6. Section 05 5000 – Metal Fabrications

1.3. REFERENCES

A. Publication Dates: Comply with standards in effect as of the date of the Contract Documents unless otherwise indicated.

B. American Society for Testing and Materials (ASTM):

1. ASTM A370 – Standard Test Methods and Definitions for Mechanical Testing of Steel Products.
2. ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Rectangular Shapes.
3. ASTM A653 – Sheet Steel, Zinc Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
4. ASTM A1003 - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members.

C. American Iron and Steel Institute (AISI):

1. North American Specification for the Design of Cold-Formed Steel Structural Members.
2. Standard for Cold-Formed Steel Framing – General Provisions.
3. Practice Guide – CF05-1: Code of Standard Practice for Cold-Formed Steel Structural Framing.

D. AWS A2.0 – Standard Welding Symbols

E. AWS D1.1 – Structural Welding Code

1.4. SUBMITTALS

A. Submit in accordance with Section 01 3300:

1. Product Data:

a. For each type of cold-formed metal framing product and accessory indicated.

2. Shop Drawings: Provide shop drawings prepared by the cold-formed metal framing manufacturer:

a. Indicate the layout, spacing, sizes, thickness and types of cold-formed metal framing, and fabrication.
b. Provide fastening and anchorage details, including mechanical fasteners.
c. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details and attachment to adjoining work.

3. Product Test Reports: For each listed product, for tests performed by a qualified testing agency.

a. Steel Sheet.
b. Expansion Anchors.
c. Power Actuated Fasteners.
d. Mechanical Fasteners.
e. Vertical deflection Clips.
f. Horizontal Drift Deflection Clips.
g. Miscellaneous Structural Clips and Accessories.

4. Welding certificates.

5. Research Reports: For non-standard cold formed framing, from ICC-IES.

1.5. QUALITY ASSURANCE

A. Manufacturer Qualifications: The Manufacturer shall have a minimum of 5 years experience in the manufacture of the systems specified in this Section. The Manufacturer shall also be a member of SSMA (Steel Stud Manufacturers Association) or SFIA (Steel Framing Industry Association).

B. Preparation of Shop Drawings, design calculations and other required structural data shall be under the direct supervision of a qualified professional engineer who is experienced in the design of cold-formed metal framing.

C. Product Tests: Mill certificates or data from a qualified testing agency or in-house testing with calibrated test equipment indicating steel sheet complies with requirements, including base metal thickness, yield strength, tensile strength, total elongation, chemical requirements, ductility and metallic-coating thickness.

D. Welding: Qualify procedures and personnel according to AWS D1.1, Structural Welding Code – Steel and AWS D1.3, Structural Welding Code – Sheet Steel.

1.6. DELIVERY, STORAGE AND HANDLING-GENERAL

A. Deliver materials to the site at such intervals to insure uninterrupted progress of the work.

B. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage and handling per AISI's "Code of Standard Practice".

C. Store materials to permit easy access for inspection and identification. Keep members off the ground, using pallets, platforms or other supports. Protect members and packaged materials from corrosion and deterioration.

D. Repair or replace damaged materials or structures as directed.

1.7. FIELD MEASUREMENTS

A. Verify that field measurements are as shown on the drawings.

2. PRODUCTS

2.1. MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering cold-formed metal framing that may be incorporated into the Work include, but are not limited to, the following:

1. AllSteel Products, Inc.
2. California Expanded Metal Products Company (CEMCO)
3. ClarkDietrich Building Systems.
4. Consolidated Fabricators Corp.; Building Products Division.
5. Craco Metals Manufacturing, LLC.
6. Custom Stud, Inc.
7. Design Shapes in Steel.
8. Formetal Co. Inc. (The).
9. MarinoWare; a division of Ware Industries.
10. MBA Metal Framing
11. Nuconsteel, A Nucor Company
12. SCAFCO Corporation.
13. Southeastern Stud & Components, Inc.
14. State Building Products, Inc.
15. Steel Network, Inc.
16. Steel Structural Systems.
17. Steel Construction Systems.
18. Super Stud Building Products, Inc.
19. United Metal Products, Inc.
20. United Steel Manufacturing.

2.2. PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide cold-formed steel framing capable of withstanding design loads within limits and under conditions indicated.

1. Design Loads: As indicated on Drawings.

2. Deflection Limits: Framing system to withstand design loads without deflections greater than that recommended by AISI.
3. Framing system to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors or other detrimental effects when subjected to ambient temperature change of 120 degree F.
4. Framing system to maintain clearances at openings to allow for construction tolerances and to accommodate live load deflection of primary building structure.
5. Cold-formed Steel Framing Design Standards:

    a. Wall Studs: AISI S211.
    b. Headers: AISI S212.
    c. Lateral Design: AISI S213.

6. AISI Specifications and Standards: Unless more stringent requirements are indicated, comply with AISI S100 and AISI S200.

2.3. MATERIALS - GENERAL

A. Recycled content of steel products: Post-consumer recycled content plus one-half of pre-consumer recycled content not less than 25%.

B. Sheet Steel: ASTM A 1003, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:

1. Grades: ST33H and ST50H.
2. Coating: G60.

C. Sheet Steel for Vertical Deflection and Drift Clips: ASTM A 653, structural steel, zinc coated, of grade and coating as follows:

1. Grade: 33.
2. Coating: G60.

2.4. EXTERIOR WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges and as follows:

1. Minimum Base-Metal Thickness: 0.0329 inch (33)
2. Flange Width: 1-5/8 inches (162)

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with straight flanges and as follows:

1. Minimum Base-Metal Thickness: Matching Steel Studs.
2. Flange Width: 1-1/4 inches.

C. Steel Box Beam or Back-to-Back Headers: Manufacturer's standard C-shapes used to form header beams, of web depths indicated, unpunched, with stiffened flanges.

D. Vertical Deflection Clips: Manufacturer's standard bypass clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.

E. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:

1. Minimum Base-Metal Thickness: 0.0428 inch (43)
2. Flange Width: 1 inch plus the design gap for one-story structures.

F. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure through positive mechanical attachment to stud web and structure.

2.5. SOFFIT FRAMING

A. Soffit Frame: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges and as follows:

1. Minimum Base-Metal Thickness: 0.0329 inch (33).
2. Flange Width: 1-5/8 inches (162), minimum.

2.6. FRAMING ACCESSORIES

A. Fabricate steel framing accessories from sheet steel, ASTM A1003, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:

1. Supplementary framing.
2. Bracing, bridging and solid blocking.
3. Anchor clips.
4. End clips.
5. Foundation clips.
6. Gusset plates.
7. Stud kickers, knee braces and girts.
8. Hole reinforcing plates.
9. Backer plates.

2.7. ANCHORS, CLIPS AND FASTENERS

A. Steel Shapes and Clips: ASTM A36, zinc coated by hot-dipped process according to ASTM A123.

B. Anchor Rods: ASTM F1554, Grade 36 KSI.

C. Threaded Rods: ASTM A36.

D. Expansion Anchors: Fabricated from corrosion resistant materials.

E. Welding Materials: Comply with AWS Standards.

F. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials.

G. Mechanical Fasteners: ASTM C1513, corrosion-resistant-coated, self drilling, self-tapping steel drill screws.

1. Head Type: Low profile head beneath sheathing, manufacturer's standard elsewhere.

2.8. MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: SSPC-Paint 20.

B. Shims: High-density multimonomer, nonleaching.

C. Sealer Gaskets: Closed cell neoprene foam, 1/4 inch thick, in widths to match the bottom track or rim track framing members.

D. Non-Shrink Grout: See Section 03 3000.

2.9. FABRICATION

A. Fabricate cold-formed metal framing and accessories plumb, square and true to line, with connections securely fastened according to manufacturer's written instructions.

1. Fabricate framing members using jigs and templates where applicable.
2. Cut framing members by sawing or shearing; do not torch cut.
3. Fasten cold-formed metal framing members by welding, screw fastening or riveting. Wire tying of framing members is not permitted.

a. Screw fasteners shall penetrate joined members by no less than three exposed screw heads.
b. Comply with AWS D1.1 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
c. Locate mechanical fasteners and install according to shop drawings, with screw penetrating joined members by no fewer than three exposed screw threads.

4. Fasten other material to cold-formed metal framing by welding, bolting or screw fastening.

B. Reinforce, stiffen and brace framing assemblies to withstand handling, delivery and erection stresses. Lift fabricated assemblies by means as to prevent damage or permanent distortion.

C. Fabrication Tolerances: Fabricate assemblies level, plumb and true to line to a maximum tolerance variation of 1/8 inch in 10 feet and as follows:

1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed shall not exceed minimum fastening requirements of sheathing or other finishing materials.
2. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch.

3. EXECUTION

3.1. EXAMINATION

A. Examine supporting substrates and abutting structural framing for compliance with requirements for the installation tolerances and other conditions affecting performance.
   1. Notify the architect in writing of conditions detrimental to the proper and timely completion of the work.
   2. Do not proceed with the work until unsatisfactory conditions have been corrected.

B. Beginning installation means erector accepts existing conditions.

3.2. PREPARATION

A. Install sealer gaskets under wall bottom track to isolate the framing from the foundation wall or slab.

3.3. INSTALLATION-GENERAL

A. Cold-formed metal wall framing systems may be shop or field fabricated.

B. Install cold-formed metal framing according to AISI S200 and to manufacturer's written instructions unless more stringent requirements are indicated on the drawings.

C. Install shop or field fabricated, cold formed framing and securely anchor to supporting structure.

   1. Screw, bolt or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.

D. Install cold-formed metal framing and accessories plumb, square and true to line and with connections securely fastened.

   1. Cut framing members by sawing or shearing, do not torch cut.
   2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening or riveting. Wire tying of framing members is not permitted.

      a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds and methods used in correcting welding work.
      b. Locate mechanical fasteners and install according to shop drawings and complying with requirements for spacing, edge distances and screw penetration.

E. Install framing members in one piece lengths unless splice connections are indicated for track or tension members.

F. Install temporary bracing and supports to secure framing and support construction loads. Maintain braces and supports in place and undisturbed until entire integrated structure has been completed and permanent connections to framing are secured.

G. Do not bridge expansion joints with cold-formed metal framing. Independently frame both sides of joints.

H. Install insulation in built-up exterior framing members, such as headers, sills, boxed joints and multiple studs at openings that will be inaccessible upon completion of the framing portion of the work.

I. Fasten hole reinforcing plate over web penetrations that exceed the size of manufacturer's approved or standard punched openings.

J. 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.

1. Space individual framing members no more than plus/ minus 1/8" from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.4. EXTERIOR NON-LOAD-BEARING WALL INSTALLATION

A. Install continuous top and bottom tracks sized to match studs. Align tracks accurately and securely anchor at corners and ends and at spacing as follows:

1. Anchor Spacing: 32 inches minimum spacing.

B. Fasten both flanges of stud to top and bottom track unless noted otherwise. Space studs as follows:

1. Stud Spacing: As indicated on drawings. 16 inches minimum stud spacing.

C. Set studs plumb, except as needed for diagonal bracing or required for non-plumb walls or warped surfaces and similar configurations.

D. Isolate non-load bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.

1. Install single deep-leg deflection tracks and anchor to building structure.
2. Install double deep-leg deflection tracks and anchor outer track to building structure.
3. Connect vertical deflection clips to bypass studs and anchor to building structure.
4. Connect drift clips to cold-formed metal framing and anchor to building structure.

E. Install horizontal bridging in stud system spaced 48 inches on center. Fasten bridging at each stud intersection.

1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.

a. Install solid blocking at 48 inch centers.

2. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs with a minimum of 2 screws into each flange of the clip angle for framing members up to 6 inches deep.
3. Bridging: Combination of flat, taut steel sheet straps of widths 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 per manufacturer's written instructions.

F. Install miscellaneous framing and connections, including supplementary framing, stud kickers, web stiffeners, clip angles, continuous angles, anchors and fasteners to provide complete and stable wall framing system.

3.5. FIELD QUALITY CONTROL

A. Field and shop weld will be subject to testing and inspection.

B. Testing agency will report test results promptly and in writing to contractor and architect.

C. Remove and replace work where test results indicate non-compliance with specified requirements.

3.6. 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 A780 and manufacturer's written instructions.

B. Provide final protection and maintain conditions that ensure that the cold-formed metal framing is without damage.

END 05 4100

1. GENERAL

1.1. WORK INCLUDES

A. Metal fabrications work shown on drawings including items fabricated from iron and steel shapes, plates, bars, strips, tubes, pipes and castings which are not a part of structural steel, steel joists, or other metal systems in other sections of the project manual.

B. Work includes but is not limited to the following:

1. Rough hardware.
2. Miscellaneous sheet metal shapes.
3. Slotted channel framing.
4. Metal-pan stairs and landings.
5. Pipe/tube railings.
6. Handrail wall brackets.
7. Metal ladders.
8. Metal bollards.
9. Abrasive metal nosings.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 3300 - Submittal Procedures
2. Section 01 6000 - Product Requirements
3. Section 03 3000 - Concrete
4. Section 04 2000 - Unit Masonry
5. Section 05 1200 - Structural Steel
6. Section 05 2100 - Steel Joists
7. Section 05 3100 - Steel Deck
8. Section 05 4000 – Cold-Formed Metal Framing
9. Section 05 7500 - Decorative Formed Column Covers
10. Section 06 4000 – Architectural Woodwork: Manufactured counter supports.
11. Section 07 7216 - Rooftop Equipment Screens
12. Section 07 8100 - Applied Fireproofing
13. Section 09 9100 - Paints and Coatings
14. Section 10 5380 - Canopies
15. Section 10 7113 - Exterior Sun Control Devices

1.3. REFERENCES

A. Publication Dates: Comply with standards in effect as of the date of the Contract Documents except for those having different revision dates as referenced in the codes indicated on the Drawings, or unless otherwise indicated.

B. American Architectural Manufacturers Association (AAMA):

1. AAMA 611 - Voluntary Standards for Anodized Architectural Aluminum.

C. American National Standards Institute (ANSI):

1. ANSI A14.3 - American National Standard for Ladders - Fixed - Safety Requirements.
2. ANSI Z359.16 - American National Standard Safety Requirements for Climbing Ladder Fall Arrest Systems.

D. American Society of Mechanical Engineers (ASME):

1. ASME B18.2.1. - Square and Hex Bolts and Screws Inch Series.
2. ASME B18.6.1. - Wood Screws (Inch Series).
3. ASME B18.6.3. - Machine Screws and Machine Screw Nuts.
4. ASME B18.21.1. - Lock Washers (Inch Series).
5. ASME B18.22.1. - Plain Washers.

E. 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 Structural Steel.
3. ASTM A47 - Standard Specification for Ferritic Malleable Iron Castings.
4. ASTM A48 - Standard Specification for Gray Iron Castings.
5. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
6. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
7. ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
8. ASTM A240 – Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
9. ASTM A276 - Standard Specification for Stainless and Heat-Resisting Steel Bars and Shapes.
10. ASTM A283 – Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates, Shapes, and Bars.
11. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
12. ASTM A312 - Standard Specification for Seamless and Welded Austenitic Stainless Steel Pipes.
13. ASTM A325 – Standard Specification for High-Strength Bolts for Structural Steel Joints.
14. ASTM A489 – Standard Specification for Carbon Steel Lifting Eyes.
15. ASTM A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
16. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
17. ASTM A666 – Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
18. ASTM A780 - Standard Practice for Repair of Damaged Hot-Dip Galvanized Coatings.
19. ASTM A786 - Standard Specification for Rolled Steel Floor Plates.
20. ASTM A793 – Standard Specification for Rolled Floor Plate, Stainless Steel.
21. 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.
22. ASTM B26 - Standard Specification for Aluminum Alloy Sand Castings.
23. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
24. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes.
25. ASTM B429 - Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.
26. ASTM B632 – Standard Specification for Aluminum-Alloy Rolled Tread Plate.

27. ASTM B633 – Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel.
28. ASTM C1107 – Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
29. ASTM D1187 – Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal.
30. ASTM E488 – Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements.
31. ASTM F593 – Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
32. ASTM F594 – Standard Specification for Stainless Steel Nuts.
33. ASTM F1554 – Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
34. ASTM F1941 – Standard Specification for Electrodeposited Coatings on Threaded Fasteners.
35. 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.

F. American Welding Society (AWS):

1. AWS D1.1 - Structural Welding Code - Steel.
2. AWS D1.2 - Structural Welding Code - Aluminum.
3. AWS D1.3 - Structural Welding Code - Sheet Steel.
4. AWS D1.6 - Structural Welding Code - Stainless Steel.
5. AWS D1.3 - Structural Welding Code, Sheet Steel.
6. AWS D2.0 - Standard Welding Symbols.

G. Master Painters Institute (MPI):

1. MPI #79: Alkyd Anti-Corrosive Metal Primer.

H. Metal Faming Manufacturers Association (MFMA):

1. MFMA-4 – Metal Framing Standards Publication.

I. National Association of Architectural Metal Manufacturers (NAAMM):

1. Metal Finishes Manual for Architectural and Metal Products.

J. Steel Structures Painting Council (SSPC):

1. SSPC-PA 1 - Shop, Field, and Maintenance Painting.
2. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic").
3. SSPC-SP 3 - Power Tool Cleaning.
4. SSPC-SP 6- Commercial Blast Cleaning.

1.4. SUBMITTALS

A. Submit in accordance with Section 01 3300:

1. Product Data: Manufacturer's specifications, details, and installation instructions. Submit for the following:

a. All manufactured products used in fabrications.

b. Paints.

2. Shop Drawings:

a. Submit shop drawings for fabrication and erection of miscellaneous metal fabrications.
b. Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fastenings, and accessories.
c. Include plans, elevations, and details of sections and connections, and erection drawings where applicable.
d. Show anchorage accessory items.
e. Provide templates for anchor and bolt installation.
f. Indicate welded connections using standard AWS 2.0 welding symbols. Indicate net weld lengths.

3. Delegated-Design Submittal: For stairs, railings and ladders, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
4. Qualification Data - Fabricator: Submit fabricator's qualification documentation.
5. Qualification Data – Professional Engineer: For professional engineer's experience with providing delegated-design engineering services of the kind indicated, including documentation that engineer is licensed in the jurisdiction in which Project is located.
6. Mill Certificates: Signed by stainless steel manufacturers, certifying that products furnished comply with requirements.
7. Welding certificates.
8. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
9. Research Reports: For post-installed anchors.

1.5. QUALITY ASSURANCE

A. Fabricator Qualifications: Minimum three years documented experience in successful fabrication of metal work of comparable size and complexity as this project. Submit names, addresses, and telephone numbers of owners, architects, engineers, and project locations.

B. Professional Engineer Qualifications: Professional structural engineer experienced in design of this work and licensed in the State of Missouri.

C. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1, "Structural Welding Code - Steel."
2. AWS D1.2, "Structural Welding Code - Aluminum."
3. AWS D1.3, "Structural Welding Code - Sheet Steel."
4. AWS D1.6, "Structural Welding Code - Stainless Steel."

1.6. DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the site at such intervals to insure uninterrupted progress of the work.

B. Store materials to permit easy access for inspection and identification. Keep ferrous metal members off the ground, using pallets, platforms, or other supports.

C. Protect ferrous metal members and packaged materials from corrosion and deterioration.

D. Do not store materials on the structure in a manner that might cause distortion or damage to the members of the supporting structures. Repair or replace damaged materials or structures as directed.

1.7. COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of 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.

1.8. PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls, floor slabs, decks, and other construction contiguous with metal fabrications by field measurements before preparation of shop drawings and fabrication. Do not delay job progress; allow for trimming and fitting wherever taking field measurements before fabrication might delay work.

2. PRODUCTS

2.1. PERFORMANCE REQUIREMENTS

A. Delegated Design: Design stairs, railings and ladders, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Structural Performance Requirements: Where complete sizes or dimensions of structural members, connections, or fasteners of any item are not indicated, design the item to produce strength appropriate to the use intended.

1. Handrails: Design to resist the loads specified by applicable building code(s).
2. Guardrails: Design to resist loads specified by applicable building code(s).
3. Stairs: Metal stairs shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.

a. Uniform Load: 100 lbf/sq. ft.
b. Concentrated Load: 300 lbf applied on an area of 4 sq. in.
c. Uniform and concentrated loads need not be assumed to act concurrently.
d. Stair Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above. Railing assembly, wall rails, and attachments to resist lateral force of 200 lbs. at any point without damage or permanent set.
e. Limit deflection of treads, platforms, and framing members to L/360 or 1/4-inch, whichever is less.

4. Ladders: Ladders shall withstand the effects of loads and stresses within limits and under conditions specified in ANSI A14.3.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2. METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.3. FERROUS METALS

A. Steel:

1. Plates, Shapes, and Bars: ASTM A36.
2. Rolled-Steel Floor Plate: ASTM A786, rolled from plate complying with ASTM A36 or ASTM A283, Grade C or D.
3. Sheet: ASTM A1008.
4. Tubing: ASTM A500, cold-formed steel tubing.
5. Pipe: ASTM A53, standard weight (Schedule 40) unless otherwise indicated.
6. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.

a. Size of Channels: 1-5/8 by 1-5/8-inches.
b. Material: Galvanized steel, ASTM A653, commercial steel, Type B, with G90 coating; 0.108-inch nominal thickness.

B. Cast Iron: Either gray iron, ASTM A48, or malleable iron, ASTM A47, unless otherwise indicated.

2.4. NONFERROUS METALS

A. Aluminum:

1. Plate and Sheet: ASTM B209, Alloy 6061-T6.
2. Extrusions: ASTM B221, Alloy 6063-T6.
3. Aluminum-Alloy Rolled Tread Plate: ASTM B632, Alloy 6061-T6.
4. Castings: ASTM B26, Alloy 443.0-F.
5. Extruded Structural Pipe and Round Tubing: ASTM B429, Alloy 6063-T6.
6. Drawn Seamless Tubing: ASTM B210, Alloy 6063-T832.

2.5. FASTENERS

A. Fasteners: Use fasteners suitable for the material being fastened and for the type of connection required. Select fasteners for type, grade, and class required.

1. For exterior use or built into exterior walls: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941, Class Fe/Zn 5.
2. Use fasteners of same material as items being fastened unless otherwise indicated:

a. Provide stainless-steel fasteners for fastening aluminum.
b. Provide stainless-steel fasteners for fastening stainless steel.
c. Provide stainless-steel fasteners for fastening nickel silver.

3. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A; with hex nuts, ASTM A563; and, where indicated, flat washers.

4. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, ASTM F593; with hex nuts, ASTM F594; and, where indicated, flat washers; Alloy Group 1.
5. Anchor Bolts: ASTM F1554, Grade 36, of dimensions indicated; with nuts, ASTM A563; and, where indicated, flat washers.

    a. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.

6. Eyebolts: ASTM A489.
7. Machine screws: ASME B18.6.3.
8. Lag Screws: ASME B18.2.1.
9. Wood screws: Flat head, ASME B18.6.1.
10. Plain washers: Round, ASME B18.22.1.
11. Lock washers: Helical, spring type, ASME B18.21.1.

B. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E488, conducted by a qualified independent testing agency.

C. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A47 malleable iron or ASTM A27 cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F2329.

D. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors, unless indicated otherwise.

1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941, Class Fe/Zn 5, unless otherwise indicated.
2. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F593, and nuts, ASTM F594.

I. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8-inches by length indicated with anchor straps or studs not less than 3-inches long at not more than 8-inches o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B633, Class Fe/Zn 5, as needed for fastening to inserts.

2.6. MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107 and capable of minimum compressive strength of 7000 psi. at 28 days. Provide grout specifically recommended by manufacturer for interior and exterior applications

C. Concrete: Normal weight ready-mix concrete as specified in Section 03 3000 - Concrete. Minimum 28-day compressive strength of 4000 pounds per square inch, unless otherwise indicated.

D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187.

E. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

F. Shop Primer: As specified in Section 09 9100 – Paints and Coatings.

2.7. FABRICATION, GENERAL

A. General:

1. Verify dimensions on site prior to shop fabrication.
2. Form exposed work with accurate angles and surfaces and straight edges.
3. Use materials of size and thickness shown. When not shown, of size and thickness to produce strength and durability in finished product. Work to dimensions shown or accepted on shop drawings, using proven details of fabrication and support. Use type of materials shown or specified for various components of work.
4. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

B. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work. Ease exposed edges to a radius of approximately 1/32" unless otherwise shown.

D. Weld corners and seams continuously to comply AWS and 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, fill and grind exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

E. Exposed Joints: Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.

F. Joints Exposed to Weather: Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

G. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

H. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

I. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

2.8. 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.

1. Fabricate units from slotted channel framing where indicated.
2. Furnish inserts for units installed after concrete is placed.

C. Finish: Galvanized at all exterior locations and where in contact with masonry or concrete; shop primed at all other conditions.

2.9. METAL-PAN STAIRS AND LANDINGS

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. Form risers, subtread pans, and subplatforms to configurations shown from steel sheet of thickness needed to comply with performance requirements but not less than 0.067 inch.

1. Fabricate stairs with closed risers and treads of pan construction to receive concrete.
2. Secure tread pans to stingers with clip angles welded in place.
3. Form stringers of rolled steel channels, 12-inch deep.
4. Form landings from minimum 10 gage sheet stock. Reinforce underside with steel T's to attain design load requirements.
5. Form balusters of steel sections indicated welded to stringers.

C. Finish: Shop primed.

2.10. ABRASIVE METAL NOSINGS

A. Cast-Metal Units: Cast iron, with integral-abrasive cast into nosing. Fabricate units in lengths necessary to accurately fit openings or conditions.

1. Manufacturers: Products of the following manufacturers, provided they comply with requirements of the Contract Documents, will be among those considered acceptable.

a. American Safety Tread Company, Inc.
b. Barry Pattern & Foundry Co., Inc. (Barry Craft)
c. Wooster Products, Inc.

2. Style: Cross-hatched units with short nose.

3. Width: 4-inch.
4. Thickness: 5/16-inch minimum.
5. Total Lip Depth: 9/16-inch.
6. Abrasive: Aluminum oxide or silicon carbide grit.
7. Finish: Black coating.
8. Length: Fabricate units in lengths necessary to accurately fit openings or conditions.
9. Anchors:

    a. For embedding into concrete: Concealed cast-on bolt/rivet anchor.
    b. Anchor spacing: As recommended by manufacturer and as indicated.

10. Coat surfaces in contact with concrete with bituminous paint.

2.11. RAILINGS

A. Railings - General: Construct as indicated.

1. Preassemble in shop to maximum extent practicable.
2. Bending of members: Use jigs to produce uniform curvature for each repetitive configuration required; maintain cross section without buckling, twisting, or otherwise deforming exposed surfaces.
3. Close exposed open ends of members using same material as used in member.
4. Railing Support: Railings shall be supported at 4 feet on center maximum spacing.
5. Expansion joints: Provide at not more than 40 feet on center.

    a. Provide slip-joint internal sleeve extending 2 inches beyond joint on each side, fastened to one side of joint.
    b. Locate joint within 6 inches of post.

6. Toeboards: Provide where indicated and at all railings around openings and at the edge of open-sided floors and platforms; use minimum 4-inch high x 1/8-inch thick plate welded to and centered between railing posts.
7. Provide all brackets, flanges, fittings, and anchors necessary for interconnection of railings and for attachment to other work.

    a. For attachment to concrete or masonry: Provide inserts for installation into concrete or masonry, or provide other type of anchorage.

        1) Provide matching metal flange, welded to post, to cover grouted joints.

    b. For anchoring to solid masonry: Use fittings fastened to masonry with bolts and expansion shields unless otherwise indicated.
    c. For anchoring to hollow masonry: Use fittings fastened to masonry with toggle bolts unless otherwise indicated.
    d. Fasten fittings to railings in same manner as railing connections.

8. Wall mounted handrails: Provide wall returns at ends except where otherwise indicated.

B. Hand Rail Wall Brackets:

1. Provide 3" wall brackets for handrails.
2. Cast, malleable iron bracket.

    a. Product/Manufacturer – Rounded Saddle (steel pipe handrail):

1) 378 / Julius Blum and Co., Inc.
2) 4591 / Wagner Companies

C. Steel Pipe/Tube Railings:

1. Black steel pipe, Schedule 40, standard weight.
2. Connections: Welded and ground.
3. Welding: Fill joints completely and grind off flush minimum NOMMA finish 2 weld.
4. Elbows: Prefabricated elbows, flush radius bends, or mitered joints.
5. Tee and cross intersections: Coped and welded.
6. Bends: Use prefabricated radius bends, or form by bending.
7. Exposed ends: Close with prefabricated fittings or with 3/16" thick steel plate fully welded.
8. Finish, including brackets and fasteners:

a. Exterior: Galvanized.
b. Interior: Shop primed.

2.12. METAL LADDERS

A. General:

1. Comply with ANSI A14.3 unless otherwise indicated.

B. Steel Ladders: Unless indicated otherwise on the Drawings, ladders shall be constructed as follows:

1. Space siderails 18 inches apart.
2. Siderails: Continuous, 3/8-by-2-1/2-inch steel flat bars, with eased edges.
3. Rungs: 3/4-inch- diameter steel bars.
4. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.
5. Provide nonslip surfaces on top of each rung, either by coating rung with aluminum-oxide granules set in epoxy-resin adhesive or by using a type of manufactured rung filled with aluminum-oxide grout.
6. Support each ladder at top and bottom and not more than 60 inches o.c. with welded or bolted steel brackets.

a. Design supports for adequate support and anchorage, and to hold the ladder clear of the wall surface with a minimum of 7-inch clearance from wall to centerline of rungs.

7. Finish, including brackets and fasteners:

a. Exterior: Galvanized.
b. Interior: Shop primed.

2.13. METAL BOLLARDS

A. Fabricate metal bollards from Schedule 40 steel pipe.

1. Where bollards are indicated to receive controls for door operators, provide necessary cutouts for controls and holes for wire.

B. Finish:

1. Exterior: Galvanized.
2. Interior: Shop primed.

2.14. 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.

C. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.15. STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A153 for steel and iron hardware and with ASTM A123 for other steel and iron products.

1. For all items indicated to be painted, do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

B. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, surfaces and edges to be field-welded, or unless otherwise indicated.

1. Shop prime with primers specified in Section 09 9100 – Paints and Coatings.
2. Coordination:

a. Coordinate shop primer product with Section 07 8100 – Applied Fireproofing manufacturer to ensure adhesion and compatibility.

3. Preparation for Shop Priming: Prepare surfaces to comply with requirements indicated below:

a. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
b. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
c. Items Indicated to Receive Primers Specified in Section 09 9100 – Paints and Coatings: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
d. Other Items: SSPC-SP 3, "Power Tool Cleaning."

4. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.
5. Painting: All items that are primed shall be finish painted per Section 09 9100 – Paints and Coatings unless noted otherwise.

2.16. ALUMINUM FINISHES

A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

B. Protect finish on exposed surfaces by using temporary protective covering.

C. Mill Finish: AA-M10 (Mechanical Finish: as fabricated, unspecified).

D. Clear Anodized Finish: Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.

3. EXECUTION

3.1. EXAMINATION

A. Examine the areas and conditions under which miscellaneous metal items are to be installed. Notify the Architect in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.2. PREPARATION

A. Furnish setting drawings, diagrams, templates, instructions, and directions for installation of anchorages such as concrete inserts, anchor bolts, and miscellaneous items having integral anchors, which will be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.

B. Obtain Architect's written approval prior to site cutting or making adjustments not scheduled.

C. Clean and strip primed steel items to bare metal where site welding is scheduled or required.

D. Make provision for erection loads with temporary bracing. Keep work in alignment.

3.3. INSTALLATION – GENERAL

A. Manufactured Items: Comply with manufacturer's printed installation drawings and coordinate location of anchorage devices with manufacturer of item to be installed.

B. Shop Fabricated Items: Comply with shop drawings for installation.

C. 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.

1. Fit exposed connections accurately together to form hairline joints.
2. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations.
3. 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.

D. Field Welding: Comply with AWS and 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 no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

E. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to inplace construction, including, threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws and other connectors.

F. Corrosion Protection: Isolate dissimilar metals to prevent electrolysis with bituminous paint or non-absorptive isolation pad to prevent contact.

1. Aluminum: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:

a. Cast Aluminum: Heavy coat of bituminous paint.
b. Extruded Aluminum: Two coats of clear lacquer.

3.4. INSTALLATION - MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

3.5. INSTALLATION – STAIRS

A. Erect stairs level and plumb, free from distortion or defects detrimental to appearance or performance.

B. Provide anchors, plates, angles, hangers, and struts required for connecting stairs to structure.

C. Verify alignment with adjacent construction. Coordinate related work.

D. Do not field cut or alter members.

E. Field bolt and weld to match standard of shop bolting and welding. Hide bolts and screws whenever possible. Where not hidden, use flush countersunk fastenings.

F. Mechanically fastened joints shall be butted tight, flush, and hairline. Grind welds smooth and flush.

G. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

H. Obtain Architect acceptance prior to site cutting or making adjustments not scheduled.

I. After erection, prime welds, abrasions, and surfaces not shop primed.

3.6. INSTALLATION - NOSINGS

A. Center nosings on tread widths unless otherwise indicated.

B. For nosings embedded in concrete steps or curbs, align nosings flush with riser faces and level with tread surfaces.

C. Seal thresholds exposed to exterior with elastomeric sealant complying with Section 07 9200 "Joint Sealants" to provide a watertight installation.

3.7. INSTALLATION – RAILINGS

A. Cut cored holes for posts. Posts shall be 2.5 inches preferred, 1.5 inches minimum from edge of concrete slabs and stair nosings.

B. Adjust railings prior to anchoring so that joints align properly.

C. Plumb posts in each direction.

D. Set posts with grout. Crown grout around posts to prevent water from ponding in core holes and at posts.

3.8. INSTALLATION - METAL LADDERS

A. Do not begin installation until substrates have been properly prepared. Notify Architect of unsatisfactory conditions before commencing work.

B. Field verify required dimensions. Coordinate with supporting construction to ensure adequate blocking and support.

C. Install ladders and accessories in accordance with manufacturer's instructions and approved submittals.

D. Securely anchor support brackets with fasteners of type and size recommended by manufacturer.

E. Place brackets at top and bottom and at 48 inches maximum intermediate points.

F. Allow 7 inches minimum clearance from wall to center line of rungs.

G. Inspect ladder to verify proper and secure installation.

H. Roof Hatches: Coordinate with requirements of roof hatch to ensure height and position of ladder is compatible with roof hatch curb and required clearances.

I. Clean ladders as recommended by manufacturer. Do not use abrasive agents, steel wool or chemicals

3.9. INSTALLATION - METAL BOLLARDS

A. Concrete Fill:

1. Concrete-Capped Bollards: After bollard installation, fill bollards solidly with concrete, mounding top surface to shed water.

B. Stationary Bollard Installation:

1. Anchor bollards in place with concrete footings. Center and align bollards in holes 3 inches (75 mm) above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.

3.10. 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.

1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 09 9100 – Paints and Coatings.

C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780.

END 05 5000

1. GENERAL

1.1. WORK INCLUDES

A. Column covers.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 3300 - Submittal Procedures
2. Section 01 6000 - Product Requirements
3. Section 05 1200 Structural Steel
4. Section 05 5000 Metal Fabrications
5. Section 09 2100 - Gypsum Board Assemblies
6. Section 09 9100 - Paints and Coatings

1.3. REFERENCES

A. Specific references, or cited portions thereof, current at the date of bidding documents unless otherwise specified, govern the work. In conflict between referenced standards and contract documents, notify Architect immediately. Confirm notification in writing. Do not proceed with the work until the Architect issues written instructions.

1.4. QUALITY ASSURANCE

A. Qualifications of Fabricator: Minimum three years documented experience in successful fabrication of metal work of comparable size and complexity as this project. Submit names, addresses, and telephone numbers of owners, architects, engineers, and project locations.

B. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication, where possible. Do not delay job progress; allow for trimming and fitting wherever taking field measurements before fabrication might delay work.

C. Shop Assembly: Preassemble items in shop to 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.

1.5. PERFORMANCE REQUIREMENTS

A. Delegated Design: Design exterior decorative formed metal items, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Structural Performance: Decorative formed metal items, including anchors and connections, shall withstand the efforts of gravity loads and the following loads and stresses without exceeding the allowable design working stress of material involved and without exhibiting permanent deformation in any components:

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

1. Temperature Change: 120 deg. F (67deg C), ambient, material surface.

D. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direction contact with incompatible materials.

1.6. SUBMITTALS

A. Submit in accordance with Section 01 3300:

1. Submit fabricator's qualification documentation in accord with Article 1.4.
2. Product Data: Manufacturer's specifications, details, and installation instructions. Submit for:

a. All manufactured products used in fabrications.
b. Paints.

3. Samples for initial selection: for products involving selection of color, texture, or design.
4. Samples for verification: for each type of exposed finish 6-inch square samples of metal of same thickness and material indicated for the work.

1.7. JOB CONDITION

A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication.

B. Coordination with Masonry and Concrete Work: Where fabricated items or their anchors are to be embedded into concrete and masonry work, deliver such items to those performing the installation, together with all coordination drawings and installation instructions required. Provide temporary bracing or anchors in formwork where required for installation.

1.8. DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site under provisions of Section 01 6000.

B. Store and protect products under provisions of Section 01 6000.

1.9. WARRANTY

A. Provide manufacturer’s warranty against defects in material and workmanship for a period of one year beginning on Date of Substantial Completion.

B. Finish warranty: Warrant fluoropolymer coating to remain free, under normal atmospheric conditions, from peeling, checking, cracking, chalking in excess of numerical rating of 8 when measured in accord with ASTM D4214, of fading in excess of 5 N.B.S. Units during warranty period. Warranty period shall be 10 years, beginning at Date of Substantial Completion.

2. PRODUCTS

2.1. COLUMN COVERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Firestone Metal Products, LLC; Una-Clad
2. Fry Reglet Corporation
3. Industrial Louvers, Inc.
4. Leed Himmel Industries, Inc.
5. Metal Sales & Service, Inc.; Metalwerks Division
6. MM Systems Corporation
7. Pittcon Industries
8. Protean Construction Products, Inc.
9. PAC-CLAD, Petersen.
10. SAF Metal Fabrications

B. Snap-Together Type: Form columns covers to shapes indicated from metal of type and minimum thickness indicated below. Return vertical edges and bend to form hook that will engage continuous mounting clips.

1. Aluminum Sheet: 3003-H14, alloy, minimum, .125” LASTM B209 (ASTM B209M).

a. Shape/Size: Square/Recangular as indicated on drawings.
b. Finish: Standard Flouropolymer Two-Coat system consists of 0.2 mil primer with 0.8 mil 70% PVDF Flouropolymer color coat.
c. Color: As selected from manufacturers full range of color and gloss.

C. Form returns at vertical joints to provide hair like V-joints.

D. Fabricate column covers with horizontal butt joints, tightly fitted and backed with a sleeve for field splicing with adhesive.

3. EXECUTION

3.1. INSPECTION

A. Examine the areas and conditions under which miscellaneous metal items are to be installed. Notify the Architect in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.2. INSTALLATION – GENERAL

A. Comply with manufacturer's printed installation drawings and coordinate location of anchorage devices with manufacturer of item to be installed.

B. Anchor metal fabrications to substrates indicated; provide all fasteners required.

C. Cut, drill, and fit items as required for installation.

1. Fit exposed connections together accurately to form tight hairline joints.

D. Set items accurately in location, alignment, and elevation; level, true, and free of rack, measured from established lines and levels.

E. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in place construction, including, threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws and other connectors.

F. Locate and place decorative formed metal items level and plumb and in alignment with adjacent construction. Perform cutting, drilling, and fitting required to install decorative formed metal.

1. Do not cut or abrade finishes that cannot be completely restored in the field. Return items with such finishes to the shop for required alterations, followed by complete refinishing, or provide new units as required.

G. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where needed to protect metal surfaces and to make a weathertight connection.

H. Form tight joints with exposed connections accurately fitted together. Provide reveals and openings for sealants and joint fillers as indicated.

I. Install concealed gaskets, joint fillers, insulation, sealants, and flashings, as the Work progresses, to make exterior decorative formed metal items weatherproof.

J. Corrosion Protection: Apply bituminous paint or other permanent separation materials on concealed surfaces where metals would otherwise be in direct contact with substrate materials that are incompatible or could result in corrosion or deterioration of either material or finish.

END 05 7500

1. GENERAL

1.1. WORK INCLUDES

A. Carpentry work shown on the drawings and in schedules, including miscellaneous rough framing, furring, and blocking.

B. Blocking for all roof, wall, or ceiling mounted fixtures, appurtenances, and equipment unless indicated otherwise.

C. Exposed plywood backing panels.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 3300 - Submittal Procedures
2. Section 06 4000 – Architectural Woodwork
3. Section 07 6200 - Sheet Metal Flashing and Trim
4. Section 07 7200 - Roof Accessories
5. Section 09 2100 - Gypsum Board Assemblies
6. Section 10 2800 – Toilet and Bath Accessories

1.3. REFERENCES

A. Publication Dates: Comply with standards in effect as of the date of the Contract Documents except for those having different revision dates as referenced in the codes indicated on the Drawings, or unless otherwise indicated.

B. ALSC - American Lumber Standards Committee: Softwood Lumber Standards.

C. APA - American Plywood Association: Grades and Standards.

D. American Society for Testing and Materials (ASTM):

1. ASTM D2898 - Practice for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing.
2. ASTM D5516 – Test Method for Evaluating the Flexural Properties of Fire-Retardant Treated Softwood Plywood Exposed to Elevated Temperatures
3. ASTM D5664 - Test Method for Evaluating the Effects of Fire-Retardant Treatments and Elevated Temperatures on Strength Properties of Fire-Retardant Treated Lumber.
4. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

E. AWPA - American Wood Preservers' Association

F. AF&PA – American Forest & Paper Association.

G. NeLMA – Northeastern Lumber Manufacturers' Association.

H. SPIB - Southern Pine Inspection Bureau.

I. WCLIB - West Coast Lumber Inspection Bureau: Standard Grading Rules for West Coast Lumber.

J. WWPA - Western Wood Products Association.

1.4. SUBMITTALS

A. Submit in accordance with Section 01 3300:

1. Submit product data as follows:

a. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
b. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
c. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D5664.

1.5. QUALITY ASSURANCE

A. U.S. Department of Commerce, National Institute of Standards and Technology:

1. Lumber Standard: Comply with DOC PS 20.
2. Plywood Standard: Comply with DOC PS 1.

1.6. PRODUCT HANDLING

A. Delivery and Storage: Keep materials dry during delivery and storage. Protect against exposure to weather and contact with damp or wet surfaces. Stack lumber and plywood, and provide air circulation within stacks.

2. PRODUCTS

2.1. MATERIALS

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated:

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
3. Unless completely concealed, provide dressed lumber, S4S.
4. Provide seasoned lumber with 15% maximum moisture content.

B. Framing Lumber:

1. For light, non-load bearing framing and blocking (less than 6" wide), provide the following grade and species: Construction grade, yellow or ponderosa pine.
2. For load-bearing framing (6" and wider and from 2" to 4" thick), provide: No. 2 grade; Douglas Fir (WCLIB or WWPA), Spruce-Pine-Fir (NeLMA or WWPA), or Southern Pine (SFPA).

C. Plywood:

1. Exposed plywood: Where plywood will be exposed in the finished work to receive a paint finish, provide interior type plywood with Grade A exposed faces and Grade D concealed faces.
2. Concealed plywood: Where plywood will be concealed by other work, provide interior type plywood C-D plugged grade.
3. Backing panels: For backing panels for electrical or telephone equipment, at ceiling backing, and as otherwise indicated on Drawings, provide fire-retardant treated standard grade plywood with exterior glue, 3/4" thick.
4. Plywood used in roofing work: APA rated sheathing, exterior exposure durability classification, 24/16 span rating.

D. Miscellaneous Materials:

1. Fasteners and anchorages: Provide size and type as indicated and as recommended by specified standards, complying with specified Federal Specifications for nails, staples, screws, bolts, nuts, washers and anchoring devices. Provide special galvanized sheet metal connectors, joint hangers and nails as required to provide the framing systems and to support the loads as shown.

    a. Fasteners and anchorages for treated lumber and where rough carpentry work is either in ground contact, in roof/parapet construction, in an area of high related humidity, or exposed to weather must be Type 304 or 316 stainless steel.
    b. Sheet metal connectors and joint hangers for treated lumber and where rough carpentry work is either in ground contact, in roof/parapet construction, in an area of high related humidity, or exposed to weather must have a minimum G90 zinc-coating meeting the requirements of ASTM A653.

2. Adhesives for Gluing Wood to Wood: Formulation complying with ASTM D3498 that is approved for use indicated by adhesive manufacturer.
3. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber or rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch.

2.2. WOOD-PRESERVATIVE TREATMENT

A. Preservative Treatment by Pressure Process: Per AWPA U1 as follows:

1. Use Categories:

    a. Use Category UC2 for interior construction not in contact with the ground.
    b. Use Category UC3B for exterior construction not in contact with the ground.
    c. Use Category UC4A for items in contact with the ground.

2. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.

3. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Kiln-dry plywood after treatment to a maximum moisture content of 15 percent. Do not use material that is warped or that does not comply with requirements for untreated material.
4. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

B. Application: Treat items indicated on Drawings, and the following:

1. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
2. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
3. Wood framing members that are less than 18 inches above the ground in crawlspaces or unexcavated areas.
4. Wood floor plates that are installed over concrete slabs-on-grade.
5. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing and roof flashing are not required to be treated unless indicated on Drawings or in contact with masonry or concrete.

2.3. FIRE RETARDANT-TREATED MATERIALS

A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame spread index of 25 or less when tested according to ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. Use treatment that does not promote corrosion of metal fasteners.
2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D2898. Use for all applications.
3. Use treatment for which chemical manufacturer publishes physical properties of treated wood after exposure to elevated temperatures, when tested by a qualified independent testing agency according to ASTM D5664 for lumber and ASTM D5516 for plywood.
4. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Kiln-dry plywood after treatment to a maximum moisture content of 15 percent.
5. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.

C. Application: Treat items indicated on Drawings, and the following:

1. Exposed plywood backing panels.
2. Concealed blocking.
3. Roof construction.

3. EXECUTION

3.1. INSPECTION

A. Examine the supporting structure and the conditions under which the rough carpentry work is to be installed. Notify the Architect in writing of conditions detrimental to the work. Do not proceed with the installation until unsatisfactory conditions have been corrected.

3.2. INSTALLATION

A. Basic Requirements:

1. Discard units of material with defects which might impair the quality of the work, and units which are too small to fabricate the work with minimum joints or the optimum joint arrangement.
2. Set carpentry work accurately to indicated levels and lines, with members plumb and true and accurately cut and fitted.
3. Securely attach carpentry work by anchoring and fastening as shown or by recognized standards. Countersink nail heads on exposed carpentry work and fill holes. Use common wire nails, except as otherwise indicated. Use finishing nails for finish work. Select fasteners of size that will not penetrate members where opposite side will be exposed to view or will receive finish materials.
4. Make tight connections between members: Install fasteners without splitting of wood; predrill as required.
5. Install sill sealer gasket to form continuous seal between sill plates and foundation walls.

B. Wood Nailers, Sleepers, and Blocking:

1. Provide wherever shown and where required for screeding or attachment of other work, including toilet accessories, fire extinguisher cabinets, casework, hollow metal frames and other equipment or items requiring blocking. Form to shapes as shown and cut for true line and level of work to be attached. Coordinate location with other work involved.
2. Attachment shall support applied loading. Countersink bolts and nuts flush with surfaces, unless otherwise shown. Build into masonry during installation of masonry work. Where possible, anchor to formwork before concrete placement.
3. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

C. Wood Furring:

1. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.

D. Installation of Plywood:

1. Comply with recommendations of the American Plywood Association (APA) for the installation of plywood.
2. Fill or grind edges of the plywood panels to provide an even surface to receive finishes indicated.

END 06 1000

1. GENERAL

1.1. WORK INCLUDES

A. Architectural woodwork as indicated on the Drawings, including:

1. General Shelving.
2. Plastic laminate finished casework and paneling.
3. Solid Surfacing.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 3300 - Submittal Procedures
2. Section 05 5000 – Metal Fabrications: Custom counter supports.
3. Section 06 1000 - Rough Carpentry
4. Section 07 9200 – Joint Sealants
5. Section 08 8000 – Glazing
6. Section 09 9100 - Paints and Coatings
7. Section 10 1100 – Visual Display Surfaces

1.3. REFERENCES

A. Publication Dates: Comply with standards in effect as of the date of the Contract Documents except for those having different revision dates as referenced in the codes indicated on the Drawings, or unless otherwise indicated.

B. AHA A135.4: Basic Hardboard.

C. American Lumber Standard Committee (ALSC).

D. American National Standards Institute (ANSI):

1. ANSI A208.1: Particleboard.
2. ANSI A208.2: Medium Density Fiberboard (MDF).

E. American Society for Testing and Materials (ASTM):

1. ASTM C1048 – Standard Specification for Heat Treated Flat Glass – Kind HS, Kind FT Coated and Uncoated Glass.
2. ASTM D523 – Standard Test Method for Specular Gloss.
3. ASTM D3201 – Standard Test Method for Hygroscopic Properties of Fire Retardant Wood and Wood Based Products.
4. ASTM D5516 – Test Method for Evaluating the Flexural Properties of Fire-Retardant Treated Softwood Plywood Exposed to Elevated Temperatures
5. ASTM D5664 - Test Method for Evaluating the Effects of Fire-Retardant Treatments and Elevated Temperatures on Strength Properties of Fire-Retardant Treated Lumber.
6. ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials.

F. AWS - Architectural Woodwork Standards, 2nd edition.

G. Builders Hardware Manufacturers Association (BHMA):

1. BHMA A156.9: Cabinet Hardware.
2. BHMA A156.11: Cabinet Locks.
3. BHMA A156.18: Materials and Finishes.

H. HPVA HP-1- American National Standard for Hardwood and Decorative Plywood.

I. ISSFA-2: International Solid Surface Fabricators Association – Classification and Standards for Solid Surfacing Materials.

J. LMA EDG-1: PVC or polyester edge banding.

K. LMA SAT-1: Thermally fused melamine finishes.

L. NEMA LD 3 - High pressure decorative laminates.

M. U.S. Department of Commerce, National Institute of Standards and Technology:

1. DOC PS 1: Product Standard for Structural Plywood.
2. DOC PS 20: American Softwood Lumber Standard.

1.4. DEFINITIONS

A. Concealed:

1. Surfaces not normally visible after installation.
2. Bottoms of cabinets less than 30" above finished floor.
3. Tops of cabinets over 78" above finished floor which are not visible from an upper level.
4. Stretchers, blocking, components concealed by drawers.

B. Exposed:

1. Surfaces visible when drawers and solid doors are closed.
2. Surfaces visible behind clear glass doors.
3. Interior surfaces of open units.
4. Bottoms of cabinets 42" or more above finished floor.
5. Tops of cabinets less than 78" above finished floor, or are visible from an upper floor or staircase after installation.
6. Front edges of cabinet body members visible through a gap greater than 1/8" with doors and drawers closed.
7. Surfaces visible when fixed appliances are installed.

C. Plywood: Veneer core plywood.

D. Semi-exposed:

1. Surfaces visible when doors are open.
2. Bottoms of cabinets 30"-42" above finished floor.
3. All front edges of shelving behind doors.

E. Gloss: Conform to ASTM D523 for the following:

1. Satin refers to low-sheen finish with a gloss range between 15 and 35 when measured at a 60 degree meter.
2. Semigloss refers to medium-sheen finish with a gloss range between 30 and 65 when measured at a 60 degree meter.
3. Full gloss refers to high-sheen finish with a gloss range more than 65 when measured at a 60 degree meter.

1.5. SUBMITTALS

A. Submit in accordance with Section 01 3300:

1. Submit shop drawings and product data.

a. Shop drawings shall include, but are not limited to the following:

1) Methods of construction.
2) Exact material selections.
3) Component profiles.
4) Method of attachment.
5) Substrates.
6) Details of joinery.
7) Dimensioned plans, sections, elevations, and details.
8) Relationship to adjacent work.
9) Locations and sizes of furring, blocking, and hanging strips.
10) Locations and sizes of cutouts and holes.
11) Schedule of finishes.
12) Woodworking fabricator's and installer's technical suggestions.
13) Refer to "Quality Assurance" article for additional information.

b. Include fire-retardant product data.
c. Include Fire-Test Response Characteristics documentation for each product per ASTM E84.

2. Samples for Verification: Submit three of each of the following:

a. Plastic laminates: Minimum 4"x4" size samples of selected finishes.
b. PVC Edge Band: Minimum 4" long sample.
c. Shop Finish: Minimum 8"x10" samples on specified wood.
d. Solid Surface: Minimum 3" x 3" size samples of selected finishes.

1.6. QUALITY ASSURANCE

A. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Standards" (AWS) for grades of interior architectural woodwork indicated for construction, finishes, installation, shop drawings, and other requirements.

1. In case of conflict between the indicated standards and other language in this Section or in the Drawings, notify the Architect in writing prior to performing Work. Wherever a higher standard is indicated, provide the higher standard.

B. Shop Drawings: The Contract Documents are not fabrication drawings and shall not be copied or referenced as shop drawings. Shop Drawings shall be of sufficient detail to illustrate compliance with the design intent, including the quality standard referenced. Fabrication shall not commence without Shop Drawings approved by the Architect.

C. Fabricator Qualifications: Shop that employs skilled workers who fabricate products similar to those required for this Project. Fabricator must have a minimum of 5 years experience and have a record of successful in-service performance for projects of similar size and scope.

D. Installer Qualifications: Installer shall have skilled workers, must have a minimum of 3 years experience and have a record of successful in-service performance for projects of similar size and scope.

E. Fire Retardant Materials: Where fire-retardant materials or products are indicated, provide materials and products with specified fire-test-response characteristics as determined by testing identical products per test method indicated by UL, ITS, or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify with appropriate markings of applicable testing and inspecting agency in the form of separable paper label or, where required by authorities having jurisdiction, imprint on surfaces of materials that will be concealed from view after installation.

1.7. DELIVERY, STORAGE, AND HANDLING

A. Protect materials during transit, delivery, storage and handling to prevent damage, soiling and deterioration.

B. Do not deliver materials until painting, wet work, grinding and similar operations which could damage, soil or deteriorate architectural woodwork have been completed in installation areas.

C. Store materials in ventilated, interior locations under constant minimum temperatures of 60 degrees F. and maximum relative humidity of 55%.

1.8. PROJECT CONDITIONS

A. Conditioning: Do not install architectural woodwork until the specified temperatures and relative humidity have been stabilized and will be maintained in installation areas.

B. Maintain temperature and humidity in installation area to maintain moisture content of installed woodwork within a 1.0% tolerance of the optimum moisture content, from the date of installation through the remainder of the construction period.

C. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed, and indicate measurements on Shop Drawings.
2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.9. COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that the Work in this Section can be supported and installed as indicated.

1.10. WARRANTY

A. Manufacturer shall warrant architectural woodwork from defects in material and workmanship for a period of three (3) years starting from date of Substantial Completion.
   1. Failures include, but are not limited to, the following:

      a. Delamination of components or other failures of adhesive bond.
      b. Warping of components.
      c. Failure of operating hardware.
      d. Deterioration of finishes.

2. PRODUCTS

2.1. MATERIALS

A. Wood Materials:

   1. Wood Moisture Content: Provide kiln-dried lumber and maintain 5 to 10% moisture content in solid wood (hardwood and softwood) through fabrication, installation, and finishing operations of interior work.
   2. Lumber: DOC PS 20 and applicable grading rules of inspection agencies certified by ALSC's Board of Review.

      a. Factory mark each piece of lumber with grade stamp of inspection agency indicating grade, species, moisture content at time of surfacing, and mill.

   3. Hardboard: AHA A135.4.
   4. Softwood Plywood: DOC PS 1; Sheathing Grade, Group 2.
   5. Hardwood Plywood: HPVA HP-1; Custom grade in accordance with AWS; with lumber core material ; with hardwood face veneer as indicated elsewhere in this Section in all exposed applications.
   6. Medium Density Particleboard: ANSI A208.1; Grade M-2; sanded faces.
   7. Medium Density Fiberboard (MDF): ANSI A208.2; Grade 130.

B. Fire-Retardant Materials:

   1. General: Where ASTM E84 fire-test-response characteristics of Class C or above are indicated as required, use the following for compliance:

      a. Lumber: If lumber is not of the Class designated, provide lumber treated as specified herein as Fire-Retardant-Treated Lumber by Pressure Process.
      b. Panels: If panel materials are not of the Class designated, provide face veneer thickness of less than 0.036 inch over a panel substrate that is of the Class designated as specified in this Section.

2. Fire-Retardant Materials, General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this Article, that are acceptable to authorities having jurisdiction, and with specified.

    a. Do not use treated materials that do not comply with requirements of referenced woodworking standard or that are warped, discolored, or otherwise defective.
    b. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
    c. Identify fire-retardant-treated materials with appropriate classification marking of UL, U.S. Testing, Timber Products Inspection, or another testing and inspecting agency acceptable to authorities having jurisdiction.

3. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame spread index of 25 or less when tested according to ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

    a. Use treatment that does not promote corrosion of metal fasteners.
    b. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D3201 at 92 percent relative humidity. Use where exterior type is not indicated
    c. Use treatment for which chemical manufacturer publishes physical properties of treated wood after exposure to elevated temperatures, when tested by a qualified independent testing agency according to ASTM D5664 for lumber and ASTM D5516 for plywood.
    d. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Kiln-dry plywood after treatment to a maximum moisture content of 15 percent.
    e. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.

4. Fire-Retardant Particleboard: Panels complying with the following requirements, made from softwood particles and fire-retardant chemicals mixed together at time of panel manufacture to achieve flame-spread index of 25 or less and smoke-developed index of 25 or less per ASTM E84.
5. Fire-Retardant Fiberboard: Medium-density fiberboard panels complying with ANSI A208.2, made from softwood fibers, synthetic resins, and fire-retardant chemicals mixed together at time of panel manufacture to achieve flame-spread index of 25 or less and smoke-developed index of 200 or less per ASTM E84.

C. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or, if not indicated, as required by woodwork quality standard:

1. The following laminate manufacturers are acceptable subject to compliance with the requirements of this Section:

    a. Formica.
    b. Lamin-Art, Inc.
    c. Wilsonart.

2. Schedule:

a. PLAM-1: Wilsonart / Landmark Wood 7981K-12

D. Thermoset Decorative Laminate (Cabinet Liner): Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1.

E. PVC Edge Banding: PVC or polyester edge banding complying with LMA EDG-1, 1 mm minimum thickness.

F. Solid Surfacing: Homogenous solid sheets of filled plastic resin complying with ISSFA-2. Standard thickness shall be ½" unless noted otherwise; Type: Standard.

1. Acceptable Manufacturers/Products:

a. DuPont / Corian
b. Formica / Solid Surface
c. Wilsonart / Gibraltar

2. Schedule:

a. SS-1: Wilsonart / Flint Rock 9207CS

2.2. CABINET HARDWARE AND ACCESSORIES

A. General:

1. Hardware Standards: Comply with BHMA A156.9, Quality Level: Type 2 (institutional), unless otherwise indicated.
2. Finish: For exposed hardware, provide finish that complies with BHMA A156.18:

a. Satin Chromium (US #26D).

B. Shelf Supports: All cabinet shelving shall be adjustable unless noted otherwise; supports shall be adjustable on 1 inch nominal centers.

1. Adjustable Shelf Standards and Supports: Clip type rests at ends of shelves per BHMA A156.9, B04071; with shelf rests, B04081. Provide 4 clips per shelf.
2. Shelf Rests: BHMA A156.9, B04013.

C. Drawer Slides:

1. For drawers 24" wide or less: all ball bearing, side or rail mount, overtravel extension with hold-in detent, 100 lb/pair load rating.

a. 7434 / Accuride
b. 422.93 / Hafele
c. 8505 / Knape & Vogt

2. For drawers 25"-42" wide: all ball bearing, side or rail mount, overtravel extension with hold-in detent, 200 lb/pair load rating.

    a. 3640 / Accuride
    b. 422.07 / Hafele
    c. 8525 / Knape & Vogt

D. Hinges: Frameless concealed hinges, BHMA A156.9, B01602; 100-degree opening angle; 3-dimensional adjustment; self-closing. Provide one of the following:

1. MODUL or CLIP/ Blum, Inc.
2. Architect/Engineer approved equal.

E. Door and Drawers Pulls: Metal wire type with 4" nominal centers. Mount pulls horizontally on drawers and vertically on doors unless indicated otherwise.

F. Locks: Locks shall be cylinder type, die-cast with disc pin tumbler mechanisms, BHMA A156.11.

1. Location: See Casework Schedule in Drawings for lockable cabinet types.
2. Keying: Each room shall be keyed alike and master keyed. Provide three (3) keys per room.
3. Finish: Finish shall match the pulls.

G. File Hanging System: All file drawers to have an integrated, metal hanging file system to allow for front –to-back or side-to-side filing.

H. Grommets: Grommets for cable passage through countertops: Molded plastic grommets and matching plastic caps with slot for wire passage.

1. Size: Unless indicated otherwise, 2 inch diameter.
2. Color: To be selected by Architect from manufacturer's full range of colors.

I. Countertop Support Hardware: Countertops not supported by casework are to be supported as follows; unsupported spans shall not exceed 48 inches:

1. Concealed Support Brackets: steel construction; 1,000 pound capacity.

    a. Acceptable Manufacturers/Products:

        1) A&M Hardware, Inc. / 2" Concealed Brackets
        2) Substitutions: Under provisions of section 01 6000.

    b. Sizes: Manufacturer's recommended sizes for countertop depth.
    c. Finish: Primer coat with finish coat to be field applied.
    d. Spacing: 32" o.c.

2.3. ACCESSORIES

A. Fasteners for interior architectural woodwork: Nails, screws, and other anchoring devices of type, size, material, and finish required for application indicated to provide secure attachment, concealed where possible.

B. Adhesives: Wood glues, paneling adhesives, laminate adhesives, and construction adhesives used in accordance with manufacturer's instructions.

C. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.

D. Wood Filler: Solvent based, tinted to match surface finish color.

2.4. GENERAL SHELVING

A. Grade: AWS Custom.

B. General: Provide shelving on standards where indicated on the Drawings.

C. Shelf: 12" deep x 3/4" thick medium density particleboard with plastic laminate finish on faces and all exposed edges.

1. Finish: Plastic Laminate shall be Horizontal Grade (HGS).

a. Plastic Laminate Color: Refer to 2.1 of this Section.

D. Shelving Standards at 12” deep shelves:

1. Standards: Knape & Vogt 87ANO - space standards at 16" o.c.
2. Brackets: Knape & Vogt 186LL ANO, 10" size.
3. Accessories: Knape & Vogt 200 Series shelf rests for anchoring shelves to brackets and shelf joiners at shelf butt joints.
4. Finish: To be selected by Architect from manufacturer’s full range of finishes.

E. Shelving Standards at 24” deep shelves:

1. Double shot standards: Knape & Vogt 85ANO - space standards at 16" o.c.
2. Double shot brackets: Knape & Vogt 185 ANO, 24" long.
3. Accessories: Knape & Vogt 85 Series shelf rests for anchoring shelves to brackets and shelf joiners at shelf butt joints.
4. Finish: To be selected by Architect from manufacturer’s full range of finishes.

2.5. PLASTIC LAMINATE CASEWORK AND PANELING

A. Grade: AWS Custom.

B. AWS Type of Cabinet Construction: Flush Overlay.

C. Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate complying with the following requirements:

1. Horizontal Surfaces Other Than Countertops: Grade HGS.
2. Postformed Surfaces: Grade HGP.
3. Vertical Surfaces: Grade HGS.

D. Materials for Semiexposed Surfaces:

1. Surfaces Other Than Drawer Bodies: Thermoset decorative panels.

a. Edges of Shelves, Doors and Drawers: PVC edge-banding.

b. For semiexposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, Grade VGS.

2. Drawer Sides and Backs: Thermoset decorative panels.
3. Drawer Bottoms: Thermoset decorative panels.

E. Concealed Backs and Bottoms of Panels with Exposed Plastic Laminate Surfaces: High-pressure decorative laminate, Grade BKL.

F. Colors, Patterns, and Finishes: Refer to 2.1 of this Section.

2.6. SOLID-SURFACE COUNTERTOPS AND SILLS

A. Grade: AWS Custom.

B. Solid-Surfacing-Material Thickness: 1/2 inch.

C. Colors, Patterns, and Finishes:

1. Countertops (including aprons, splashes, etc.): Refer to schedule in 2.1 of this Section.
2. Window Sills: Refer to schedule in 2.1 of this Section.

D. Core Material: Particleboard or medium-density fiberboard.

E. Core Material at Countertops and at Window Sills: Particleboard made with exterior glue, medium-density fiberboard made with exterior glue, or exterior-grade plywood.

F. Counter Configuration:

1. Front style: Square.

a. Thickness: 1 inch built-up edge.

2. Backsplash and Endsplash/Sidesplash:

a. Style: Square edge with scribe.
b. Attachment Style: Field-applied.
c. Height: 4 inches.
d. Thickness: 1/2 inch.

G. Sill Configuration:

1. Front Style: As shown on Drawings.

a. Thickness: 1/2 inch.

H. Fabricate tops in one piece, unless otherwise indicated. Comply with solid-surfacing-material manufacturer's written recommendations for adhesives, sealers, fabrication, and finishing.

1. Install integral lavatory bowls in countertops in shop.
2. Drill holes for plumbing fittings and similar openings in countertops in shop.
3. All edges shall be eased.

2.7. FABRICATION – GENERAL

A. Design and Construction Features: Comply with the Drawings for profile and construction and, comply with specified Quality Standards.

B. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

C. Provide concealed fasteners in entire construction.

D. Measurements: Before proceeding with fabrication of woodwork to be fitted to other construction, obtain measurements and verify dimensions and shop drawing details as required for accurate fit.

E. Eased Edges: Ease edges to radius indicated for the following:

1. Corners of Cabinets and Edges of Solid-Wood (Lumber) Members 3/4 Inch Thick or Less: 1/16 inch.
2. Edges of Rails and Similar Members More Than 3/4 Inch Thick: 1/8 inch.

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

1. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements indicated on Shop Drawings before disassembling for shipment.

G. Shop-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. Sand edges of cutouts to remove splinters and burrs.

H. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Make corners and joints hairline. Slightly bevel arises. Laminate joints in countertops or large flat areas shall have a maximum variation of 0.010 inches.

2.8. FABRICATION – CASEWORK

A. General: Comply with the specified Quality Standards except as follows:

1. Cabinet backs:

a. Exposed cabinet backs shall be 3/4” material and finished to match cabinet fronts.

2. Drawers:

a. Drawer fronts shall be applied to separate drawer body component sub-front.

3. Shelving:

a. Material: Shelves shall be constructed of the same material as the casework construction unless noted otherwise below:

1) Shelves up to 32" in length shall be ¾" minimum thickness.
2) Shelves 32"-42" in length shall be 1" minimum thickness.
3) Shelves 42"-48" in length shall be hardwood plywood core; 1" minimum thickness.

b. Finish:

1) Laminate Casework: All laminate casework shall be of balanced construction. Components to receive plastic laminate must receive laminate, liner, or backer in the appropriate thickness on the reverse face. Thermoset decorative finish, where used, is to be applied to both faces.
2) Wood Casework: All four sides are to be finished, with the leading edge to be solid wood to match cabinet fronts.

4. Wall Cabinets: Underside of wall cabinets shall be flush; front, back, and sides shall not extend below the bottom unless indicated otherwise.
5. Fillers: Provide fillers and corner panels, including scribe fillers.

3. EXECUTION

3.1. EXAMINATION

A. Examine, with the Installer present, the areas and conditions under which the work is to be installed. Notify the Architect in writing of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected.

B. Verify adequacy of backing and support framing and all dimensions relating to the installation of architectural woodwork work.

3.2. PREPARATION

A. Condition wood materials to average prevailing humidity conditions in installation areas for a minimum of 24 hours prior to installation.

B. Back prime all trim for painted finish prior to installation.

C. Examine architectural woodwork materials before installation. Reject materials that are wet, damaged, moisture damaged, mold damaged, or of otherwise unacceptable quality.

1. Discard all material which is unsound, warped, bowed, twisted, damaged, too small to fabricate work without minimum joints, or which is of defective manufacture with respect to surfaces, sizes or patterns.

D. Clean substrates of projections and substances detrimental to application.

3.3. INSTALLATION – GENERAL

A. Woodwork installation shall meet or exceed AWS Custom Grade.

B. Install the work plumb, level, true, aligned with adjacent materials, and straight with no distortion. Shim as required using concealed shims. Install to a tolerance of 1/8" in 8'-0" for plumb and level; and with 1/32" maximum gap between exposed components, 1/16" maximum offsets in revealed adjoining surfaces. Scribe and cut work to fit adjoining work and surfaces, and refinish cut surfaces or repair damaged finish at cuts.

C. Coordinate interior architectural woodwork with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate architectural woodwork.

D. Fasten to prevent movement or warping. Anchor architectural woodwork to framing 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.

E. Install without splitting; drill pilot holes before fastening where necessary to prevent splitting.

F. Avoid face/"exposed" fastening wherever possible. Use fine finish nails or screws for "exposed" fastening, countersunk and filled flush with finish surface with non-shrink wood putty. Putty must be colored to match the architectural woodwork and be top-coated with a minimum of one coat of clear coat (varnish or polyurethane as specified) or paint finish, as appropriate. Final appearance of "exposed" fastening shall be barely detectable to the naked eye from a distance of 6' to 8'.

3.4. INSTALLATION – GENERAL SHELVING

A. Install standards for adjustable shelf brackets according to manufacturer's written instructions, spaced not more than 16 inches o.c. and within 6 inches of end of shelves. Fasten to framing members or in-wall blocking.

B. Install shelves, fully seated on brackets. Install shelf seats and shelf joiners. Anchor shelves to brackets.

3.5. INSTALLATION – CASEWORK

A. Cabinets: Install without distortion so 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 installation of hardware and accessory items as indicated.

1. Wall-to-wall installations, unless noted otherwise, shall be centered and scribe fillers be applied as needed. Gaps of 1/16" or less may be filled with color-matched caulking.
2. Secure cabinets to floor using appropriate anchorages.
3. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
4. Fasten wall cabinets through back, near top and bottom, at ends not more than 16 inches o.c.

3.6. INSTALLATION – COUNTERTOPS AND SILLS

A. Countertops and Sills: Scribe to adjacent surfaces. Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.

1. Solid-Surfacing: Align adjacent solid-surfacing-material countertops and form seams to comply with manufacturer's written recommendations using adhesive in color to match countertop. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
2. Install countertops with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
3. Secure applied backsplashes and endsplashes to tops with concealed metal brackets at 16 inches o.c. and to walls with adhesive.
4. Caulk space between backsplash/endsplashes and wall with sealant specified in Section 07 9200 – Joint Sealants.

3.7. ADJUSTMENT, CLEANING, AND PROTECTION

A. Repair damaged and defective architectural woodwork work wherever possible to eliminate defects functionally and visually; where not possible to repair properly, replace woodwork. Adjust joinery for uniform appearance.

B. Clean all exposed and semi-exposed surfaces of architectural woodwork and all casework interiors. Touch up shop-applied finishes to restore damaged or soiled areas. Clean, lubricate, and adjust hardware.

C. Protect and maintain conditions to ensure that the work will be without damage or deterioration at the time of acceptance.

END 06 4000

1. GENERAL

1.1. WORK INCLUDES

A. Building insulation work where shown on the Drawings and as described herein.

1. Foam-plastic board insulation.
2. Nailbase insulation.
3. Glass fiber blanket insulation.
4. Sound attenuation blanket insulation.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 3300 – Submittal Procedures
2. Section 04 2000 – Unit Masonry: Cavity Wall Insulation
3. Section 06 1000 – Rough Carpentry
4. Section 07 2129 – Sprayed Urethane Foam Insulation
5. Section 07 2726 – Fluid-Applied Membrane Air Barrier
6. Section 07 5423 – Thermoplastic Polyolefin (TPO) Membrane Roofing: Roof insulation
7. Section 07 8413 – Penetration Firestopping
8. Section 07 8446 – Fire-Resistive Joint Systems

1.3. REFERENCES

A. Comply with standards in effect as of the date of the Contract Documents except for those having different revision dates as referenced in the codes indicated on the Drawings, or unless otherwise indicated.

B. American Association of Textile Chemists and Colorists (AATCC):

1. AATCC 127 – Water Resistance: Hydrostatic Pressure Test.

C. 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 C578 – Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
3. ASTM C665 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
4. ASTM C764 - Standard Specification for Mineral Fiber Loose Fill Thermal Insulation.
5. ASTM C1015 - Standard Practice for Installation of Cellulosic and Mineral Fiber Loose Fill Thermal Insulation.
6. ASTM C1320 – Standard Practice for Installation of Mineral Fiber Batt and Blanket Thermal Insulation for Light Frame Construction.
7. ASTM D1117 - Standard Guide for Evaluating Nonwoven Fabrics.
8. ASTM D882 - Standard Test Method for Tensile Properties of Thin Plastic Sheeting.
9. ASTM D1621 – Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
10. ASTM D4397 - Standard Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications.

11. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
12. ASTM E90 – Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
13. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.
14. ASTM E136 – Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 Degrees C.
15. ASTM E1677 - Standard Specification for an Air Retarder (AR) Material or System for Low Rise Framed Building Walls.
16. ASTM E2178 – Standard Test Method for Air Permeance of Building Materials.

D. Technical Association of the Pulp and Paper Industry (TAPPI):

1. TAPPI T-460 – Air Resistance of Paper (Gurley Method)

1.4. SUBMITTALS

A. Submit in accordance with Section 01 3300:

1. Manufacturer's Data:

a. Submit manufacturer's specifications and installation instructions for each type of insulation required.

1) Product Data: Provide data on product characteristics, performance criteria, limitations, and other pertinent data.
2) Manufacturer's Installation Instructions: Indicate special environmental conditions required for installation and installation techniques.

b. Include manufacturer's certificate substantiating that the materials comply with specified requirements.

1.5. QUALITY ASSURANCE

A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1.6. DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

B. Protect foam-plastic board insulation as follows:

1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site before installation time.
3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

1.7. PROJECT CONDITIONS

A. Do not proceed with the installation of insulation until subsequent work which conceals the insulation is ready to be performed.

2. PRODUCTS

2.1. GENERAL

A. Identification: Each piece of insulation shall receive an R-value identification mark applied by the manufacturer.

2.2. FOAM-PLASTIC BOARD INSULATION

A. General: Extruded-Polystyrene Board Insulation: ASTM C578, of type and minimum compressive strength indicated below. Insulation shall be minimum of Class B with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E84.

1. Compressive Strength, ASTM D1621: Type IV, 25 psi, minimum unless indicated otherwise.
2. R-Value per inch of thickness, ASTM C518: 5.0 minimum.

B. Perimeter Foundation Insulation. Extruded-polystyrene board insulation complying with ASTM C578, Type IV, 25 psi minimum compressive strength.

1. Location: Provide on the interior-side of all foundation walls and where indicated on Drawings.
2. Acceptable Product / Manufacturer:

    a. Certifoam 25 / DiversiFoam Products, Inc.
    b. Styrofoam Score Board or Square Edge / DuPont de Nemours, Inc.
    c. GreenGuard XPS 25 / Kingspan Insulation LLC
    d. Foamular 250 / Owens-Corning

3. Sheathing: 5/8” fire treated plywood; fire treated and tested as an assembly with NFPA 285.
4. Edges: Tongue and groove.
5. Composite R-Value: 15.0 Minimum.
6. Nominal Composite Thickness: 3.5”
7. Acceptable Product / Manufacturer:

    a. EnergyShield Ply Pro / Atlas
    b. ThermaCal WALL / Cornell Corporaton
    c. XCI Ply / Hunter
    d. ECOBASEci/ Rmax
    e. R2+Base / Carlisle Coatings & Waterproofing

2.3. NAILBASE INSULATION

A. General: Nailbase Insulation consists of foam-plastic board insulation factory-bonded to wood sheathing:

1. Location: Provide where indicated on Drawings.

2. Insulation: Polyisocyanurate or Extruded-Polystyrene.

    a. Insulation shall be minimum of Class B with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E84.

3. Sheathing: 5/8" fire treated plywood; fire treated and tested as an assembly with NFPA 285.
4. Edges: Tongue and groove.
5. Composite R-Value: 15.0 minimum.
6. Nominal Composite Thickness: 3.5"
7. Acceptable Product / Manufacturer:

    a. EnergyShield Ply Pro / Atlas
    b. ThermaCal WALL / Cornell Corporation
    c. XCI Play / Hunter
    d. ECOBASEcl / Rmax
    e. R2+Base / Carlisle Coatings & Waterproofing

2.4. GLASS-FIBER BLANKET INSULATION

A. Unfaced, Glass-Fiber Blanket Insulation: ASTM C665, Type I; shall be Class A with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E84; passing ASTM E136 for combustion characteristics.

1. Location: Provide where indicated on Drawings.
2. Thermal resistance: Aged R=3.25 for 1" thickness.
3. Batt size: Manufacturer's standards, to fit spacing of supporting members.
4. Thickness: 3 ½ inches minimum, unless indicated otherwise.
5. Acceptable Manufacturers:

    a. CertainTeed.
    b. Knauf.
    c. Johns Manville.
    d. Owens-Corning.

B. Sound Attenuation Blankets: ASTM C665, Type I; unfaced glass or mineral fiber, friction fit, pre-formed. Material shall be labeled as sound attenuation batts and designed to increase STC ratings.

1. Location: Provide where indicated on Drawings.
2. Batt size: Manufacturer's standards, to fit spacing of supporting members.
3. Thickness: 3 ½ inches minimum, unless indicated otherwise.
4. Acceptable Manufacturers:

    a. CertainTeed.
    b. Johns Manville.
    c. Knauf.
    d. Owens-Corning.

2.5. MISCELLANEOUS INSULATION MATERIALS

A. Mechanical Fasteners: Types, such as wires, mesh, or pins, recommended by the insulation manufacturer.

B. Adhesive for Bonding Insulation: The type recommended by the insulation manufacturer, and complying with fire-resistance requirements and insurance requirements. Adhesive must be compatible with air barrier material.

C. Foam-Plastic Board Insulation Filler: Crack and joint adhesive, mastic, or sealant recommended by insulation manufacturer and compatible with insulation and other adjacent construction.

3. EXECUTION

3.1. EXAMINATION

A. Examine the areas and the conditions under which the insulation work is to be performed. Notify the Architect in writing of any unsatisfactory conditions. Do not proceed with the insulation work until unsatisfactory conditions have been corrected.

1. Verify substrate and adjacent materials are dry and ready to receive insulation and adhesive where required.
2. Verify insulation boards are unbroken, free of damage, with face membrane undamaged.
3. Verify mechanical and electrical services within walls have been installed and tested.

3.2. PREPARATION

A. Prepare surfaces to receive insulation per manufacturer's instructions. Clean substrates of substances that are harmful to insulation or that interfere with insulation attachment.

3.3. INSTALLATION, GENERAL

A. Comply with insulation manufacturer's instructions for the particular conditions of installation in each case. When printed instructions are not available or do not apply to the project conditions, consult the manufacturer's technical representative for specific recommendations before proceeding with the work.

B. Extend insulation full thickness as shown over entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation.

C. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.4. INSTALLATION OF FOAM-PLASTIC BOARD INSULATION

A. General: Seal joints between foam-plastic insulation units by applying Foam-Plastic Board Insulation Filler to edges of each unit to form a tight seal as unites are pressed into place. Fill voids in completed installation with Foam-Plastic Board Insulation Filler as recommended by insulation manufacturer.

1. Stagger end joints. Fit units tightly together and to obstructions.

B. Perimeter Foundation Insulation: Set insulation units using manufacturer’s recommended adhesive according to manufacturer’s written instructions.

1. If not otherwise indicated, extend insulation a minimum of 24 inches below exterior grade line.

3.5. INSTALLATION OF NAILBASE INSULATION

A. Install with mechanical fasteners in accordance with manufacturer’s instructions.

3.6. INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

A. Install insulation complying with manufacturer's written instructions and ASTM C1320. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

B. Glass-Fiber Blanket Insulation: Install in cavities formed by framing members according to the following requirements:

1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
2. Fluff insulation to full thickness before installation. Do not compress insulation.
3. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
4. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
5. Within exterior wall framing, install insulation to fit between pipes and backside of sheathing. Cut insulation material as required to fit around wiring and plumbing.
6. For framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically.

C. Sound Attenuation Insulation: Install insulation where indicated in sound rated assemblies in accordance with manufacturer’s recommendations and ASTM E90. Maintain acoustical rating of assembly.

D. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:

1. Batt Insulation: Compact to approximately 40 percent of normal maximum volume.
2. Spray Polyurethane Insulation: Refer to Section 07 2129 – Sprayed Urethane Foam Insulation.

3.7. PROTECTION

A. Protect installed insulation from harmful weather exposure, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END 07 2100

1. GENERAL

1.1. WORK INCLUDES

A. Closed-cell spray urethane foam insulation to fill gaps and uninsulated voids where indicated in Drawings.

B. Spray applied thermal barrier over sprayed urethane foam insulation.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 04 2000 - Unit Masonry: Cavity Wall Insulation
2. Section 05 1200 - Structural Steel
3. Section 05 2100 - Steel Joists
4. Section 07 2100 – Building Insulation
5. Section 07 2726 – Fluid-Applied Membrane Air Barrier
6. Section 07 6200 - Sheet Metal Flashing and Trim
7. Section 07 8413 – Penetration Firestopping
8. Section 07 8446 – Fire-Resistive Joint Systems
9. Section 07 9000 - Joint Sealants

1.3. REFERENCES

A. Publication Dates: Comply with standards in effect as of the date of the Contract Documents unless otherwise indicated.

B. Air Barrier Association of America (ABAA).

C. 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 C1029 - Standard Specification for Spray-Applied Rigid Cellular Polyurethane Thermal Insulation.
3. ASTM D1621 - Standard Test Method for Compressive Properties Of Rigid Cellular Plastics.
4. ASTM D1622 - Standard Test Method for Apparent Density of Rigid Cellular Plastics.
5. ASTM D2126 - Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging.
6. ASTM D6226 - Standard Test Method for Open Cell Content of Rigid Cellular Plastics.
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 E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
10. ASTEM E2178 - Standard Test Method for Air Permeance of Building Materials.

D. Factory Mutual (FM):

1. ANSI FM 4880: American National Standard for Evaluating the Fire Performance of Insulated Building Panel Assemblies and Interior Finish Materials - Class 1 Fire Rating of Insulated Wall or Wall and Roof/Ceiling Panels, Interior Finish Materials or Coatings, and Exterior Wall Systems.

E. International Building Code (IBC).

F. International Code Council (ICC):

1. ICC AC377 - Acceptance Criteria for Spray-Foam Plastic Insulation.

G. National Fire Protection Association (NFPA):

1. NFPA 286: Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth.

H. Spray Polyurethane Foam Alliance (SPFA).

I. Underwriters Laboratories (UL):

1. UL 1715: Fire Test of Interior Finish Material.

1.4. SUBMITTALS

A. Submit in accordance with Section 01 3300:

1. Product Data: Submit manufacturer's product data for each type of insulation product being used.

a. Provide installation instructions.

2. Product Test Reports: Submit test reports performed by a qualified third-party testing agency evidencing compliance of insulation products with specified requirements including those for thermal resistance, fire-test-response characteristics, water vapor transmission, and other specified performance requirements, based on comprehensive testing of current products.
3. Evaluation Report: Submit evaluation report showing compliance of foam-plastic insulations with International Building Code (IBC) and International Energy Conservation Code (IECC) requirements.
4. Manufacturer's certification that specified products are compatible and suitable for intended application.
5. Manufacturer's certification that Installer has been approved by manufacturer to install their product.

1.5. QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer with a minimum of five (5) years experience manufacturing products in this section. Manufacturer shall be a member in good standing of the Spray Polyurethane Foam Alliance (SPFA).

B. Installer Qualifications: The Installer shall be an applicator approved by the manufacturer of the foam insulation applied. Furnish to the Architect a currently dated "Applicator's License Certificate" issued by the materials manufacturer. The certificate shall verify the applicator's qualifications to properly install the spray foam insulation system.

1. Installer shall have at least five (5) years of previous certification with the materials manufacturer as a licensed applicator for the specified spray foam insulation system.

C. Single-Source Responsibility: Obtain polyurethane foam insulation and accessory materials from a single manufacturer regularly engaged in manufacturing the product.

D. Products shall comply with all federal, state and local regulations controlling use of volatile organic compounds (VOCs).

E. Products shall be evaluated by qualified testing agency for compliance with applicable codes in accordance with ICC AC377.

F. Products shall be evaluated by the Air Barrier Association of America (ABAA).

G. Products shall be installed in accordance with IBC and all other applicable codes.

H. Thermal Barrier shall be installed per ANSI FM 4880, UL 1040, NFPA 286 or UL 1715.

1.6. DELIVERY, STORAGE, AND HANDLING

A. Storage: Store and handle materials in compliance with manufacturer's recommendations to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, exposure to direct sunlight, or other causes. Store all products in a manner to prevent damage; in a secure place, out of the way of construction operations. Provide protection until ready for use.

1.7. PROJECT CONDITIONS

A. Protection:

1. Protection shall be provided for the overspray of foam caused by operations under this phase of work.
2. Protect this building project, and any other improvements from damage due to operations under this work, with tarps and drop cloths as necessary.

B. Application of Urethane Foam:

1. Unless specifically allowed in manufacturer’s written instructions, do not proceed with application of urethane foam materials when ambient exterior temperature is less than 60 degrees F., or is expected to drop to below 60 degrees F. within 24 hours.
2. Do not proceed with application of urethane foam materials when wind velocity is above 15 mph.

1.8. WARRANTY

A. The Contractor shall furnish to the Owner, as a part of this contract, a written guarantee signed by the Installer and endorsed by the manufacturer of the insulation materials covering materials and workmanship. The guarantee shall insure the performance of the system on all surfaces which have received newly installed spray applied foam insulation for a period of five (5) years on materials and one year on labor following date of Substantial Completion.

1.9. PRE-INSTALLATION CONFERENCE

A. Pre-Installation Conferences: Conduct a pre-installation conference at Project site prior to commencing Work of this section for coordination with other construction.

1. Attendees: Installer, representative of spray foam insulation manufacturer and all trades that require coordination with the Work shall attend the meeting.

a. Include installers of other construction connecting to the spray foam insulation, including roofing, waterproofing, masonry, sealants, windows, glazed curtain walls, and door frames.

2. Review methods and procedures related to spray foam insulation and thermal barrier including, but not limited to, the following:

a. Inspect and discuss condition of substrate and other preparatory work performed by other trades.
b. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
c. Review manufacturer's installation procedures and requirements including the following:

1) Minimum curing period.
2) Forecasted weather conditions.
3) Areas not to be sealed.
4) Special details and sheet flashings.
5) Mock-ups.
6) Sequence of installation.
7) Testing and inspection procedures.
8) Protection and repairs.

d. Review protection of adjacent areas.

2. PRODUCTS

2.1. SYSTEM DESCRIPTION

A. General: Spray applied urethane foam insulation to fill gaps and uninsulated voids indicated in Drawings. Spray-applied thermal barrier product is applied over the insulation to provide code-required fire resistance to plastic foam insulation.

2.2. CLOSED-CELL SPRAY POLYURETHANE FOAM INSULATION, TYPICAL

A. General: ASTM C1029, Type II, two-component, medium density, closed-cell, rigid-class urethane foam, sprayed-in-place, formaldehyde-free, CFC-free, and having the following physical properties:

Property		Actual Values	ASTM Test Method
1.	Core Density	2.0 lb/ft³ minimum	D1622
2.	Closed Cell Content	90% minimum	D6226
3.	Compressive Strength	25 psi minimum	D1621
4.	Tensile Strength	41 psi minimum	D1623

5.	Dimensional Stability	12% maximum	D2126
6.	Aged Thermal Resistance at 1-inch	6.4 minimum	C518
7.	Water Vapor Transmission - Permeance	1.39 perms @ 1-inch, max.	E96
8.	Air Permeance @ 75PA	< 0.02 L/s*m2 @ 1-inch	E2178
9.	Flame Spread	< 25	E84
10.	Smoke Developed	< 450	E84

B. Products/Manufacturers: Subject to compliance with the requirements of the Contract Documents, the following manufacturers and products are acceptable:

1. WallTite / BASF Corporation.
2. SealTite PRO Closed Cell / Carlisle.
3. OnePass HFO / Enverge.
4. Heatlok HFO Pro / Huntsman Building Solutions.
5. JM Corbond III / Johns Manville.

C. Primer: Provide insulation primer as recommended by insulation manufacturer.

2.3. THERMAL BARRIER

A. General: Spray applied cellulose or cementitious protective coating for application over rigid urethane foam.

1. Barrier shall provide 15 minute rating per ASTM E119 and be UL or ICC approved for this application.
2. Apply in thickness required to provide specified rating.

B. Manufacturer/Product: Subject to compliance with the requirements of the Contract Documents, the following manufacturers and products are acceptable:

1. A. D. Fire Protection Systems / AD Thermal Barrier
2. W. R. Grace / Monokote Z-3306
3. International Cellulose Corporation / Ure-K
4. Other products meeting the requirements of the Contract Documents and acceptable to manufacturer of Sprayed Urethane Foam Insulation.

3. EXECUTION

3.1. INSPECTION

A. Examine the areas and conditions under which urethane foam is to be applied. Verify surfaces to receive the foam are clean and dry. Do not proceed with the work until unsatisfactory conditions have been corrected. Beginning installation means installer acceptance of existing surfaces.

1. Verify that insulation backing surface is in place to prevent accidental spread of insulation into required wall cavities and similar spaces.

B. Following the installation of the urethane foam, examine the areas and conditions under which the spray applied thermal barrier is to be applied. Verify surfaces are clean, dry, and are acceptable to receive the thermal barrier application. Do not proceed with the work until unsatisfactory conditions have been corrected. Beginning installation means installer acceptance of existing surfaces.

3.2. PREPARATION

A. Prepare surfaces as recommended by manufacturer:

1. Remove existing dust and foreign objects from insulation area. Clean with high pressure air to ensure all dust is completely removed from insulation surfaces.
2. All wall protrusions or mounting or support members of roof mounted mechanical equipment, such as air conditioners, fan ducts, pipes, etc., shall have the sprayed urethane foam applied. A tape flashing fabric shall be wrapped around areas where the foam stops on the metal to insure a positive watertight insulation. All metal to which foam is to be applied must be free of oil, grease and rust.

B. Protection: Surfaces not designated to receive the system shall be properly masked or otherwise protected in an acceptable manner against application of any of the specified materials to those surfaces. Extreme caution shall be exercised in spray application of liquid materials to prevent staining or other damage from overspray.

1. Provide barriers to prevent migration of foam into vents or required airspaces and cavities.

C. Priming: Prime substrates where recommended by insulation manufacturer. Apply primer to comply with insulation manufacturer's written instructions. Confine primers to areas to be insulated; do not allow spillage or migration onto adjoining surfaces.

3.3. APPLICATION OF SPRAYED URETHANE FOAM

A. Apply insulation in accordance with manufacturer’s written instructions.

1. The foam shall be applied to a clean, dry surface.
2. Foam shall be applied in multiple passes to uniform monolithic density without voids:

a. Minimum Cured Thickness: 7”.

3. All items protruding through the wall such as vents, pipes, curbs, cants, or conduits shall have the urethane foam carried up in a smooth transition a minimum of 6” up the side of any projection.
4. All gaps, voids, and cracks in exterior walls and exterior wall and roof transitions shall be fully sealed.

B. Do not apply foam where it will be in contact with equipment or materials with operating temperatures of 180 degrees F. or greater.

C. Do not seal openings and vents required for ventilation of roofing including eave ventilation troughs. Verify specific areas with Architect prior to application.

D. Do not fill required airspaces of cavity wall construction.

E. Do not overfill voids resulting in buckling or distortion of substrates and surfaces.

3.4. APPLICATION OF THERMAL BARRIER

A. Thermal barrier shall completely cover the interior surface of the sprayed foam insulation to provide a fire-separation of the interior of the building from the sprayed foam insulation.

B. Apply thermal barrier in accordance with manufacturer's written instructions.

1. Examine surface to ensure they are dry, clean, and free from grease, water, oil, or other contaminants.
2. Apply manufacturer recommended adhesive if required by manufacturer.
3. Apply thermal barrier in thickness required for specified rating.

3.5. CLEANING

A. All debris of construction including rags and flammable trash shall be picked up daily and legally disposed of off Owner's premises.

B. Surfaces not intended to receive sprayed foam insulation shall be protected from spillage, dripping, spotting and damage during application of the system. Should this protection not be effective, or not be provided, the respective surfaces shall be restored to the satisfaction of the Architect by cleaning, repairing or replacing.

3.6. PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes.

B. Touch-up, repair, or replace damaged products before Substantial Completion.

END 07 2129

1. GENERAL

1.1. WORK INCLUDES

A. Fluid-applied vapor retarding membrane air barrier.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 4000 – Quality Requirements: Testing responsibility.
2. Section 04 2000 - Unit Masonry: Thru-wall flashing.
3. Section 07 2100 - Building Insulation: Air infiltration and vapor barriers.
4. Section 07 9000 - Joint Sealants
5. Section 09 2100 – Gypsum Board Assemblies

1.3. REFERENCES

A. American Society of Testing and Materials (ASTM):

1. ASTM A240: Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
2. ASTM C920: Standard Specification for Elastomeric Joint Sealants.
3. ASTM C1193: Standard Guide for Use of Joint Sealants.
4. ASTM D412: Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers Tension.
5. ASTM D4258: Standard Specification for Preformed Architectural Compression Seals for Buildings and Parking Structures.
6. ASTM D4263: Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method.
7. ASTM D4541: Standard Test Method for Pull-off Strength of Coating Using Portable Adhesion Testers.
8. ASTM E96: Standard Test Methods for Water Vapor Transmission of Materials.
9. ASTM E162: Standard Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source.
10. 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.
11. ASTM E783: Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors.
12. ASTM E1186: Standard Practice for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems.
13. ASTM E2178: Standard Test Method for Air Permeance of Building Materials.
14. ASTM E2357: Standard Test Method for Determining Air Leakage of Air Barrier Assemblies.

1.4. DEFINITIONS

A. ABAA: Air Barrier Association of America.

B. Air-Barrier Material: A primary element that provides a continuous barrier to the movement of air and vapor.

C. Air-Barrier Accessory: A transitional component of the air barrier that provides continuity.

D. Air-Barrier Assembly: The collection of air barrier materials and accessory materials applied to an opaque wall, including joints and junctions to abutting construction, to control air and vapor movement through the wall.

1.5. SUBMITTALS

A. Submit in accordance with Section 01 3300 – Submittal Procedures.

1. Product Data: Include manufacturer's written instructions for evaluating, preparing, and treating substrate; technical data; and tested physical and performance properties of air barrier.
2. Shop Drawings: Show locations and extent of air barrier. Include details for substrate joints and cracks, counterflashing strip, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.

    a. Include project specific details of interfaces with other materials that form part of air barrier.

3. Installer Qualifications: Qualifications as indicated in Quality Assurance article of this Section.
4. Product Certificates: For air barriers, certifying compatibility of air barrier and accessory materials with Project materials that connect to or that come in contact with the barrier; signed by product manufacturer.

1.6. QUALITY ASSURANCE

A. Source Limitations: Obtain primary air barrier materials and primers through one source from a single manufacturer. Provide secondary materials recommended by manufacturer of primary materials.

B. Installer Qualifications: A firm experienced in applying air barrier materials similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.

1. Installer shall employ installers and supervisors on the Project who are trained and approved by the air barrier manufacturer.

C. VOC Content: Products, including accessory materials, shall comply with VOC limits of authorities having jurisdiction.

1.7. PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit air barrier to be performed according to manufacturer's written instructions. Do not proceed with application of air barrier membrane when rain is expected within 24 hours.

B. Ventilation: Provide adequate ventilation during application of air barrier in enclosed spaces. Maintain ventilation until air barrier has cured.

1.8. PRE-INSTALLATION CONFERENCE

A. Contractor shall convene a pre-installation conference a minimum of one week prior to commencing work of this Section.

1. Include installers of other construction connecting to air barrier, including roofing, waterproofing, masonry, sealants, windows, glazed curtain walls, and door frames.
2. Include testing agency.
3. Review submittals.
4. Review air barrier requirements including surface preparation, substrate condition and pre-treatment, minimum substrate curing period, forecasted weather conditions, special details and sheet flashings, mockups, installation procedures, sequence of installation, testing and inspection procedures, and protection and repairs.

2. PRODUCTS

2.1. VAPOR-RETARDING MEMBRANE AIR BARRIER

A. General: Provide vapor-retarding synthetic polymer membrane products. Bituminous products will not be acceptable.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Grace Construction Products / Perm-A-Barrier Liquid.
2. Henry Company / Air-Bloc 16MR.
3. Rubber Polymer Corporation / Rub-R-Wall Airtight.
4. W. R. Meadows, Inc / Air-Shield LSR

C. Physical and Performance Properties:

1. Ultimate Elongation: Minimum 270 percent; ASTM D412, Die C.
2. Membrane Air Permeance: Not to exceed 0.004 cfm x 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; ASTM E2178.
3. Membrane Vapor Permeance: Not to exceed 0.1 perm (5.8 ng/Pa x s x sq. m); ASTM E96, Method B (wet cup).

D. System Performance Requirements:

1. 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 E283, ASTM E783, or ASTM E2357.

2.2. SYSTEM DESCRIPTION

A. General: Air barrier shall be capable of performing as a continuous vapor-retarding air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

1. Fluid-applied membrane air barrier shall be applied over all substrates in exterior cavity wall construction. A minimum 3" width lap is required onto all adjoining substrates and materials, but no portion of the barrier shall remain exposed to view.
2. Unless indicated otherwise, connections shall be made between:

    a. Foundation and walls.
    b. Walls and fenestration (windows, doors, storefront, curtainwall, louvers, etc.).
    c. Different wall systems.
    d. Wall and roof.
    e. Walls across control and expansion joints.
    f. Walls to utility, pipe and duct penetrations.

3. The air-barrier system shall be capable of withstanding positive and negative combined design wind, fan and stack pressures on the envelope without damage or displacement, and shall transfer the load to the structure. It shall not displace adjacent materials under full load.
4. The air-barrier shall be joined in an airtight and flexible manner to the air barrier material of adjacent systems, allowing for the relative movement of systems due to thermal and moisture variations and creep.

B. Membrane Thickness: Dry film thickness shall be as required by manufacturer to meet performance requirements specified in this Section, but not less than 30-mil (0.8-mm) dry film thickness.

2.3. ACCESSORY MATERIALS

A. General: Accessory materials recommended by air barrier manufacturer to produce a complete air-barrier assembly and compatible with primary air barrier membrane.

B. Primer: Liquid primer recommended for substrate by manufacturer of air barrier materials.

C. Counterflashing Strip: Provide one of the following:

1. Modified bituminous, 40-mil-thick, self-adhering sheet consisting of 32 mils of rubberized asphalt laminated to an 8-mil-thick, cross-laminated polyethylene film with release liner backing.
2. A 36-mil self-adhering sheet consisting of 32-mils of rubberized asphalt laminated to a nonwoven polyester fabric with exposed polyester fabric, subsequently saturated with fluid-applied air/water-resistive barrier material.

D. Termination Strip at Roofing: Provide one or both of the following as recommended by membrane manufacturer for compatibility with roofing materials.

1. Butyl Strip: 30- to 40-mil- thick, self-adhering; polyethylene-film-reinforced top surface laminated to layer of butyl adhesive with release liner backing
2. Modified Bituminous Strip: 40-mil-thick, smooth-surfaced, self-adhering; consisting of 36 mils of rubberized asphalt laminated to a 4-mil-thick polyethylene film with release liner backing.

E. Joint Reinforcing Strip: Air barrier manufacturer's glass-fiber-mesh tape.

F. Substrate Patching Membrane: Manufacturer's standard trowel-grade substrate filler.

G. Adhesive and Tape: Air barrier manufacturer's standard adhesive and pressure-sensitive adhesive tape.

H. Stainless-Steel Sheet: ASTM A240, Type 304, 0.0187 inch minimum thickness, and Series 300 stainless-steel fasteners.

I. Sprayed Polyurethane Foam Sealant: 1- or 2-component, foamed-in-place, polyurethane foam sealant, 1.5 to 2.0 lb/cu. ft density; flame spread index of 25 or less according to ASTM E162; with primer and noncorrosive substrate cleaner recommended by foam sealant manufacturer.

J. Transition Strip: Provide one of the following:

1. Modified bituminous. 40-mil-thick, smooth-surfaced, self-adhering; consisting of 36 mils of rubberized asphalt laminated to a 4-mil-thick polyethylene film with release liner backing.
2. A 36-mil self-adhering sheet consisting of 32-mils of rubberized asphalt laminated to a nonwoven polyester fabric with exposed polyester fabric, subsequently saturated with fluid-applied air/water-resistive barrier material.

K. Elastomeric Flashing Sheet: ASTM D2000, minimum 50- to 65-mil- thick, cured sheet neoprene with manufacturer's recommended contact adhesives and lap sealant with stainless-steel or aluminum termination bars and stainless steel fasteners.

L. Joint Sealant: ASTM C920, single-component, neutral-curing silicone; Class 100/50 (low-modulus), Grade NS, Use NT related to exposure, and, as applicable to joint substrates indicated, Use O. Comply with Section 07 9000 - Joint Sealants.

M. Termination Mastic: Air-barrier manufacturer's standard cold fluid-applied elastomeric liquid; trowel grade.

3. EXECUTION

3.1. EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for surface smoothness and other conditions affecting performance of work.

1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
2. Verify that concrete has cured and aged for minimum time period recommended by air barrier manufacturer.
3. Verify that concrete is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D4263 or other means recommended in writing by air-barrier manufacturer.
4. Verify that masonry joints are flush and completely filled with mortar.

B. Proceed with air barrier application only after substrate construction and penetrating work have been completed and unsatisfactory conditions have been corrected.

3.2. PREPARATION

A. Protection of Other Work: Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction. Prevent air barrier materials from entering and clogging weep holes and drains.

B. Clean, prepare, treat, and seal substrate according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for air barrier application.

C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

D. Remove fins, ridges, mortar, and other projections.

E. Strike masonry joints flush. Remove excess mortar from masonry ties, shelf angles, and other obstructions.

F. Fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate patching membrane to provide an even substrate.

G. At changes in substrate plane provide one of the following:

1. Apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.
2. Apply a 6 inch self-adhered transition membrane with 3 inches extending onto each adjacent plane.

H. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier. Gaps up to 1 inch may be prefilled with manufacturer’s compatible termination sealant.

I. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by air barrier sheet on same day. Reprime areas exposed for more than 24 hours.

3.3. JOINT TREATMENT

A. Concrete and Masonry: Prepare, treat, rout, and fill joints and cracks in substrate according to ASTM C1193 and air barrier manufacturer’s written instructions. Remove dust and dirt from joints and cracks complying with ASTM D4258 before coating surfaces.

1. Prime substrate and apply a single thickness of air-barrier manufacturer's recommended preparation coat extending a minimum of 3 inches along each side of joints and cracks. Apply a double thickness of air barrier membrane and embed a joint reinforcing strip in preparation coat.

B. Sheathing: Fill joints greater than 1/4 inch with sealant according to ASTM C1193 and air barrier manufacturer's written instructions. Apply first layer of fluid air barrier membrane at joints. Tape joints with joint reinforcing strip after first layer is dry. Apply a second layer of fluid air barrier membrane over joint reinforcing strip.

3.4. TRANSITION STRIP INSTALLATION

A. Install strips, transition strips, and accessory materials according to air barrier manufacturer’s written instructions to form a seal with adjacent construction and maintain a continuous air barrier.

1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.

2. Install butyl or modified bituminous strip on roofing membrane or base flashing so that a minimum of 3 inches of coverage is achieved over each substrate.

B. Connect and seal exterior wall air barrier membrane 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.

C. At end of each working day, seal top edge of strips and transition strips to substrate with termination mastic.

D. Apply joint sealants forming part of air barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

E. Wall Openings: Prime concealed perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply modified bituminous transition strip or elastomeric flashing sheet so that a minimum of 3 inches of coverage is achieved over both substrates. Maintain 3 inches of full contact over firm bearing to perimeter frames with not less than 1 inch of full contact.

1. Modified Bituminous Transition Strip: Roll firmly to enhance adhesion.
2. Elastomeric Flashing Sheet: Apply adhesive to wall, frame, and flashing sheet. Install flashing sheet and termination bars, fastened at 6 inches o.c. Apply lap sealant over exposed edges and on cavity side of flashing sheet.

F. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of air barrier with foam sealant.

G. Seal strips and transition strips around masonry reinforcing or ties and penetrations with termination mastic.

H. Seal top of through-wall flashings to air barrier with an additional 6-inch-wide, modified bituminous or counterflashing strip.

I. Seal exposed edges of strips with termination mastic at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets.

J. Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fishmouths and blisters. Patch with transition strips extending 6 inches beyond repaired areas in strip direction.

3.5. AIR BARRIER MEMBRANE INSTALLATION

A. General: Apply air barrier membrane to form a seal with strips and transition strips and to achieve a continuous air barrier according to air barrier manufacturer's written instructions.

B. Apply air barrier membrane within manufacturer's recommended application temperature ranges.

C. Apply primer to substrates at required rate and allow to dry. Limit priming to areas that will be covered by air barrier sheet in same day. Reprime areas exposed for more than 24 hours.

1. Prime glass-fiber-surfaced gypsum sheathing with number of prime coats needed to achieve required bond, with adequate drying time between coats.

D. Apply a continuous unbroken air barrier membrane to substrates according to the following minimum thickness. Apply membrane in full contact around protrusions such as masonry ties.

1. Dry Film Thickness: Dry film thickness shall be as required by manufacturer to meet performance requirements specified in this Section, but not less than 40-mil (1.0-mm) dry film thickness.

E. Apply strip and transition strip a minimum of 1 inch onto cured air membrane or strip and transition strip over cured air membrane overlapping 3 inches onto each surface according to air barrier manufacturer's written instructions.

F. Do not cover air barrier until it has been tested and inspected by 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. The Testing Agency shall perform field quality-control tests and inspections. Inspections shall include the following:

1. Continuity of air barrier system has been achieved throughout the building envelope with no gaps or holes.
2. Continuous structural support of air barrier system has been provided.
3. Masonry and concrete surfaces are smooth, clean and free of cavities, protrusions, and mortar droppings.
4. Site conditions for application temperature and dryness of substrates have been maintained.
5. Maximum exposure time of materials to UV deterioration has not been exceeded.
6. Surfaces have been primed, if applicable.
7. Laps in strips and transition strips have complied with minimum requirements and have been shingled in the correct direction (or mastic has been applied on exposed edges), with no fishmouths.
8. Termination mastic has been applied on cut edges.
9. Strips and transition strips have been firmly adhered to substrate.
10. Compatible materials have been used.
11. Transitions at changes in direction and structural support at gaps have been provided.
12. Connections between assemblies (membrane and sealants) have complied with requirements for cleanliness, preparation and priming of surfaces, structural support, integrity, and continuity of seal.
13. All penetrations have been sealed.

B. The Testing Agency shall prepare and submit test and inspection reports, noting all deficiencies, corrective actions, and retest results.

C. Additional Tests: Testing and inspecting agency shall make additional tests when test results indicate that requirements have not been satisfied. This additional testing will be at the Contractor's expense.

1. Air barriers will be considered defective if they do not pass inspections. Repair damages to air barriers caused by inspection. Remove and replace deficient air barrier components. Then reinspect as specified above.

3.7. CLEANING AND PROTECTION

A. Protect air barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.

1. Protect air barrier from exposure to UV light and harmful weather exposure as required by manufacturer. If exposed for a period of time in excess of manufacturer's written instructions, or more than 60 days, whichever period of time is less, remove and replace air barrier.
2. Protect air barrier from contact with incompatible materials and sealants not approved by air barrier manufacturer.

B. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended by manufacturer of affected construction.

C. Remove masking materials after installation.

END 07 2726

1. GENERAL

1.1. WORK INCLUDES

A. Fully adhered sheet membrane roofing over base and tapered insulation.

B. Flexible flashings.

C. Counterflashing membrane termination.

D. Related accessories as specified or required herein.

E. Roof edge systems.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 3300 - Submittal Procedures
2. Section 01 7700 - Closeout Procedures
3. Section 05 3100 - Steel Deck
4. Section 06 1000 - Rough Carpentry
5. Section 07 6200 - Sheet Metal Flashing and Trim
6. Section 07 7200 - Roof Accessories
7. Divisions 22 and 23: For roof drains, vents and rooftop mounted mechanical equipment.

1.3. REFERENCES

A. Publication Dates: Comply with standards in effect as of the date of the Contract Documents except for those having different revision dates as referenced in the codes indicated on the Drawings, or unless otherwise indicated.

B. ASTM International (ASTM):

1. ASTM C1289 – Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
2. ASTM D471 - Standard Test Method for Rubber Property—Effect of Liquids.
3. ASTM D573 - Standard Test Method for Rubber—Deterioration in an Air Oven.
4. ASTM D751 - Standard Test Methods for Coated Fabrics.
5. ASTM D1079 - Standard Terminology Relating to Roofing and Waterproofing.
6. ASTM D1149 - Standard Test Methods for Rubber Deterioration—Cracking in an Ozone Controlled Environment.
7. ASTM D1204 - Standard Test Method for Linear Dimensional Changes of Nonrigid Thermoplastic Sheeting or Film at Elevated Temperature.
8. ASTM D2244 - Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates.
9. ASTM D3746 - Standard Test Method for Impact Resistance of Bituminous Roofing Systems.
10. ASTM D4214 - Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films.
11. ASTM D4272 - Standard Test Method for Total Energy Impact of Plastic Films by Dart Drop.
12. ASTM D6878 - Standard Specification for Thermoplastic Polyolefin Based Sheet Roofing.
13. ASTM E108 - Standard Test Methods for Fire Tests of Roof Coverings.
14. ASTM E903 - Standard Test Method for Solar Absorptance, Reflectance, and Transmittance of Materials Using Integrating Spheres.
15. ASTM E1918 - Standard Test Method for Measuring Solar Reflectance of Horizontal and Low-Sloped Surfaces in the Field.
16. ASTM G152 - Standard Practice for Operating Open Flame Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials.
17. ASTM G154 - Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials.
18. ASTM G155 - Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials.

C. National Roofing Contractors Association (NRCA):

1. The NRCA Roofing Manual: Membrane Roof Systems.

D. Underwriter's Laboratories (UL):

1. UL 580 - Standard for Tests for Uplift Resistance of Roof Assemblies.
2. UL 790 - Standard for Standard Test Methods for Fire Tests of Roof Coverings.
3. UL 1897 – Uplift Tests for Roof Covering Systems.

1.4. DEFINITIONS

A. Roofing Terminology: Definitions in ASTM D1079 and glossary in NRCA's "The NRCA Roofing Manual: Membrane Roof Systems" apply to Work of this Section.

1.5. REGULATORY REQUIREMENTS

A. Underwriter’s Laboratories, Inc. (UL): UL 790 Class A Fire Hazard Classification.

B. Roof Assembly Classification: Minimum FM Class 1-60 Construction with enhanced perimeter fastening, in accordance with FM Construction Bulletin 1-28.

1.6. SUBMITTALS

A. Submit in accordance with Section 01 3300:

1. Product Data: For each type of product, including the following:

a. Product data for sheet membrane, base flashing, joint cover sheet, and joint and crack sealants, with temperature range for application of membrane.
b. Product data for base and tapered insulation.
c. Product data for cover board.
d. Product data for roof edge system.

2. Shop Drawings: Submit to the membrane manufacturer for approval. Include roof plans, sections, details, and attachments to other work, including the following:

a. Layout and thickness of insulation.
b. Base flashings and membrane termination details.
c. Flashing details at penetrations.
d. Tapered insulation layout, thickness, and slopes.
e. Roof plan showing orientation of steel roof deck and orientation of roof membrane, fastening spacings, and patterns for mechanically fastened roofing system.
f. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.

3. Installer Certificate: Signed by roofing manufacturer certifying that the installer is approved, authorized, or licensed by the manufacturer to install the specified roofing system.

4. Manufacturer Certificates:

a. Performance Requirement Certificate: Signed by roof membrane manufacturer, certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
b. Submit evidence of compliance with performance requirements.
c. Special Warranty Certificate: Signed by roof membrane manufacturer, certifying that all materials supplied under this Section are acceptable for special warranty.

5. Product Test Reports: For roof membrane and insulation, for tests performed by a qualified testing agency, indicating compliance with specified requirements.
6. Evaluation Reports: For components of roofing system, from ICC-ES.
7. Field Test Reports:

a. Fastener-pullout test results and manufacturer's revised requirements for fastener patterns.

8. Sample Warranties: Specimen copy of roofing manufacturer's warranty stating obligations, remedies, limitations, and exclusions of warranty.

9. Installer certificate: Signed by roofing manufacturer certifying that the installer is approved, authorized, or licensed by the manufacturer to install the specified roofing system.

B. Submit in accordance with Section 01 7700:

1. Maintenance Data: For roofing system to include in maintenance manuals.

2. Warranty Documentation: Submit executed copies of written warranties indicated in this Section.

1.7. QUALITY ASSURANCE

A. Applicator: Manufacturer authorized roofing applicator with minimum five years documented experience.

B. All roof work must comply with the current edition of the NRCA (National Roofing Contractors Association) Roofing and Waterproofing Manual. In case of conflict between the NRCA Manual and the Contract Documents, the Contractor shall notify the Architect/Engineer in writing before proceeding with the work.

C. Minimum Performance Requirements: Following are the minimum performance requirements of IBC 2015. These requirements are in addition to all other performance requirements indicated in this Section.

1. Physical Properties: Roof coverings shall demonstrate physical integrity after 2,000 hours of exposure to accelerated weathering tests conducted in accordance with ASTM G152, G154, or G155. Following testing, roof coverings subject to cyclical flexural response due to wind loads shall not demonstrate any significant loss of tensile strength for unreinforced membranes or breaking strength for reinforced membranes.
2. Impact Resistance: Roof coverings shall resist impact damage based upon one of the following tests: ASTM D3746, ASTM D4272, CGSB 37-GP-52M, or the "Resistance to Foot Traffic Test" in Section 5.5 of FM 4470.
3. Wind Resistance: Roof systems shall be tested in accordance with FM 4474, UL 580, or UL 1897.
4. Roof Edges: Roof system metal edge securement, except gutters, shall be designed and installed to meet ANSI/SPRI ES-1 testing requirements for the following wind speed: 90 mph.

1.8. DELIVERY, STORAGE AND HANDLING

A. Deliver, store, and handle products under provisions of Section 01 6000.

B. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.

C. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer, but not outside of between 60 degrees F. and 80 degrees F. Protect stored liquid material from water and direct sunlight.

D. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

E. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

F. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.

1.9. ENVIRONMENTAL REQUIREMENTS

A. Do not apply membrane during inclement weather or when air temperature is below 40 degrees F.

1.10. WARRANTY

A. Roofing System Manufacturer's Warranty: Include coverage of all roofing materials furnished by the manufacturer including insulation, roof edge system, and accessories. Provide wind speed coverage for peak gusts of 72 mph. The warranty shall cover installation of all roofing materials and repair of all leaks and defects in the roofing system.

1. Provide 20 year total roofing system manufacturers' warranty. Warranty shall be without monetary limitation and shall be non pro-rated.

a. Warranty Inspection: Roofing membrane manufacturer shall inspect roof prior to issuance of guarantee. Owner shall be notified, in writing, of date of inspection at least five days prior to inspection.

2. Roof Edge System Finish Warranty: The manufacturer shall warrant for twenty (20) years that the exterior finish coating on all components of the roof edge system against:

a. Cracking, checking, and peeling
b. Fade not to exceed 5 ΔE hunter units per ASTM D2244.
c. Chalking is to not exceed number 8 rating per ASTM D659.

B. Roofing Contractor's Full System Warranty: Roofing Contractor shall also provide a two year written warranty on the entire roofing system including coverage of resultant damage to the building components and finishes (excluding contents) from failure to resist penetration of moisture.

1.11. PRE-INSTALLATION CONFERENCE

A. Contractor will convene a pre-installation conference one week prior to commencing work of this Section. Conference shall be attended by all parties directly affecting work of this Section. Review conditions of installation, procedures, and coordination required with related work.

2. PRODUCTS

2.1. MEMBRANE PRODUCTS / MANUFACTURERS

A. Acceptable TPO Membrane products/manufacturers:

1. Sure-Weld / Carlisle
2. Ultraply TPO / Elevate
3. Everguard TPO / GAF Materials Corp
4. Genflex / Genflex Roofing Systems
5. UltraGard TPO / Johns Manville
6. Versiweld / Versico, Inc.

2.2. MEMBRANE MATERIALS

A. Fabric-Reinforced Thermoplastic Polyolefin Sheet: ASTM D6878, uniform, flexible sheet formed from a thermoplastic polyolefin, internally fabric or scrim reinforced.

1. Thickness: 60 mils, nominal
2. Exposed Face Color: White
3. Physical Properties:

    a. Breaking Strength: 225 lbf ; ASTM D751, grab method.
    b. Elongation at Break: 15%; ASTM D751.
    c. Tearing Strength: 55 lbf minimum; ASTM D751, Procedure B.
    d. Brittleness Point: - 22 deg F.
    e. Ozone Resistance: No cracks after sample, wrapped around a 3" diameter mandrel, is exposed for 166 hours to a temperature of 104 deg F and an ozone level of 100 pphm; ASTM D1149.
    f. Resistance to Heat Aging: 90% minimum retention of breaking strength, elongation at break, and tearing strength after 166 hours at 240 deg F; ASTM D573.
    g. Water Absorption: Less than 4% mass change after 166 hours' immersion at 158 deg F; ASTM D471.
    h. Linear Dimension Change: ± 2%; ASTM D1204.

2.3. INSULATION MATERIALS

A. General: Preformed roof insulation boards approved by membrane roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated.

1. Identification: Each piece of insulation shall receive an R-value identification mark applied by the manufacturer.

B. Insulation: Polyisocyanurate: ASTM C1289, Type II, Class 1, Grade 2 minimum, glass reinforced mat facers integrally bonded to polyisocyanurate foam core square edged.

1. Provide insulation compressive strength required by manufacturer to meet the specified wind warranty.
2. Insulation shall contain zero HCFC's and have zero ozone depletion potential (zero-ODP).
3. Long Term Thermal Resistance (LTTR) is defined as using CAN/ULC S770 method for determining a permeably faced foam insulation product's thermal performance, equivalent to the time weighted average over 15 years. LTTR of the insulation shall be a minimum of R5.7 per inch. Provide LTTR label on the product.
4. Insulation shall be furnished in two layers to provide a minimum total thickness of 5.5 inches.

C. Tapered roof insulation:

1. Polyisocyanurate tapered insulation; facing type approved by membrane manufacturer for use with membrane system.
2. Provide at roof areas where indicated to provide positive drainage of roof surfaces.
3. Minimum ¼" per foot finished slope.
4. Unless indicated otherwise, provide tapered insulation, crickets, and saddles as needed to provide positive drainage. Provide crickets up slope of all roof curbs. Crickets and saddles to have ½" per foot minimum slope.

D. Cover Board: ½" thick ASTM C 117/C 1177M-99, Fiberglass mat faced, moisture resistant, secure rock-primed surface equivalent. Location as indicated on drawings.

1. ½" USG SECUROCK gypsum-fiber roof board.
2. ½" DensDeck prime roof board.
3. Architect approved equal.

2.4. ROOF EDGE SYSTEM - COPING

A. Coping: Roofing Manufacturer's factory made cover and anchor support.

1. General: Designed to meet ANSI/SPRI ES-1 testing requirements.
2. Basis-of-Design: Pac-Tite Gold Coping.
3. Outer Face Height: Refer to Drawings.
4. Covers: 24 gauge galvanized steel. Provide manufacturer's corners and accessories as required. Miters, transitions and end caps shall be factory welded watertight.

a. Finish: Fluoropolymer (PVF2 – polyvinyl fluoride) resin finish coat.
b. Color: To match Pac-Clad/Dark Bronze.

5. Anchorage: 16 gauge pre-punched galvanized cleat with stainless steel spring mechanically locked to cleat normally 12-inc (305 mm) wide at 3'-0" on center. Mechanically fastened as indicated and detailed.
6. Fasteners: 1-1/2 inch (38 mm) stainless steel with driver.

B. Warranty: Include roof edge system in the roofing manufacturer's warranty.

2.5. AUXILIARY MATERIALS AND ACCESSORIES

A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with membrane roofing.

1. Liquid type auxiliary shall meet VOC limits of authorities having jurisdiction.

B. Fasteners: factory coated steel fasteners and metal or plastic plates complying with corrosion resistance provisions in FM Approvals 4470, designed for fastening insulation to roof deck and acceptable to roofing system manufacturer.

C. Insulation Adhesive: Roofing system manufacturer's recommended adhesive formulated to attach roof insulation and recover boards to substrate or to another insulation layer. Asphalt adhesive is not acceptable.

D. Membrane Adhesive: Roofing system manufacturer's recommended adhesive formulated to attach roof membrane to substrate.

E. Sheet flashing: Manufacturer's standard unreinforced thermoplastic polyolefin sheet flashing 55 mils thick, minimum, of same color as sheet membrane.

F. Metal termination bars: Manufacturer's standard predrilled stainless steel or aluminum bars, approximately 1 x 1/8" thick; with anchors.

G. Metal battens: Manufacturer's standard aluminum-zinc-alloy-coated or pre-coated steel sheet, approximately 1" wide x .05" thick, prepunched.

H. Walk pads: Provide roof manufacturer's adhered TPO walkway pads, 24" x 30" x 5/32" minimum dimensions, where indicated on drawings.

I. Miscellaneous accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, termination reglets, cover strips, and other accessories.

3. EXECUTION

3.1. INSPECTION

A. Verify deck is clean and smooth, free of depressions, waves, or projections, and properly sloped. Verify flutes of steel deck are clean and dry.

B. Verify roof openings penetrating elements through roof are solidly set, and wood nailing strips are in place. Verify deck is supported and secured.

C. Do not apply roofing materials to damp, frozen, dirty, deck surfaces which are unacceptable to manufacturer or applicator.

D. Verify deck surfaces are dry and free of snow or ice.

E. Ensure flatness and verify tight joints of metal deck and board insulation.

F. Beginning installation means Installer acceptance of existing surfaces.

3.2. PREPARATION

A. Install blocking, curbs or nailers where required by details. Methods of fastening shall be acceptable to membrane manufacturer and the A/E.

3.3. INSULATION APPLICATION

A. The minimum finished slope of the roof shall be ¼" per foot.

B. Install board insulation in accordance with manufacturer's instructions. Cut insulation cleanly and accurately at roof breaks and protrusions to provide a smooth surface. Offset insulation joints 1'-0". Insulation shall be butted together with no gaps greater than 1/4".

C. Install board insulation and cover boards in layers as indicated with joints staggered from previous layer. Mechanically fasten in conformance with manufacturer's instructions. Use Factory Mutual 1-60 attachment. Where acoustical deck is exposed to the interior, mechanical fasteners shall be spaced such that they penetrate upper flute of deck only. Where cellular deck occurs, mechanical fasteners shall be of length to prevent penetration of bottom pan.

D. Set insulation and cover boards in insulation adhesive, firmly pressing and maintaining recover board in place. Install per roofing system manufacturer's written requirements to obtain the specified performance and warranty.

E. Install tapered insulation, crickets, and saddles.

3.4. MEMBRANE INSTALLATION

A. Install roofing membrane over area to receive roofing according to membrane roofing system manufacturer's written instructions. Unroll roofing membrane and allow to relax before installing.

1. Install sheet according to ASTM D5036.

B. Accurately align roofing membrane and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

C. Membrane adhesive: Apply membrane adhesive to substrate and underside of roofing membrane at rate required by manufacturer and allow to partially dry before installing roofing membrane. Do not apply adhesive to splice area of roofing membrane.

D. Mechanically or adhesively fasten bonding membrane securely at terminations, penetrations, and perimeter of roofing.

E. Apply roofing membrane with side laps shingled with slope of roof deck where possible.

F. Seams: Clean seam areas, overlap roofing membrane, and hot-air weld side and end laps of roofing membrane according to manufacturer's written instructions to ensure a watertight seam installation.

1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of roofing membrane.
2. Verify field strength of seams a minimum of twice daily and repair seam sample areas.
3. Repair tears, voids, and lapped seams in roofing membrane that does not meet requirements.

G. Spread sealant or mastic bed over deck drain flange at deck drains and securely seal roofing membrane in place with clamping ring.

H. Execute work such that the membrane can be temporarily sealed on a down slope surface at the end of each day in a waterproof condition. The roofing membrane shall be extended at least 2' over the last row of insulation and left in a condition that will prevent any water intrusion into the insulation or under the roofing membrane.

3.5. BASE FLASHING INSTALLATION

A. Install sheet flashings and preformed flashing accessories and adhere to substrates according to membrane roofing system manufacturer's written instructions.

B. Apply solvent-based bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply bonding adhesive to seam area of flashing.

C. Flash penetrations and field-formed inside and outside corners with sheet flashing.

D. Clean seam areas and firmly roll sheet flashings into the adhesive. Weld side and end laps to ensure a watertight seam installation.

E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

3.6. WALKWAY INSTALLATION

A. Flexible walkways: Install walkway products in locations indicated. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instruction.

3.7. PROTECTION AND CLEANING

A. Protect membrane roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to A/E.

B. Correct deficiencies in or remove membrane roofing system that does not comply with requirements, repair substrates, and repair or reinstall membrane roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

D. Accompany the manufacturer's technical inspector, and assist with equipment and workers if necessary, to provide access to the roof. Correct all defects noted during the inspection.

3.8. TESTING

A. Test roof drains after completion of work.

END 07 5423

1. GENERAL

1.1. WORK INCLUDES

A. Roof drainage sheet metal fabrications.

B. Roof sheet metal fabrications.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 3300 - Submittal Procedures
2. Section 04 2000 - Unit Masonry: Through-wall flashings.
3. Section 06 1000 - Rough Carpentry
4. Section 07 5423 - Thermoplastic Polyolefin (TPO) Membrane Roofing: Roof Edge Systems.
5. Section 07 7200 - Roof Accessories
6. Section 07 9200 - Joint Sealants
7. Division 22 and 23: For roof drains, vents and rooftop mounted mechanical equipment.

1.3. PERFORMANCE REQUIREMENTS

A. General: Sheet metal flashing and trim assemblies as indicated shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

B. Thermal Movements: Provide sheet metal flashing and trim that allows for thermal movements from ambient and surface temperature changes.

1.4. SUBMITTALS

A. Submit in accordance with Section 01 3300:

1. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.
2. Shop Drawings: Show fabrication and installation layouts of sheet metal flashing and trim, including plans, elevations, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work. Include the following:

    a. Identification of material, thickness, weight, and finish for each item and location in Project.
    b. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
    c. Details for joining, supporting, and securing sheet metal flashing and trim, including layout of fasteners, cleats, clips, and other attachments. Include pattern of seams.
    d. Details of termination points and assemblies, including fixed points.
    e. Details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction.

f. Details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings as applicable.
g. Details of special conditions.
h. Details of connections to adjoining work.
i. Detail formed flashing and trim at a scale of not less than 1-1/2 inches per 12 inches.

3. Samples for Initial Selection: For each type of sheet metal flashing, trim, and accessory indicated with factory-applied color finishes involving color selection.
4. Samples for Verification: For each type of exposed finish required. Where finish involves normal color or texture variations, include samples showing the full range of variations expected.
5. Qualification Data: For qualified fabricator.
6. Warranty: Sample of special warranty.

B. Submit in accordance with Section 01 7700:

1. Maintenance Data: For sheet metal flashing, trim, and accessories to include in maintenance manuals.

1.5. QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

B. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.

C. Copper Sheet Metal Standard: Comply with CDA's "Copper in Architecture Handbook." Conform to dimensions and profiles shown unless more stringent requirements are indicated.

D. General Fabrication: NRCA (National Roofing Contractors Association).

1.6. DELIVERY, STORAGE, AND HANDLING

A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.

B. Protect strippable protective covering on sheet metal flashing and trim for exposure to sunlight and high humidity, except to the extent necessary for the period of sheet metal flashing and trim installation.

1.7. WARRANTY

A. Fluoropolymer Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within 20 years from date of Substantial Completion. Deterioration includes, but is not limited to, the following:

1. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
2. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
3. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. PRODUCTS

2.1. SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.

B. Metallic-Coated Steel Sheet: Restricted flatness steel sheet, metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755.

1. Galvanized (Zinc-Coated) Steel Sheet: ASTM A 653, G90 (Z275) coating designation; structural quality.
2. Surface: Smooth, flat.
3. Exposed Coil-Coated Finish:

a. Two-Coat Fluoropolymer: AAMA 621. 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.
b. Color: As selected by Architect from manufacturer’s full range of choices for color and gloss.

4. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil (0.013 mm).

2.2. UNDERLAYMENT/SEPARATION MATERIALS

A. Polyethylene Sheet: 6-mil- (0.15-mm-) thick polyethylene sheet complying with ASTM D 4397.

B. Felt: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.

C. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils (0.76 to 1.0 mm) thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.

1. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F (116 deg C).
2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F (29 deg C).

D. Slip Sheet: Building paper, 3-lb/100 sq. ft. (0.16-kg/sq. m) minimum, rosin sized.

E. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.3. MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and recommended by manufacturer of primary sheet metal unless otherwise indicated.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal.

1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.

a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating.
b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.

2. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Hot-dip galvanized steel according to ASTM A 153 or ASTM F 2329 or Series 300 stainless steel.

C. Solder:

1. For Zinc-Coated (Galvanized) Steel: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead or Grade Sn60, 60 percent tin and 40 percent lead.

D. Sealants: As specified in Section 07 9200 - Joint Sealants.

2.4. FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, geometry, metal thickness, and other characteristics of item indicated. Fabricate items at the shop to greatest extent possible.

1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
2. Obtain field measurements for accurate fit before shop fabrication.
3. Form sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces exposed to view.

B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

C. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant.

D. Expansion Provisions: Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.

1. Fascia Trim, etc: Provide expansion joints at 10’ o.c. max., with 1/2” wide joints with concealed splice plates; splice plates must be finished to match fascia trim.

E. Cleats and Attachment Devices: Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal. Size as recommended by SMACNA's "Architectural Sheet Metal Manual" for application, but not less than thickness of metal being secured. Cleats shall be continuous.

F. Seams in metal other than aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.

2.5. ROOF SHEET METAL FABRICATIONS

A. Counterflashing: Fabricate from the following materials:

1. Galvanized Steel: 0.022 inch thick.

B. Flashing Receivers: Fabricate from the following materials:

1. Galvanized Steel: 0.022 inch thick.

C. Roof-Drain Flashing: Fabricate from the following materials:

1. Lead: 4.0 lb/sq. ft., hard tempered.

2.6. WALL SHEET METAL FABRICATIONS

A. Opening Flashings in Frame Construction: Fabricate head, sill, and similar flashings to extend 4 inches beyond wall openings. Form head and sill flashing with 2-inch- (50-mm-) high, end dams. Fabricate from the following materials:

1. Galvanized Steel: 0.022 inch thick.

3. EXECUTION

3.1. EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of the Work.

1. Verify compliance with requirements for installation tolerances of substrates.
2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2. INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
1. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.

2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
3. Blind clips shall be continuous.
4. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
5. Install sealant tape where indicated.
6. Torch cutting of sheet metal flashing and trim is not permitted.
7. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.

1. Coat back side of sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of self-adhering high temperature sheet and cover with a slip sheet.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.

D. Seal joints as shown and as required for watertight construction.

1. Form joints to completely conceal sealant. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F (4 deg C).
2. Prepare joints and apply sealants to comply with requirements in Section 07 9200 - Joint Sealants.

E. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches, except reduce pre-tinning where pre-tinned surface would show in completed Work.

1. Do not solder aluminum sheet.
2. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.

3.3. ROOF FLASHING INSTALLATION

A. General: Install sheet metal flashing and trim to comply with performance requirements and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

B. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten.

C. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base flashing. Lap counterflashing joints a minimum of 4 inches and bed with sealant. Secure in a waterproof manner.

D. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Turn lead flashing down inside vent piping, being careful not to block vent piping with flashing.

3.4. WALL FLASHING INSTALLATION

A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

B. Flashing Receivers: Installation of flashing receivers is specified in Section 04 2000 - Unit Masonry.

3.5. ERECTION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.6. CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder.

C. Clean off excess sealants.

D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of installation, remove unused materials and clean finished surfaces. Maintain in a clean condition during construction.

E. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END 07 6200

1. GENERAL

1.1. WORK INCLUDES

A. Prefabricated roof hatch, with integral support curb, safety railing, operable hardware, and counterflashings.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 3300 - Submittal Procedures
2. Section 07 5423 – Thermoplastic Polyolefin (TPO) Membrane Roofing
3. Section 07 6200 - Sheet Metal Flashing and Trim
4. Section 09 9100 - Paints and Coatings.

1.3. REFERENCES

A. Publication Dates: Comply with standards in effect as of the date of the Contract Documents unless otherwise indicated.

B. Underwriters Laboratories, Inc. (UL) and Factory Mutual (FM) requirements as applicable.

1.4. SUBMITTALS

A. Submit in accordance with Section 01 3300:

1. Submit shop drawings, manufacturer's installation instructions, and product data.
2. Indicate the following on shop drawings: general construction, configuration and dimension of components, fastening methods, adjacent construction, required clearances and tolerances, and other affected work.
3. Provide product data on shape of components, materials, and finishes, anchor types, and locations.

2. PRODUCTS

2.1. ROOF HATCHES

A. Acceptable Manufacturers: Products of the following manufacturers, provided they comply with the requirements of the Contract Documents as determined by the Architect, are considered acceptable:

1. Babcock-Davis Hatchways, Inc., Arlington, VA.
2. Bilco Company, New Haven, CT
3. Milcor Limited Partnership, Lima, OH

B. Unit: 30" x 30" size, single leaf type. Roof hatch shall be of the railing ready design with predrilled holes on cap flashing of hatch for mounting safety railing system.

1. Safety Railing: Safety railing system with swinging, self-closing gate. System shall meet OSHA fall protection requirements and allow installation without penetration of roof hatch curb flashing.

a. Acceptable Products/Manufacturers:

1) Bilco / BIL-Guard Hatch Railing System
2) Milcor / Safety Rail
3) SafePro / SafePro Roof Hatch Safety Rail

C. Curb: 11 gage mill finish aluminum with 1" rigid insulation; integral cap flashing to receive roof flashing system; extended flange for mounting; 12" high.

D. Cover: 11 gage mill finish aluminum with 1" glass fiber insulation retained by 18 gage mill finish aluminum inner liner. Continuous neoprene vinyl gasket to provide weatherproof seal.

E. Hardware: Manufacturer's standard manually operated type with compression or torsion spring operators, positive snap latch with turn handles inside and out and padlock hasp inside; automatic hold-open arm with vinyl covered grip for easy release; zinc plated finish.

F. Hinges: Manufacturer's recommended heavy duty pintle type of galvanized steel.

G. Miscellaneous Materials: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.

2.2. FABRICATION

A. Fabricate free of visual distortions and defects. Weld corners and joints.

B. Provide for collection and removal of condensation.

C. Provide weathertight assembly.

3. EXECUTION

3.1. INSPECTION

A. Verify that deck, curbs, roof membrane, base flashing, and other items affecting work of this Section are in place and positioned correctly.

B. Beginning of installation means acceptance of existing conditions.

3.2. INSTALLATION

A. Install in accordance with manufacturer's instructions. Coordinate with installation of roofing system and related flashings. Provide weathertight installation.

B. Apply bituminous paint on metal surfaces of units in contact with cementitious materials and dissimilar metals.

END 07 7200

1. GENERAL

1.1. WORK INCLUDES

A. Fixed, aluminum rooftop supports for equipment screens.

B. Louver screen.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Division 05 - Metals: Structural Metal Framing and Steel Decking for attachment of equipment rails to roof structure
2. Division 07 - Thermal and Moisture Protection applicable to roofing material penetrations and resealing

1.3. PERFORMANCE REQUIREMENTS

A. Design: Design framing and equipment rails, including comprehensive engineering analysis by a qualified engineer, using structural performance requirements and design criteria indicated.

B. Structural Performance: Framing shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of framing components, noise or metal fatigue, or permanent damage to fasteners and anchors.

1. Wind Loads: Determine loads based on a uniform pressure of 30 lb./sq. ft. (1435 Pa), acting inward or outward.
2. Deflection Criteria: Framing member deflection shall not exceed L/120

1.4. SUBMITTALS

A. Submit in accordance with Section 01 3300:

1. Product Data: For each type of product indicated.
2. Shop Drawings: For structural framing system and accessories. Include plans, elevations, sections, details, and attachments to other work. Show frame locations, sizes, and components required.
3. Samples: For each type of metal finish required.
4. Submittal: For structural framing system indicated to comply with structural performance requirements and design criteria indicated.

2. PRODUCTS

2.1. MATERIALS

A. Aluminum Extrusions: ASTM B 221M, Alloy 6063-T5.

B. Aluminum Sheet: ASTM B 209M, Alloy 3003 with temper as required for forming.

C. Fasteners: Use types and sizes to suit unit installation conditions.

1. Use 300 series stainless-steel fasteners.

2.2. FABRICATION, GENERAL

A. Join frame members to each other and to connection brackets with threaded fasteners. Join equipment rail components with fillet welds.

2.3. ROOFTOP EQUIPMENT SCREENS

A. Aluminum Base Supports and Structural Framing

1. Basis-of-Design Product: “Sturdistruct” framing by Architectural Louvers Co. (Harray, LLC). Subject to compliance with requirements, provide the specified product or comparable product by one of the following:

a. Manufacturers of equivalent products submitted and approved in accordance with Section 01 6000 - Product Substitution Procedures.

2. Base Support Thickness: Not less than 0.080 inch (2.03 mm)
3. Frame Member Thickness: Not less than 0.125 inch (3.2 mm)
4. Curb Cap Thickness: Not less than 0.125 inch (3.2 mm)
5. Connection Bracket Thickness: Not less than 0.250 inch (6.4 mm)
6. Component Design Requirements:

a. Posts and Girts shall be 3-inch x 3-inch (76 mm x 76 mm) profiles with slots for easy attachment to other components
b. Kicker Braces and Racking Braces shall be 1-1/2-inch x 1-1/2-inch (38 mm x 38 mm) profiles with slots for easy attachment to other components.
c. Connection Brackets shall have minimum 4 holes per leg for acceptance of 5/16 inch (8 mm) fasteners.

7. Finish: Mill finish.

B. Vertical Blade Louvered Roof Top Equipment Screen

1. Basis-of-Design Product: Architectural Louvers Co. (Harray, Inc); Model V2TV. Subject to compliance with requirements, provide the specified product or comparable product by one of the following:

a. Manufacturers of equivalent products submitted and approved in accordance with Section 01 6000 - Product Substitution Procedures.

2. Louver Blade Depth: 2 inches
3. Blade Profile: Tube style blade 4.75 inches wide
4. Blade Spacing: 6 inches
5. Blade Nominal Thickness: Not less than 0.080 inch
6. Framing Support Nominal Thickness: Not less than 0.125 inch
7. High-Performance Organic Finish: 3-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pre-treat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers’ written instructions.

a. Color and Gloss: As selected by Architects from manufacturers’ full range.

3. EXECUTION

3.1. INSTALLATION

A. Install base supports and framing in accordance with manufacturer's printed instructions.

B. Locate and place base supports level, plumb, and at indicated locations per project drawings provided by the manufacturer.

C. Repair any roof penetrations per the original roofing material manufacturer's instructions.

D. Posts and Girts shall be level and plumb to accept equipment screens being supported.

E. Locate and place equipment screens level, plumb, and at indicated alignment with adjacent work.

F. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weather tight connection.

G. Provide perimeter reveals and openings of uniform width to allow for thermal expansion, as indicated.

H. Repair damaged surfaces so no evidence remains of corrective work. Return items that cannot be repaired to the manufacturer for replacement.

END 07 7216

Locate and place equipment screens level, plumb, and at indicated alignment with adjacent work.

Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weather-tight connection.

Provide perimeter reveals and openings of uniform width to allow for thermal

1. GENERAL

1.1. WORK INCLUDES

A. Interior spray-applied fire resistive materials (SFRM), exposed to view

B. Qualified independent Testing Agency to provide testing specified herein.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 3300 - Submittal Procedures
2. Section 01 4000 – Quality Requirements : Testing responsibility
3. Section 05 1200 - Structural Steel: Coordination with steel primer.
4. Section 05 2100 - Steel Joists: Coordination with steel primer.
5. Section 05 3100 - Steel Deck
6. Section 07 2129 – Sprayed Urethane Foam Insulation: Applied thermal (fire) barrier.
7. Section 07 8413 - Penetration Firestopping
8. Section 07 8446 - Fire-Resistive Joint Systems

1.3. REFERENCES

A. Publication Dates: Comply with standards in effect as of the date of the Contract Documents unless otherwise indicated.

B. American Society for Testing and Materials (ASTM):

1. ASTM E84 - Test for Surface Burning Characteristics of Building Materials
2. ASTM E119 - Fire Test of Building Construction and Materials
3. ASTM E136 -Behavior of Materials in a Vertical Tube Furnace at 750º C
4. ASTM E605 -Thickness and Density of Sprayed Fire Resistive Materials Applied to Structural Members
5. ASTM E736 - Cohesion/Adhesion of Sprayed Fire Resistive Materials Applied to Structural Members
6. ASTM E759 - Effect of Deflection of Sprayed Fire Resistive Materials Applied to Structural Members
7. ASTM E760 - Effect of Impact on Bonding of Sprayed Fire Resistive Materials Applied to Structural Members
8. ASTM E761 - Compressive Strength of Sprayed Fire Resistive Materials Applied to Structural Members
9. ASTM E859 - Air Erosion of Sprayed Fire Resistive Materials Applied to Structural Members
10. ASTM E937 - Corrosion of Steel By Sprayed Fire Resistive Materials Applied to Structural Members.
11. ASTM G21 - Determining Resistance of Synthetic Polymeric Materials to Fungi

C. AWCI (Association of the Wall and Ceiling Industry): “Standard Practice for the Testing and Inspection of Field Applied Sprayed Fire-Resistive Materials".

1.4. SUBMITTALS

A. Submit in accordance with Section 01 3300:

1. Product Data: Submit manufacturer's product data, installation instructions, use and limitations for each material used, and applicable fire-resistance design designations as listed by a qualified fire testing organization.
2. Shop Drawings: Framing plans, schedules, or both, indicating the following:

    a. Extent of fireproofing for each construction and fire-resistance rating.
    b. Applicable fire-resistance design designations of a qualified testing agency acceptable to authorities having jurisdiction.
    c. Minimum fireproofing thicknesses needed to achieve required fire-resistance rating of each structural component and assembly.
    d. Treatment of fireproofing after application.

3. Performance Certification: Submit manufacturer's verification of performance criteria, fire performance and compliance with applicable standards.

1.5. QUALITY ASSURANCE

A. Installer: A firm or individual certified, licensed, or otherwise qualified by fireproofing manufacturer as experienced and with sufficient trained staff to install manufacturer's products according to specified requirements. A manufacturer's willingness to sell products to an Installer engaged by the Contractor, does not in itself confer qualification on the Installer.

B. Source Limitations: Obtain spray-applied fire resistive materials products from a single source for each product required. Provide secondary materials, which are acceptable to the fireproofing manufacturer which, are included in the tested and/or listed designs.

C. Fire Resistance: Provide fireproofing materials that have been listed and classified by Underwriters Laboratories, Intertek Testing Services/Warnock Hersey, or other testing and inspecting agency acceptable to the architect and authorities having jurisdiction.

D. Asbestos: Products supplied shall be 100% asbestos free.

E. Painted/Primed Steel Surfaces: Steel surfaces requiring fireproofing that are painted and/or primed, shall meet UL requirements for application and adhesion characteristics. Provide certifications from fireproofing manufacturer of compatibility of fireproofing and painted systems.

F. Remedial Work: Steel surfaces with incompatible primers or paint shall be either removed, lathed, or otherwise remedied within the requirements of UL, so that adequate and approved bonding can occur, acceptable to authorities having jurisdiction.

    1. Primers and paints shall not be removed without the written consent of the Architect.

1.6. PROJECT CONDITIONS

A. Environmental Limitations: Do not apply sprayed fireproofing material when ambient or substrate temperatures are 40 degrees F. or lower, unless temporary heat and protection is provided to maintain temperatures at or above this level for 24 hours before, during and 24 hours after application of fireproofing.

B. Ventilation: Ventilate building spaces during and after application of fireproofing, providing complete air exchanges according to manufacturer's written instructions. Use natural means or, if they are inadequate, forced-air circulation until fireproofing dries thoroughly.

1.7. WARRANTY

A. General Warranty: Submit a written warranty, executed by the Contractor and cosigned by the Installer, agreeing to repair or replace applied fireproofing materials that fail within the specified warranty period.

1. Failures include, but are not limited to cracking, flaking, eroding in excess of specified requirements, peeling and delaminating of applied fireproofing from substrates due to defective materials or installation.
2. Not covered in this warranty are failures due to damage by others, such as occupants and owner maintenance personnel, exposure to environmental conditions other than those investigated and approved during fire-response testing, excessive flexing of floor systems, work on roof systems, and other causes not reasonably foreseeable under conditions of normal use.

B. Warranty Period: 2 years, from date of Substantial Completion.

2. PRODUCTS

2.1. GENERAL

A. General: Manufacturer's standard, factory-mixed, lightweight, dry formulation, complying with indicated fire-resistance design, and mixed with water at Project site. All products shall be cementitious fireproofing materials. Physical properties shall be in accordance with below listed properties. Products shall be a mixture of gypsum and/or cement based materials, with lightweight aggregates to be mixed with water to form a slurry for conveyance and application.

B. Assemblies: Provide fireproofing, including auxiliary materials, as an assembly according to requirements of each fire-resistance design and manufacturer's written instructions.

C. Fire-Resistance Design: Tested according to ASTM E119 or UL 263 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Steel members are to be considered unrestrained unless specifically noted otherwise.
2. Provide UL-classified systems indicated. Systems shall be selected from the UL “Fire Resistance Directory”. The selected system shall be within the range of numbered systems listed in this schedule:

Location	UL Designation
Floor Assemblies with Metal Deck	A700-799; D700-999; G700-799

2.2. INTERIOR SPRAY-APPLIED FIRE RESISTIVE MATERIALS

A. Acceptable Products: Subject to compliance with the requirements of this Section, provide one of the following products. Where more than one product is listed for a manufacturer, the Contractor may select the most appropriate product:

1. Carboline Company / AD Southwest Type 5 GP
2. Isolatek International / CAFCO 300; or CAFCO Blaze-Shield II
3. W. R. Grace & Co. / MK-6

B. Fire Rating: As indicated on Drawings.

C. Thickness: As required for fire-resistance design indicated, measured according to requirements of fire-resistance design or ASTM E605, whichever is thicker, but not less than 0.375 inch.

D. Physical Properties:

1. Density: 15 lb/cu. ft. minimum per ASTM E605.
2. Bond Strength: 150 lbf/sq. ft. minimum per ASTM E736.
3. Combustion Characteristics: Non-combustible per ASTM E136.
4. Surface Burning Characteristics: Per ASTM E84:

    a. Flame-Spread Index: 10 or less.
    b. Smoke-Developed Index: 0.

5. Compressive Strength: 5 lbf/sq. in. minimum per ASTM E761.
6. Corrosion Resistance: No evidence of corrosion according to ASTM E937.
7. Deflection: No cracking, spalling, or delamination according to ASTM E759.
8. Effect of Impact on Bonding: No cracking, spalling, or delamination according to ASTM E760.
9. Air Erosion: Maximum weight loss of 0.005 g/sq. ft. in 24 hours according to ASTM E859.
10. Fungal Resistance: The material shall show resistance to mold growth for a minimum period of 28 days when tested in accordance with ASTM G21, or achieve a rating of 10 according to ASTM D3274 when tested in accordance with ASTM D3273.

    a. Treat products with manufacturer's standard antimicrobial formulation if required to pass tests.

2.3. AUXILIARY MATERIALS

A. General: Provide auxiliary materials where required by this Section, or where required or recommended by SFRM manufacturer. The auxiliary materials shall be compatible with fireproofing and substrates and are approved by UL or another testing and inspecting agency acceptable to authorities having jurisdiction for use in fire-resistance designs indicated.

B. Substrate Primers: Primers approved by fireproofing manufacturer and complying with one or both of the following requirements:

1. Primer and substrate are identical to those tested in required fire-resistance design by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
2. Primer's bond strength in required fire-resistance design complies with specified bond strength for fireproofing and with requirements in UL's "Fire Resistance Directory" or in the listings of another qualified testing agency acceptable to authorities having jurisdiction, based on a series of bond tests according to ASTM E736.

C. Bonding Agent: Product approved by fireproofing manufacturer and complying with requirements in UL's "Fire Resistance Directory" or in the listings of another qualified testing agency acceptable to authorities having jurisdiction.

D. Metal Lath: Expanded metal lath fabricated from material of weight, configuration, and finish required, according to fire-resistance designs indicated and fireproofing manufacturer's written recommendations. Include clips, lathing accessories, corner beads, and other anchorage devices required to attach lath to substrates and to receive fireproofing.

E. Reinforcing Fabric: Glass- or carbon-fiber fabric of type, weight, and form required to comply with fire-resistance designs indicated; approved and provided by fireproofing manufacturer.

F. Reinforcing Mesh: Metallic mesh reinforcement of type, weight, and form required to comply with fire-resistance design indicated; approved and provided by fireproofing manufacturer. Include pins and attachment.

G. Sealer: Provide where required and recommended by fireproofing manufacturer to meet performance requirements.

H. Top Coat: Provide where required and recommended by fireproofing manufacturer to meet performance requirements.

3. EXECUTION

3.1. EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrates and other conditions affecting performance of the Work and according to each fire-resistance design. Verify compliance with the following:

1. Substrates are free of dirt, oil, grease, release agents, rolling compounds, mill scale, loose scale, incompatible primers, paints, and encapsulants, or other foreign substances capable of impairing bond of fireproofing with substrates under conditions of normal use or fire exposure.
2. Objects penetrating fireproofing, including clips, hangers, support sleeves, and similar items, are securely attached to substrates.
3. Substrates receiving fireproofing are not obstructed by ducts, piping, equipment, or other suspended construction that will interfere with fireproofing application.

B. Verify that concrete work on steel deck has been completed before beginning fireproofing work.

C. Verify that roof construction, installation of roof-top HVAC equipment, and other related work is complete before beginning fireproofing work.

D. Conduct tests according to fireproofing manufacturer's written recommendations to verify that substrates are free of substances capable of interfering with bond.

1. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2. PREPARATION

A. Cover other work subject to damage from fallout or overspray of fireproofing materials during application. Provide temporary enclosure when necessary to temporarily confine fireproofing and protect the environment.

B. Clean substrates of substances that could impair bond of fireproofing.

C. Prime substrates where included in fire-resistance design and where recommended in writing by fireproofing manufacturer unless compatible shop primer has been applied and is in satisfactory condition to receive fireproofing.

D. Exposed Locations: For applications visible on completion of Project, repair substrates to remove surface imperfections that could affect uniformity of texture and thickness in finished surface of fireproofing. Remove minor projections and fill voids that would telegraph through fire-resistive products after application.

1. Mask edges of terminations so as to achieve neat and sharp edges.

E. Coordinate application of fireproofing with other construction to minimize need to cut or remove fireproofing.

1. Do not begin applying fireproofing until clips, hangers, supports, sleeves, and other items penetrating fireproofing are in place.
2. Defer installing ducts, piping, and other items that would interfere with applying fireproofing until application of fireproofing is completed.

F. Metal Decks:

1. Do not apply fireproofing to underside of metal deck substrates until concrete topping, if any, has been completed.
2. Do not apply fireproofing to underside of metal roof deck until roofing has been completed; prohibit roof traffic during application and drying of fireproofing.

3.3. APPLICATION

A. Construct fireproofing assemblies that are identical to fire-resistance design indicated and products as specified, tested, and substantiated by test reports; for thickness, primers, sealers, topcoats, finishing, and other materials and procedures affecting fireproofing work.

B. Comply with fireproofing manufacturer's written instructions for mixing materials, application procedures, and types of equipment used to mix, convey, and apply fireproofing; as applicable to particular conditions of installation and as required to achieve fire-resistance ratings indicated.

C. Install auxiliary materials as required, as detailed, and according to fire-resistance design and fireproofing manufacturer's written recommendations for conditions of exposure and intended use. For auxiliary materials, use attachment and anchorage devices of type recommended in writing by fireproofing manufacturer.

D. Spray apply fireproofing to maximum extent possible. Following the spraying operation in each area, complete the coverage by trowel application or other placement method recommended in writing by fireproofing manufacturer.

E. Extend fireproofing in full thickness over entire area of each substrate to be protected.

F. Install body of fireproofing in a single course unless otherwise recommended in writing by fireproofing manufacturer.

G. Where sealers are used, apply products that are tinted to differentiate them from fireproofing over which they are applied.

H. Provide a uniform finish complying with description indicated for each type of fireproofing material and matching finish approved for required mockups.

I. Finishes: Apply fireproofing to produce the following finishes:

1. Concealed Locations: Spray-Textured Finish: Finish left as spray applied with no further treatment.
2. Exposed Locations: Spray-Textured Finish: Finish left as spray applied with no further treatment.

3.4. FIELD QUALITY CONTROL

A. The Testing Agency shall perform the following tests and inspections:

1. Special Inspections: Test and inspect as required by IBC 2015. Tests and inspections include:

a. Prior to application:

1) Verify condition of substrates meet all conditions of manufacturer's written instructions.

b. During application:

1) Verify substrate temperatures and area ventilation meet all conditions of manufacturer's written instructions.

c. After application:

1) Verify thickness of application in accordance with ASTM E605.
2) Verify density in pounds per cubic foot in accordance with ASTM E605.
3) Verify bond strength adhesion and cohesion in accordance with ASTM E736.

B. Perform the tests and inspections of completed Work in successive stages. Do not proceed with application of fireproofing for the next area until test results for previously completed applications of fireproofing show compliance with requirements. Tested values must equal or exceed values as specified and as indicated and required for approved fire-resistance design.

C. Fireproofing will be considered defective if it does not pass tests and inspections.

1. Remove and replace fireproofing that does not pass tests and inspections, and retest. Additional testing will be at the Contractor's expense.
2. Apply additional fireproofing, per manufacturer's written instructions, where test results indicate insufficient thickness, and retest.

D. The Testing Agency shall prepare and submit test and inspection reports, noting all deficiencies, corrective actions, and retest results.

3.5. PROTECTION

A. Protect fireproofing, according to advice of manufacturer and Installer, from damage resulting from construction operations or other causes, so fireproofing will be without damage or deterioration at time of Substantial Completion.

1. Prohibit all traffic on floor until application of fireproofing is completed and dry.

3.6. CLEANING AND REPAIR

A. Cleaning: Immediately after completing spraying operations in each containable area of Project, remove material overspray and fallout from surfaces of other construction and clean exposed surfaces to remove evidence of soiling.

B. Do not install enclosing or concealing construction until after fireproofing has been applied, inspected, and tested and corrections have been made to deficient applications.

C. Repair fireproofing by reapplying it using same method as original installation or using manufacturer's recommended trowel-applied product.

END 07 8100

1. GENERAL

1.1. WORK INCLUDES

A. Through-penetration firestop systems for penetrations through fire-resistance-rated assemblies, smoke barriers, and smoke partitions indicated on the Drawings. Through-penetrations include both empty openings and openings containing penetrating items.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 3300 - Submittal Procedures
2. Section 01 4000 – Quality Requirements: Testing responsibility.
3. Section 01 7329 - Cutting and Patching
4. Section 07 2129 – Sprayed Urethane Foam Insulation: Applied thermal (fire) barrier.
5. Section 07 8100 - Applied Fireproofing
6. Section 07 8446 - Fire-Resistive Joint Systems
7. Section 07 9200 – Joint Sealants: Non-fire resistive joint sealants.
8. Division 21 Sections specifying fire-suppression piping penetrations.
9. Divisions 22 and 23 Sections specifying duct and piping penetrations.
10. Divisions 26, 27, and 28 Sections specifying cable and conduit penetrations.

1.3. REFERENCES

A. Publication Dates: Comply with standards in effect as of the date of the Contract Documents unless otherwise indicated.

B. American Society for Testing and Materials (ASTM):

1. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
2. ASTM E814 – Standard Test Method for Fire Tests of Through Penetration Firestops.
3. ASTM E2174 - Standard Practice for On-Site Inspection of Installed Fire Stops.

C. Intertek Laboratories “Directory of Listed Building Products”.

D. Underwriters Laboratories (UL):

1. UL 555 – Standard for Safety of Fire Dampers.
2. UL 723 – Surface Burning Characteristics of Building Materials.
3. UL 1479 – Fire Tests of Through Penetration Firestops.
4. UL Fire Resistance Directory:

    a. Firestop Devices (XHJI)
    b. Fire Resistance Ratings (BXRH)
    c. Through Penetration Firestop Systems (XHEZ)
    d. Fill, Voids, or Cavity Material (XHHW)
    e. Forming Materials (XHKU
    f. Joint Systems (XHBN)
    g. Perimeter Fire Containment Systems (XHDG)

1.4. DEFINITIONS

A. Annular Space: The penetration space surrounding a penetrating item.

1.5. SUBMITTALS

A. Submit in accordance with Section 01 3300:

1. Product Data: For each type of through-penetration firestop system product indicated.
2. Color selection charts where applicable.
3. Shop Drawings: For each through-penetration firestop system, show each kind of construction condition penetrated, relationships to adjoining construction, and type of penetrating item. Include firestop design designation from UL and information that evidences compliance with requirements for each condition indicated.

    a. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each through-penetration firestop system configuration for construction and penetrating items.
    b. Engineering Judgements: Where Project conditions require modification of a qualified testing and inspecting agency's illustration to suit a particular through-penetration firestop condition, submit an illustration with modifications marked. The modifications shall be approved in writing by the through-penetration firestop system manufacturer's fire-protection engineer.

4. Firestop System Schedule: Indicate locations of each through-penetration firestop system, along with the following information:

    a. Types of penetrating items.
    b. Types of constructions penetrated, including fire-resistance rating and thicknesses of construction penetrated.

    c. Through-penetration firestop systems for each location identified by firestop design designation of qualified testing agency.

5. Product Test Reports: From a qualified testing agency indicating through-penetration firestop system complies with requirements, based on comprehensive testing of current products.
6. Installer qualifications, including all certifications required under “Quality Assurance”.

1.6. QUALITY ASSURANCE

A. Installer Qualifications: An experienced Installer who has completed through-penetration firestop systems 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.

1. Installer shall be certified by product manufacturers if required by the manufacturer.

1.7. DELIVERY, STORAGE, AND HANDLING

A. Deliver through-penetration firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer; date of manufacture; lot number; shelf life if applicable; qualified testing and inspecting agency's classification marking applicable to Project; curing time; and mixing instructions for multicomponent materials.

B. Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.8. PROJECT CONDITIONS

A. Environmental Limitations: Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limits permitted by through-penetration firestop system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Ventilate through-penetration firestop systems per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.

1.9. COORDINATION

A. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.

B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.

C. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until Architect/Engineer , local building inspector, and Testing Agency has reviewed each installation.

2. PRODUCTS

2.1. MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. A/D Fire Protection Systems Inc.
2. Grace, W.R. & Co.
3. Hilti Construction Chemicals, Inc.
4. Johns Manville
5. Nelson Firestop Products.
6. NUCO Industries.
7. RectorSeal Corporation (The).
8. Specified Technologies Inc.
9. 3M Fire Protection Products.
10. Tremco.
11. USG (United States Gypsum Company).

2.2. FIRESTOPPING, GENERAL

A. General: Provide through-penetration firestop systems indicated in the Through-Penetration Firestop System Schedule at the end of Part 3.

1. Painted Areas: Firestop systems shall be colored white where systems are exposed to view in areas indicated to receive paint.
2. Unpainted Areas: Color of firestop systems where systems are exposed to view and are not indicated to receive paint shall be selected by Architect from manufacturer’s standard colors.

B. Fill Materials: Fill materials are those referred to in directories of the referenced testing and inspecting agencies as “fill”, “void”, or “cavity” materials.

C. Moisture-Resistance: Product formulations after curing shall not re-emulsify during exposure to moisture.

D. Compatibility: Provide through-penetration firestop systems that are compatible with one another, with the substrates forming openings, and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.

E. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by the qualified testing and inspecting agency for firestop systems indicated.

F. Removable/Adjustable Materials: Where removable or adjustable firestop materials are indicated, where possible provide reusable heat-expanding pillows/bags.

2.3. PERFORMANCE REQUIREMENTS

A. General: For penetrations through the following fire-resistance-rated constructions, including both empty openings and openings containing penetrating items, provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated.

1. Fire-resistance-rated walls, including fire walls, fire partitions, fire barriers, smoke barriers and smoke partitions.
2. Fire-resistance-rated horizontal assemblies including floors, floor/ceiling assemblies, and ceiling membranes of roof/ceiling assemblies.

B. Rated Systems: Provide through-penetration firestop systems with the following ratings determined per ASTM E814 or UL 1479.

1. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.
2. T-Rated Systems: For the following conditions, provide through-penetration firestop systems with T-ratings indicated, as well as F-ratings, where systems protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas:

    a. Penetrations in floors located outside wall cavities.
    b. Penetrations in floors located outside fire-resistive shaft enclosures.

3. W-Rated Systems: Provide through-penetration firestop systems with W-ratings at floor penetrations for plumbing and wet-pipe sprinkler systems.
4. L-Rated Systems: Provide through-penetration firestop systems with L-ratings at smoke barriers and smoke partitions.

C. Durability: For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that after curing do not deteriorate when exposed to these conditions both during and after construction.

1. For floor penetrations with annular spaces exceeding 4" in width and exposed to possible loading and traffic, provide a means capable of supporting floor loads involved either by installing floor plates or by other means acceptable to the Architect.
2. For penetrations involving insulated piping, where possible provide through-penetration firestop systems not requiring removal of insulation.
3. Firestopping shall be flexible for all normal penetrating item movement due to expansion and contraction.

D. For through-penetration firestop systems exposed to view, provide products with flame-spread ratings of less than 25 and smoke-developed ratings of less than 450, as determined per ASTM E84.

E. Firestop System installation must meet requirements of ASTM E814 or UL 1479 tested assemblies that provide a fire rating equal to that of construction being penetrated.

F. Firestop materials and methods shall conform to applicable governing codes having local jurisdiction.

G. Structural Integrity: Firestop systems do not reestablish the structural integrity of load bearing partitions/assemblies, or support live loads and traffic. Installer shall consult the Architect prior to penetrating any load bearing assembly.

H. Engineering Judgements: For those firestop applications that exist for which no qualified tested system is available through a manufacturer, an engineering judgement derived from similar qualified tested system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineering Judgement documents must follow requirements set forth by the International Firestop Council.

2.4. MIXING

A. For those products requiring mixing before application, comply with through-penetration firestop system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

3. EXECUTION

3.1. EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2. PREPARATION

A. Surface Cleaning: Clean out openings immediately before installing through-penetration firestop systems to comply with written recommendations of firestop system manufacturer and the following requirements:

1. Remove foreign materials that could interfere with adhesion of through-penetration firestop systems from surfaces of opening substrates and from penetrating items.

2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with through-penetration firestop systems. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Priming: Prime substrates where recommended in writing by through-penetration firestop system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Masking Tape: Use masking tape to prevent through-penetration firestop systems from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestop system materials. Remove tape as soon as possible without disturbing firestop system's seal with substrates.

3.3. THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

A. General: Install through-penetration firestop systems to comply with "Performance Requirements" Article and firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

1. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.

C. Install fill materials for firestop systems by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required per tested system to achieve fire-resistance ratings indicated.
2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4. IDENTIFICATION

A. Stenciling:

1. All fire- and smoke-rated walls, partitions, and barriers shall be stenciled with:

a. The type of barrier, for example: “SMOKE PARTITION” OR “2 HOUR FIRE WALL”. Stenciled letters shall be 3 inches high in red paint.
b. Beneath the barrier type, indicate: “PROTECT ALL OPENINGS”, or similar wording. Stenciled letters shall be not less than 1 inch high.

2. Stencils shall be applied on both sides of the wall/partition/barrier at interval no greater than 20 feet.

B. Confer with Owner and Architect on locations for labels and stencils that will remain visible.

3.5. FIELD QUALITY CONTROL

A. Proceed with enclosing through-penetration firestop systems with other construction only after firestop installation has been reviewed by the Architect/Engineer , local building inspector, and Testing Agency.

B. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements.

3.6. CLEANING AND PROTECTION

A. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by through-penetration firestop system manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure through-penetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce through-penetration firestop systems complying with specified requirements.

3.7. THROUGH-PENETRATION FIRESTOP SYSTEM SCHEDULE

A. Provide UL-classified systems indicated. Systems shall be selected from the UL "Fire Resistance Directory" under product Category XHEZ based on substrate construction and penetrating item size and material. The selected system shall be within the range of numbered systems listed in this schedule.

THROUGH-PENETRATION FIRESTOP SYSTEM SCHEDULE FIRESTOP SYSTEMS ARE LISTED USING THE ALPHA-ALPHA-NUMERIC IDENTIFICATION SYSTEM PUBLISHED IN UL'S *FIRE RESISTANCE DIRECTORY* UNDER PRODUCT CATEGORY XHEZ						
TYPE OF PENETRANT	CONSTRUCTION					
	FLOOR PENETRATION SYSTEMS (FIRST ALPHA COMPONENT = C OR F)			WALL PENETRATION SYSTEMS (FIRST ALPHA COMPONENT = C OR W)		
	CONCRETE FLOORS WITH A MINIMUM THICKNESS LESS THAN OR EQUAL TO 5 INCHES (125 MM)	CONCRETE FLOORS WITH A MINIMUM THICKNESS GREATER THAN 5 INCHES (125 MM)	FRAMED FLOORS	CONCRETE OR MASONRY WALLS WITH A MINIMUM THICKNESS LESS THAN OR EQUAL TO 8 INCHES (200 MM)	CONCRETE OR MASONRY WALLS WITH A MINIMUM THICKNESS GREATER THAN 8 INCHES (200 MM)	FRAMED WALLS
NO PENETRATING ITEMS	C-AJ-0001-0999 or F-A-0001-0999	C-BJ-0001-0999		C-AJ-0001-0999, C-BJ-0001-0999, or W-J-0001-0999		W-L-0001-0999
METALLIC PIPE, CONDUIT, OR TUBING	C-AJ-1001-1999 or F-A-1001-1999	C-BJ-1001-1999, C-BK-1001-1999 or F-B-1001-1999	F-C-1001-1999	C-AJ-1001-1999, C-BJ-1001-1999, or W-J-1001-1999	C-BK-1001-1999 or W-K-1001-1999	W-L-1001-1999
NONMETALLIC PIPE, CONDUIT, OR TUBING	C-AJ-2001-2999 or F-A-2001-2999	C-BJ-2001-2999 or F-B-2001-2999	F-C-2001-2999	C-AJ-2001-2999, C-BJ-2001-2999, or W-J-2001-2999	C-BK-2001-2999	W-L-2001-2999
ELECTRICAL CABLES	C-AJ-3001-3999 or F-A-3001-3999	C-BJ-3001-3999 or F-B-3001-3999	F-C-3001-3999	C-AJ-3001-3999, C-BJ-3001-3999, or W-J-3001-3999	C-BK 3001-3999	W-L-3001-3999
CABLE TRAYS WITH ELECTRICAL CABLES	C-AJ-4001-4999 or F-A-4001-4999	C-BJ-4001-4999		C-AJ-4001-4999, C-BJ-4001-4999, or W-J-4001-4999	W-K-4001-4999	W-L-4001-4999
INSULATED PIPES	C-AJ-5001-5999 or F-A-5001-5999	C-BJ-5001-5999	F-C-5001-5999	C-AJ-5001-5999 or W-J-5001-5999	C-BK-5001-5999	W-L-5001-5999
MISCELLANEOUS ELECTRICAL PENETRANTS	C-AJ-6001-6999 or F-A-6001-6999			C-AJ-6001-6999		W-L-6001-6999
MISCELLANEOUS MECHANICAL PENETRANTS	C-AJ-7001-7999		F-C-7001-7999	C-AJ-7001-7999 or W-J-7001-7999		W-L-7001-7999
GROUPINGS OF PENETRATIONS	C-AJ-8001-8999 or F-A-8001-8999	C-BJ-8001-8999	F-C-8001-8999	C-AJ-8001-8999, C-BJ-8001-8999, or W-J-8001-8999		W-L-8001-8999
For each location where a fire-resistance-rated floor or wall assembly is penetrated, provide a UL-classified through-penetration firestop system selected from the applicable UL number range listed above that complies with SECTION 07841 - THROUGH-PENETRATION FIRESTOP SYSTEMS and is suitable for the penetration conditions indicated for the Project.						

B. Empty Openings: In conditions where there is no penetrating item, an alternate method of firestopping is to patch the penetration to match the original rated construction.

C. Cable Trays and Cable Sleeves: Firestopping at cable trays and sleeves shall be removable and adjustable to allow removal, replacement or addition of cables.

D. Electrical Boxes: Electrical boxes on the opposite sides of walls shall be protected by listed putty pads unless separated by a horizontal distance of 24" minimum.

E. Fire Dampers: Install firestop elastomeric sealants at perimeter of fire damper mounting angles at both sides of wall/floor. Consult with fire damper manufacturer for proper sealing of opening in accordance with UL 555 to maintain damper integrity and damper warranty. Firestopping must not interfere with function of fire dampers.

F. Required Sleeve Or Opening Sizes For Bare And Insulated Metal Penetrants: Unless otherwise required by the tested firestop systems, opening sizes shall be as follows:

1. For insulated pipes, a minimum ½ " annular space must remain between the outside of the insulation and the inside of the opening.
2. All sleeves, where provided, in fire-rated walls/floors shall be flush with the finish surface on both sides of wall/floor unless noted otherwise.
3. See Table below for additional information:

PIPE SIZES	WITHOUT INSULATION	WITH 1/2" INSULATION	WITH 3/4" INSULATION	WITH 1" INSULATION	WITH 1 1/2" INSULATION	WITH 2" INSULATION	WITH 2 1/2" INSULATION	WITH 3" INSULATION
1/2"	1 to 2"	3"	4"	4"	5"			
3/4"	2"	4"	4"	4 or 5"	5"			
1"	2"	4"	4"	4 or 5"	6"			
1 1/4"	3"	4"	5"	5"	6"			
1 1/2"	3"	4"	5"	5"	6"			
2"	3"	5"	5"	5"	7"	8"		
2 1/2"	4"	5"	6"	6"	7"	8"		
3"	4"	5"	6"	7"	8"	9"		
4"	5"	7"	8"	8"	9"	10"		
5"	6"	8"	8"	9"	10"	12"	14"	16"
6"	8"	9"	10"	10"	12"	12"	14"	16"
8"	10"	12"	12"	12"	12" or 14"	16"	18"	18"
10"	12"	14"	14"	14"	16"	16"	20"	20"
12"	14"	16"	16"	16"	18"	20"	20"	24"

G. Required Opening Sizes For Non-Metallic Penetrants: Unless otherwise required by the tested firestop systems, opening sizes shall be as follows:

1. Non-metallic pipes are to be centered in the opening as best as possible or be able to be easily moved to center.
2. All sides of the penetrant must be accessible.
3. All sleeves, where provided, in fire-rated walls/floors shall be flush with the finish surface on both sides of wall/floor unless noted otherwise.
4. See Table below for additional information.

PIPE SIZES	MAXIMUM HOLE SIZE IN CONCRETE	MAXIMUM HOLE SIZE IN DRYWALL
1 1/2"	3"	2 1/8"
2"	3 1/2"	2 5/8"
2 1/2"	3 1/2 to 4"	3 1/2"
3"	4"	4"
4"	6"	5"
5"	6"	6 3/8"
6"	7 to 7 1/2"	7"
8"	9 to 9 1/2"	9 1/2"
10"	11 to 11 1/2"	11 1/2"

END 07 8413

1. GENERAL

1.1. WORK INCLUDES

A. Fire-Resistive Joint Systems for the following:

1. Joints in or between fire-resistance rated constructions.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 3300 - Submittal Procedures
2. Section 01 4000 – Quality Requirements: Testing responsibility.
3. Section 07 2129 – Sprayed Urethane Foam Insulation: Applied thermal (fire) barrier.
4. Section 07 8100 - Applied Fireproofing
5. Section 07 8413 - Penetration Firestopping
6. Section 07 9200 - Joint Sealants: Non-fire-resistive joint sealants.
7. Section 09 2100 - Gypsum Board Assemblies: Head-of-wall joints in stud partitions.

1.3. REFERENCES

A. Publication Dates: Comply with standards in effect as of the date of the Contract Documents unless otherwise indicated.

B. American Society for Testing and Materials (ASTM):

1. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
2. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems.
3. ASTM E2307 - Standard Test Method for Determining Fire Resistance of Perimeter Fire Barrier Systems Using Intermediate Scale, Multi Story Test Apparatus.
4. ASTM E2393 - Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers.

C. Intertek Laboratories “Directory of Listed Building Products”.

D. Underwriters Laboratories (UL):

1. UL 723 – Surface Burning Characteristics of Building Materials.
2. UL 1479 – Fire Tests of Through Penetration Firestops.
3. UL 2079 - Tests for Fire Resistance of Building Joint Systems.
4. UL Fire Resistance Directory:

a. Firestop Devices (XHJI)
b. Fire Resistance Ratings (BXRH)
c. Through Penetration Firestop Systems (XHEZ)
d. Fill, Voids, or Cavity Material (XHHW)
e. Forming Materials (XHKU
f. Joint Systems (XHBN)

1.4. SUBMITTALS

A. Submit in accordance with Section 01 3300:

1. Product Data: For each type of joint system product indicated.
2. Color selection charts where applicable.
3. Shop Drawings: For each fire-resistive joint system, show each kind of construction condition in which joints are installed; also show relationships to adjoining construction. Include fire-resistive joint design designation from UL and information that evidences compliance with requirements for each condition indicated.

a. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each fire-resistive joint system configuration for construction items.

4. Product Test Reports: From a qualified testing agency indicating fire-resistive joint system complies with requirements, based on comprehensive testing of current products.
5. Installer qualifications.

1.5. QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed fire-resistive joint systems 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.

1. Installer shall be certified by product manufacturers if required by the manufacturer.

1.6. DELIVERY, STORAGE, AND HANDLING

A. Deliver fire-resistive joint system products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer; date of manufacture; lot number; shelf life if applicable; qualified testing and inspecting agency's classification marking applicable to Project; curing time; and mixing instructions for multicomponent materials.

B. Store and handle materials for fire-resistive joint systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.7. PROJECT CONDITIONS

A. Environmental Limitations: Do not install fire-resistive joint systems when ambient or substrate temperatures are outside limits permitted by fire-resistive joint system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Ventilate fire-resistive joint systems per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.

1.8. COORDINATION

A. Coordinate construction of joints to ensure that fire-resistive joint systems are installed according to specified requirements.

B. Coordinate sizing of joints to accommodate fire-resistive joint systems.

C. Do not cover up fire-resistive joint system installations that will become concealed behind other construction until Architect/Engineer , local building inspector, and Testing Agency has reviewed each installation.

2. PRODUCTS

2.1. MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. A/D Fire Protection Systems Inc.
2. Grace, W.R. & Co.
3. Hilti Construction Chemicals, Inc.
4. Johns Manville
5. Nelson Firestop Products.
6. NUCO Industries.
7. RectorSeal Corporation (The).
8. Specified Technologies Inc.
9. Thermafiber LLC
10. 3M Fire Protection Products.
11. Tremco.

2.2. FIRE-RESISTIVE JOINT SYSTEMS

A. General: Provide fire-resistive joint systems containing the materials indicated in the Fire-Resistive Joint System Schedule at the end of Part 3.

1. Painted Areas: Firestop systems shall be colored white where systems are exposed to view in areas indicated to receive paint.
2. Unpainted Areas: Color of firestop systems where joints are exposed to view and are not indicated to receive paint shall be selected by Architect from manufacturer’s standard colors.

B. Moisture-Resistance: Product formulations after curing shall not re-emulsify during exposure to moisture.

C. Compatibility: Provide fire-resistive joint systems that are compatible with joint substrates, under conditions of service and application, as demonstrated by fire-resistive joint system manufacturer based on testing and field experience.

D. Accessories: Provide components for each fire-resistive joint system, including primer and forming materials, that are needed to install fill materials and to comply with "Performance Requirements" Article. Use only components specified by fire-resistive joint system manufacturer and approved by the qualified testing and inspecting agency for systems indicated.

2.3. PERFORMANCE REQUIREMENTS

A. General: Provide fire-resistive joint systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assembly in which fire-resistive joint systems are installed. Fire-resistive joint systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gases.

1. Fire-resistive joint system installation shall meet requirements of ASTM E1966, UL 1479, or ASTM E2307 tested assemblies that provide a fire rating equal to that of construction being penetrated.
2. For fire-resistive joint systems exposed to view, provide products with flame-spread ratings of less than 25 and smoke-developed ratings of less than 450, as determined per ASTM E84.
3. Firestop materials and methods shall conform to applicable governing codes having local jurisdiction.

B. Joint Systems in-and-between Fire-Resistance-Rated Constructions: Provide systems with assembly ratings equaling or exceeding the fire-resistance ratings of construction that they join as tested in accordance to UL 2079 or ASTM E1966.

C. Engineering Judgements: For those firestop applications that exist for which no qualified tested system is available through a manufacturer, an engineering judgement derived from similar qualified tested system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineering Judgement documents must follow requirements set forth by the International Firestop Council.

3. EXECUTION

3.1. EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2. PREPARATION

A. Surface Cleaning: Clean joints immediately before installing fire-resistive joint systems to comply with written recommendations of fire-resistive joint system manufacturer and the following requirements:

1. Remove foreign materials that could interfere with adhesion of fire-resistive joint systems from surfaces of joint substrates.
2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Priming: Prime substrates where recommended in writing by fire-resistive joint system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Masking Tape: Use masking tape to prevent fire-resistive joint systems from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from fire-resistive joint system materials. Remove tape as soon as possible without disturbing fire-resistive joint system's seal with substrates or damaging adjoining surfaces.

3.3. INSTALLATION

A. General: Install fire-resistive joint systems to comply with "Performance Requirements" Article and fire-resistive joint system manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming/packing/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

1. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of fire-resistive joint systems.

C. Install fill materials for fire-resistive joint systems by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings, forming/packing/backing materials, and accessories as required to achieve fire-resistance ratings indicated.
2. Apply fill materials so they contact and adhere to substrates formed by joints.
3. Provide uniform cross-sectional shapes and depths relative to joint width that optimize joint movement capability.
4. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4. FIELD QUALITY CONTROL

A. Proceed with enclosing fire-resistive joint systems with other construction only after joint system installation has been reviewed by the Architect/Engineer , local building inspector, and Testing Agency.

B. Where deficiencies are found, repair or replace fire-resistive joint systems so they comply with requirements.

3.5. CLEANING AND PROTECTION

A. Clean off excess fill materials adjacent to joint as Work progresses by methods and with cleaning materials that are approved in writing by fire-resistive joint system manufacturers and that do not damage materials in which joints occur.

B. Provide final protection and maintain conditions during and after installation that ensure fire-resistive joint systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated fire-resistive joint systems immediately and install new materials to produce fire-resistive joint systems complying with specified requirements.

3.6. FIRE-RESISTIVE JOINT SYSTEM SCHEDULE

A. UL Systems: Provide UL-classified systems indicated. Systems shall be selected from the UL "Fire Resistance Directory" under product Category XHBN. The selected system shall be within the range of numbered systems listed in this schedule.

1.

Joint Description	UL Designation
Floor to Floor	FF-D 0000-3999
Wall to Wall	WW-D 0000-3999

Floor to Wall	FW-D 0000-3999
Head of Wall	HW-D 0000-3999
Bottom of Wall	BW-S 0000-3999

END 07 8446

1. GENERAL

1.1. WORK INCLUDES

A. Preparation of sealant substrate surfaces.

B. Sealants, primers, and backings.

C. Exterior joints in vertical surfaces and nontraffic horizontal surfaces.

D. Exterior joints in horizontal traffic surfaces.

E. Interior joints in vertical surfaces and horizontal nontraffic surfaces.

F. Interior joints in horizontal traffic surfaces.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 3300 - Submittal Procedures
2. Section 07 8413 - Penetration Firestopping
3. Section 07 8446 - Fire-Resistive Joint Systems
4. Section 08 8000 – Glazing: Sealants used in conjunction with glazing installation.
5. Section 09 2100 - Gypsum Board Assemblies: Acoustic sealants.
6. Section 09 3000 – Tile: Control joint sealants.

1.3. REFERENCES

A. Publication Dates: Comply with standards in effect as of the date of the Contract Documents unless otherwise indicated.

B. American Society for Testing and Materials (ASTM):

1. ASTM C717 – Standard Terminology for Building Seals and Sealants.
2. ASTM C719 – Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement.
3. ASTM C804 - Use of Solvent-Release Type Sealants.
4. ASTM C834 – Standard Specification for Latex Sealants.
5. ASTM C919 – Standard Practice for Use of Sealants in Acoustical Applications.
6. ASTM C920 – Standard Specification for Elastomeric Joint Sealants.
7. ASTM C1021 – Standard Practice for Laboratories Engaged in the Testing of Building Sealants.
8. ASTM C1193 – Standard Guide for Use of Joint Sealants.
9. ASTM C1247 – Standard Test Method for Durability of Sealants Exposed to Continuous Immersion in Liquids.
10. ASTM C1248 – Standard Test Method for Staining of Porous Substrate by Joint Sealants.
11. ASTM C1311 – Standard Specification for Solvent Release Sealants.
12. ASTM C1330 – Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants.
13. ASTM C1521 – Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints.

14. ASTM D1056 – Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber.
15. ASTM D2240 – Standard Test Method for Rubber Property 8212; Durometer Hardness.

C. Code of Federal Regulations: 21 CFR 177.2600 – Rubber Articles Intended for Repeated Use.

D. FS TT-S-00230 - Sealing Compound: Elastomeric Type, Single Component.

E. NSF/ANSI 51 – Food Equipment Materials.

F. SWRI (Sealant, Waterproofing, and Restoration Institute).

1.4. DEFINITIONS

A. Class: Per ASTM C920, elastomeric sealants are categorized according to tested capabilities. The following classes are expressed as a percentage of joint width.

1. 12-1/2 = 12-1/2% movement in both extension and compression for a total of 25%.
2. 25 = 25% movement in both extension and compression for a total of 50%
3. 35 = 35% movement in both extension and compression for a total of 70%
4. 50 = 50% movement in both extension and compression for a total of 100%
5. 100/50 = 100% movement in extension and 50% in compression.

B. Grade: Per ASTM C920:

1. NS = Non-Sag
2. P = Pourable

C. Type: Per ASTM C920:

1. M = Multi-Component
2. S = Single Component

D. Use: Per ASTM C920, elastomeric sealants are categorized according to tested performance.

1. Substrates:

a. A = Aluminum (Clear Anodized).
b. G = Glass (Clear Float).
c. M = Mortar (Portland Cement Mortar).
d. O = Other than A, G, or M.

2. I = Immersed in Liquids
3. NT = Non-Traffic
4. T = Traffic

1.5. SUBMITTALS

A. Submit in accordance with Section 01 3300:

1. Submit manufacturer's product data for each sealant/product indicating:

a. Chemical characteristics.
b. Performance criteria.

c. Limitations.
d. Color availability.
e. Installation instructions.

2. Certificates:

a. Certification by joint sealant manufacturer that their products comply with specification requirements and are suitable for the use and substrates indicated.

3. Samples for Initial Selection: Manufacturer's standard bead samples, consisting of strips of actual products showing full range of colors available, for each product exposed to view.
4. Qualification Data: At the request of the Architect/Engineer, provide documentation to demonstrate the required level of applicator qualifications as specified in the "Quality Assurance" Article in this Specification to document 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.

1.6. QUALITY ASSURANCE

A. Conform to Sealant, Waterproofing, and Restoration Institute recommendations for materials and installation.

B. Installer Qualifications: Engage an experienced Installer who has completed joint sealant applications similar in material, design, and extent to that indicated for Project and that have resulted in a record of successful in-service performance. If a manufacturer requires authorized installers for their products, the installer must be authorized to install said products.

C. VOC Content: All products shall comply with VOC limits of authorities having jurisdiction.

D. Source Limitations: Obtain each type of joint sealant from a single manufacturer.

1.7. DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multicomponent materials.

B. Store and handle materials in compliance with manufacturer's recommendations to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes. Store all products in a manner to prevent damage; in a secure place, out of the way of construction operations. Provide protection until ready for use.

C. Handle in accord with manufacturer's recommendations.

1.8. PROJECT CONDITIONS

A. Environmental Conditions: Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside the limits permitted by joint sealant manufacturer.
2. When joint substrates are wet.
3. Do not install solvent curing sealants in enclosed building spaces.

4. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.
5. Weather: Do not install products during adverse weather conditions.

B. Joint Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than or greater than allowed by joint sealant manufacturer for application indicated.

C. Joint Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with their adhesion are removed from joint substrates.

1.9. SEQUENCING AND SCHEDULING

A. Coordinate the work of this Section with all Sections referencing this Section.

1. Coordinate the sequence of painting with sealant installation.

1.10. WARRANTY

A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants and accessories which fail to achieve air tight and watertight seal, exhibit loss of adhesion or cohesion, tear, rupture, or do not cure. Prime Contractor shall co-certify the warranty.

1. Three years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer's standard form in which joint-sealant manufacturer agrees to furnish joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Elastomeric Sealants:

a. Silicone Sealants: Twenty years from date of Substantial Completion.
b. Polyurethane Sealants: Five years from date of Substantial Completion.
c. Hybrid Sealants: Ten years from date of Substantial Completion.

C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:

1. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
2. Disintegration of joint substrates from natural causes exceeding design specifications.
3. Mechanical damage caused by individuals, tools, or other outside agents.
4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

2. PRODUCTS

2.1. MATERIALS, GENERAL

A. Products: Subject to compliance with requirements, provide one of each of the types of products listed in this Specification.

B. Compatibility: Provide joint sealants, joint fillers, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

C. Stain-Test-Response Characteristics: Sealants shall be nonstaining to exposed porous substrates. Provide products that have undergone testing according to ASTM C1248 and have not stained porous joint substrates indicated for Project.

D. Colors: Provide color of exposed joint sealants to comply with the following:

1. Provide selections made by Architect from manufacturer's full range of colors for products of type specified.

2.2. SYSTEM PERFORMANCE REQUIREMENTS

A. Provide joint sealants for exterior and interior applications that have been produced and installed to establish and maintain airtight continuous seals that are water resistant and cause no staining or deterioration of joint substrates.

2.3. ELASTOMERIC JOINT SEALANTS

A. General, Elastomeric Sealants:

1. Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing elastomeric sealants that comply with ASTM C920 and other requirements indicated for each elastomeric joint sealant, including those requirements referencing ASTM C920 classifications for Type, Grade, Class, and Uses related to exposure and joint substrates.

B. Silicone Sealants:

1. SEALANT ES-1: Silicone Sealant for Stone and Masonry: Manufacturer's recommended low-modulus silicone sealant for sealing joints in masonry and limestone applications:

1) 790 / Dow Corning
2) SilPruf NB SCS2900 / GE Momentive
3) 890-NST / Pecora Corp.
4) Sikasil WS-290 / Sika Corp.
5) Spectrem 3 / Tremco

2. SEALANT ES-6: Single-Component Mildew-Resistant Silicone Sealant: Manufacturer's standard, single component, acid-curing or neutral-curing, mildew-resistant; high modulus type.

a. Acceptable products/manufacturers:

1) Sanitary SCS1700 / GE Momentive
2) 898-NST / Pecora Corp.
3) Tremsil 200 / Tremco

b. Grade: NS (Non-Sag)
c. Class: 25
d. Uses Related to Exposure: NT (Non-Traffic)

C. Polyurethane Sealants:

1. SEALANT ES-7: Single-Component Polyurethane Sealant: Manufacturer's standard, single-component, moisture-curing.

    a. Acceptable products/manufacturers:

        1) Sonolastic Ultra / BASF Construction Systems
        2) Sikaflex 1a / Sika Corp.
        3) Vulkem 116 / Tremco

    b. Grade: NS (Non-Sag)
    c. Class: 25
    d. Uses Related to Exposure: NT (Non-Traffic) and T (Traffic)

2. SEALANT ES-7A: Single-Component Polyurethane Sealant, Non-Traffic Applications: Manufacturer's standard, single-component, moisture-curing.

    a. Acceptable products/manufacturers:

        1) NP 1 / BASF Construction Systems
        2) DynaTrol I-XL / Pecora Corp.
        3) Stampede 1 / Sherwin-Williams

    b. Grade: NS (Non-Sag)
    c. Class: 25
    d. Uses Related to Exposure: NT (Non-Traffic)

3. SEALANT ES-8: Single-Component Pourable Polyurethane Sealant: Manufacturer's standard, single-component, moisture-curing.

    a. Acceptable products/manufacturers:

        1) SL 1 / BASF Construction Systems
        2) NR-201 / Pecora Corp.
        3) Stampede-2SL / Sherwin-Williams
        4) Sikaflex 1c SL / Sika Corp.
        5) Vulkem 45 SSL / Tremco

    b. Grade: P (Pourable)
    c. Class: 25
    d. Uses Related to Exposure: NT (Non-Traffic) and T (Traffic)

4. SEALANT ES-9: Multi-Component Polyurethane Sealant: Manufacturer's standard, multi-component, chemical curing.

    a. Acceptable products/manufacturers:

        1) Dynatrol II / Pecora Corp.
        2) Dymeric 240FC / Tremco

    b. Grade: NS (Non-Sag)
    c. Class: 50
    d. Uses Related to Exposure: NT (Non-Traffic)

5. SEALANT ES-10: Multi-Component Polyurethane Sealant: Manufacturer's standard, multi-component, chemical curing.

    a. Acceptable products/manufacturers:

        1) NP 2 / BASF Construction Systems
        2) Stampede-2NS / Sherwin-Williams
        3) Sikaflex 2c NS / Sika Corp.

    b. Grade: NS (Non-Sag)
    c. Class: 25
    d. Uses Related to Exposure: NT (Non-Traffic)

6. SEALANT ES-11: Multi-Component Pourable Polyurethane Sealant: Manufacturer's standard, multi-component, chemical curing, self-leveling.

    a. Acceptable products/manufacturers:

        1) SL 2 / BASF Construction Systems
        2) Dynatrol II-SG / Pecora Corp.
        3) Stampede-2SL / Sherwin-Williams
        4) Sikaflex 2c SL / Sika Corp.
        5) THC-900/901 / Tremco

    b. Grade: P (Pourable)
    c. Class: 25
    d. Uses Related to Exposure: NT (Non-Traffic) and T (Traffic)

D. Hybrid Sealants:

1. SEALANT ES-12: Single-Component Silyl-Terminated Polyether Sealant: Chemical curing; paintable; low modulus type.

    a. Acceptable products/manufacturers:

        1) Sonolastic 150 with VLM Technology / BASF Construction Systems

    b. Grade: NS (Non-Sag)
    c. Class: 50
    d. Uses Related to Exposure: NT (Non-Traffic)

2.4. SEMI-ELASTOMERIC JOINT SEALANTS

A. SEALANT SES-1: Acrylic-Based Solvent-Release Sealant: Manufacturer's standard one-part, non-sag, paintable, solvent-release-curing acrylic terpolymer sealant complying with ASTM C1311 or FS TT-S-00230 or both. Sealant must, without failure in adhesion and cohesion, withstand 12-1/2% movement in both extension and compression for a total of 25% joint movement.

1. Acceptable products/manufacturers: Mono 555 / Tremco
2. Grade: NS (Non-Sag)
3. Class: n/a
4. Uses Related to Exposure: NT (Non-Traffic)

B. SEALANT SES-2: Acrylic-Emulsion Sealant: Provide manufacturer's standard siliconized acrylic latex, one-part, non-sag, paintable product complying with ASTM C834. Sealant must, without failure in adhesion and cohesion, withstand 5% movement in both extension and compression for a total of 10% joint movement.

1. Acceptable products/manufacturers:

    a. Sonolac / BASF Construction Systems
    b. Siliconized Acrylic / Bostik, Inc.
    c. AC-20+ Silicone / Pecora Corp.
    d. 950A Siliconized Acrylic / Sherwin-Williams
    e. Tremflex 834 / Tremco

2. Grade: NS (Non-Sag)
3. Class: n/a
4. Uses Related to Exposure: NT (Non-Traffic)

C. SEALANT SES-3: Butyl-Rubber Solvent-Release Sealant: Manufacturer's standard one-part, non-sag, solvent-release-curing, polymerized butyl sealant complying with ASTM C1311.

1. Acceptable products/manufacturers:

    a. Chem-Calk 300 / Bostik, Inc.
    b. BC-158 / Pecora Corp.
    c. Tremco Butyl Sealant / Tremco

2. Grade: NS (Non-Sag)
3. Class: n/a
4. Uses Related to Exposure: NT (Non-Traffic)

2.5. SEMI-RIGID JOINT SEALANTS

A. SEALANT SR-1: Multi-Component Polyurea Sealant: Manufacturer's standard, multi-component, chemical curing.

1. Acceptable products/manufacturers:

    a. TF-100 / BASF Construction Systems
    b. Euco QWIKJoint 200 / Euclid Chemical
    c. 4880 / General Polymers
    d. Spal-Pro RS 88 / Metzger-McGuire

2. Shore Hardness (ASTM D2240, Shore A): 80 minimum.
3. Uses Related to Exposure: T (Traffic)

B. SEALANT SR-2: Multi-Component Epoxy Sealant: Manufacturer's standard, multi-component, self-leveling, chemical curing.

1. Acceptable products/manufacturers:

    a. Epolith / BASF Construction Systems
    b. Euco 700 / Euclid Chemical
    c. MM-80 / Metzger-McGuire
    d. Dynapoxy EP-800 / Pecora Corp.

2. Shore Hardness (ASTM D2240, Shore A): 80 minimum.
3. Uses Related to Exposure: T (Traffic)

2.6. ACOUSTICAL JOINT SEALANTS

A. Acoustical Sealants: Sealant shall be effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies per ASTM E90.

1. SEALANT AS-1: Latex Acoustical Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C834.

a. Acceptable products/manufacturers:

1) CP 506 Smoke and Acoustic Sealant / Hilti
2) AC-20 FTR Acoustical and Insulation Sealant / Pecora Corp.
3) AIS-919 Acoustical and Insulation Sealant / Pecora Corp.
4) SHEETROCK Acoustical Sealant / United States Gypsum Co. (USG)

2. SEALANT AS-2: Synthetic Rubber Acoustical Sealant: Manufacturer's standard, non-drying, non-hardening, non-skinning, non-staining, gunnable, synthetic rubber sealant recommended for sealing interior concealed joints.

a. Acceptable products/manufacturers: Tremco Acoustical Sealant / Tremco, Inc.

2.7. JOINT SEALANT BACKING

A. General: Provide sealant backings of material and type that are non-staining; are compatible with joint substrates, sealants, primers and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Joint Backings: ASTM C1330; Type listed below, and of size, shape, and density to control sealant depth and otherwise contribute to producing optimum sealant performance:

1. Type B: Bicellular material with a surface skin (“soft rod”).
2. Individual rod width must be of adequate width to fit snugly in joint. Combining, twisting or braiding of smaller rods is not acceptable for wider joints.

C. Elastomeric Tubing Joint Fillers: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D1056, nonabsorbent to water and gas, capable of remaining resilient at temperatures down to minus 26 degrees F. Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and otherwise contribute to optimum sealant performance.

D. Bond-Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.8. ACCESSORIES AND MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated; non-staining type.

B. Cleaners for Nonporous Surfaces: Cleaners recommended by sealant manufacturer. Chemical cleaners shall be acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming in any way joint substrates and adjacent nonporous surfaces, and formulated to promote optimum adhesion of sealants with joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

3. EXECUTION

3.1. EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint sealant performance. Do not proceed with installation of joint sealants until unsatisfactory conditions have been corrected.

1. Beginning of installation means installer accepts the condition of surfaces and substrates.

B. Verify that sealants are appropriate for the substrates they are to be applied to.

3.2. PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with recommendations of joint sealant manufacturer and the following requirements:

1. Remove all foreign and loose material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean concrete, masonry, unglazed surfaces of ceramic tile, and similar porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
3. Remove laitance and form release agents from concrete.
4. Clean metal, glass, porcelain enamel, glazed surfaces of ceramic tile, and other nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.

B. Verify that joint backing, primers, and release tapes are compatible with sealant.

C. Measure joint dimensions and size materials to achieve required width/depth ratios.

D. Joint Priming: Prime joint substrates where indicated or where recommended by joint sealant manufacturer based on preconstruction joint sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's recommendations. Confine primers to areas of joint sealant bond; do not allow spillage or migration onto adjoining surfaces.

E. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

F. Protect elements surrounding the work of this Section from damage or disfiguration.

3.3. INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint sealant manufacturer's printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations of ASTM C1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Acoustical Sealant Application Standard: Comply with recommendations of ASTM C919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.

D. Installation of Sealant Backings: Install sealant backings to comply with the following requirements:

1. Install joint fillers of type indicated to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

a. Do not leave gaps between ends of joint fillers.
b. Do not stretch, twist, puncture, or tear joint fillers.
c. Remove absorbent joint fillers that have become wet prior to sealant application and replace with dry material.

2. Install bond breaker tape between sealants where backer rods are not used between sealants and joint fillers or back of joints.

E. Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability. Install sealants at the same time sealant backings are installed.

1. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
2. Install sealant in uniform, continuous ribbons free of air pockets, gaps, foreign embedded matter, ridges, and sags.
3. Ensure complete "wetting" of the joints. Bond surfaces equally on opposite sides. Fill sealant rabbet to a slightly concave surface, slightly below adjoining surfaces.
4. Tape Sealants: Apply tape sealants in double rows approximately 1” apart.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer. Tool joints as follows:

1. Provide concave joint configuration per Figure 5A in ASTM C1193, unless otherwise indicated.

G. Install sealants to depths as shown or as required by sealant manufacturer. When not shown or indicated, install within the following limitations:

1. For sidewalks, pavements, and similar joints sealed with elastomeric sealants and subject to traffic and other abrasion and indentation exposures, fill joints to a depth equal to 75% of joint width, but not more than 3/4" deep or less than 3/8" deep.
2. For normal moving joints sealed with elastomeric sealants, but not subject to traffic, fill joints to a depth equal to 50% of joint width, but not more than 1/2" deep or less than 1/4" deep.
3. For joints sealed with non-elastomeric sealants and caulking compounds, fill joints to a depth in the range of 65% to 125% of joint width.

H. Spillage: Do not allow sealants or compounds to overflow or spill onto adjoining surfaces.

1. Use masking tape or other precautionary devices to prevent staining of adjoining surfaces.

3.4. CURING

A. Cure sealants and caulking compounds in compliance with manufacturer's instructions to obtain high early bond strength and surface durability.

3.5. FIELD QUALITY CONTROL

A. Field-Adhesion Testing by Sealant Manufacturer in Conjunction with the Contractor: Field test joint sealant adhesion to joint substrates as follows:

1. Notify Architect 7 days in advance of the dates and times when test joints will be erected.
2. Extent of Testing: Location of each test shall be determined by the Architect. Test completed and cured sealant joints as follows:

a. Initial Testing: Perform one test for every 100 feet of joint length for each kind of sealant and joint substrate indicated above until 10 successive acceptable tests are completed.
b. Subsequent Testing: Perform 1 test for each 1000 feet of joint length thereafter or 1 test per each floor per elevation.

3. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C1193, or Method A, Tail Procedure, in ASTM C1521.

a. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.

4. Inspect tested joints and report on the following:

a. Whether sealants filled joint cavities and are free of voids.
b. Whether sealant dimensions and configurations comply with specified requirements.
c. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.

5. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.
6. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.

B. Non-Destructive Testing: The Architect may elect to perform additional testing utilizing non-destructive test methods per the Dowel Method per ASTM C1521.

C. Evaluation of Field-Adhesion Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

1. Retest: Perform one adhesion test for each contiguous length of replaced sealant joint, minimum one test for every 50 feet of replacement.

3.6. CLEANING AND REPAIRING

A. Clean work under provisions of Section 01 7700.

B. Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

C. Upon completion, carefully examine all sealant and caulking work. Remove all damaged and defective work and replace with new materials.

D. Remove all surplus products, containers, and rubbish and dispose of off site.

E. Remove all spilled or spattered materials from all surfaces. When adjacent surface or other work has been damaged or stained as a result of sealing and caulking work, repair all damage and remove all stains to the satisfaction of the Architect.

3.7. PROTECTION

A. Protect finished installation under provisions of Section 01 5000.

B. Protect joint sealants during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage (other than normal wear or weathering)at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so that and installations with repaired areas are indistinguishable from original work.

3.8. SCHEDULE

A. If more than one sealant is listed below for a particular joint type, Contractor may at his option choose which sealant to use.

B. If no color is indicated, use the sealant manufacturer's standard color.

C. Exterior Window, Curtainwall, Storefront, and Door Perimeter:

1. Type: ES-4, ES-4A, ES-12
2. Color: To be selected by Architect/Engineer.

D. Exterior Precast Concrete, Stone, Cast Stone, and Masonry Expansion and Control Joints:

1. Type: ES-1, ES-12
2. Color: To be selected by Architect/Engineer.

E. Interior Precast Concrete, Stone, Cast Stone, and Masonry Expansion and Control Joints:

1. Type: ES-9, ES-12
2. Color: To be selected by Architect/Engineer.

F. Interior Window, Curtainwall, Storefront, and Door Perimeter:

1. Type: SES-1, SES-2
2. Color: To be selected by Architect/Engineer.

G. Interior Slab Control Joints at all sealed concrete and resinous flooring locations.

1. Type: SR-1, SR-2
2. Color: To be selected by Architect/Engineer.

H. Metal Siding/Flashing:

1. Type: ES-7, ES-7A, ES-9, ES-10, ES-12
2. Color: To be selected by Architect/Engineer.

I. Threshold Bedding:

1. Type: SES-3
2. Color: Provide manufacturer’s standard.

J. Paving Joints:

1. Type: ES-8, ES-11
2. Color: To be selected by Architect/Engineer.

K. Joints between Plumbing Fixtures and Adjoining Walls, Floors, and Counters:

1. Type: ES-6, SES-2
2. Color: To be selected by Architect/Engineer.

L. Perimeter of Countertops and Splashes, non-wet locations:

1. Type: SES-1, SES-2
2. Color: To be selected by Architect/Engineer.

M. Perimeter of Countertops and Splashes, Wet locations:

1. Type: SES-2
2. Color: To be selected by Architect/Engineer.

N. Interior Tile Expansion Joints, Non-Toilet Rooms:

1. Type: ES-7, ES-10
2. Color: To be selected by Architect/Engineer.

O. Interior Tile Expansion Joints, Toilet Rooms and Other Wet Locations:

1. Type: ES-6
2. Color: To be selected by Architect/Engineer.

P. Acoustic Partitions: All perimeter joints and penetrations of non-fire rated-partitions that include sound attenuation insulation, and where otherwise indicated on the Drawings.

1. Type: AS-1, AS-2
2. Color: To be selected by Architect/Engineer.

END 07 9200

1. GENERAL

1.1. WORK INCLUDES

A. Non-rated steel hollow metal frames for wood doors shown on the Drawings and schedules.

B. Steel hollow metal frames for borrowed lites, sidelites and transoms.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 3300 - Submittal Procedures
2. Section 03 3000 - Concrete
3. Section 04 2000 - Unit Masonry: Masonry Mortar fill of metal frames
4. Section 06 1000 - Rough Carpentry
5. Section 08 1400 - Wood Doors
6. Section 08 1613 - Fiberglass Doors and Frames
7. Section 08 3100 - Access Doors and Panels
8. Section 08 3613 - Sectional Overhead Doors
9. Section 08 4113 - Aluminum Entrances & Storefronts
10. Section 08 7100 - Hardware
11. Section 08 8000 - Glazing
12. Section 08 9000 - Louvers
13. Section 09 2100 - Gypsum Board Assemblies
14. Section 09 9100 - Paints and Coatings: Field painting of doors and frames.

1.3. REFERENCES

A. Publication Dates: Comply with standards in effect as of the date of the Contract Documents except for those having different revision dates as referenced in the codes indicated on the Drawings, or unless otherwise indicated.

B. American Society for Testing and Materials (ASTM):

1. ASTM A153 - 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 A1008 - Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
4. ASTM A1011 - Specification for Steel, Sheet and Strip, Hot Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
5. ASTM C1363 - Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus.
6. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
7. ASTM E413 - Classification for Rating Sound Insulation.

C. Builders Hardware Manufacturers Association (BHMA):

1. BHMA A156.115: Hardware Preparation in Steel Doors and Steel Frames.

D. The National Association of Architectural Metal Manufacturers; Hollow Metal Manufacturers Association division (NAAMM-HMMA):

1. NAAMM-HMMA 803 – Steel Tables.
2. NAAMM-HMMA 840 - Installation and Storage of Hollow Metal Doors and Frames.

E. National Fire Protection Association (NFPA):

1. NFPA 80 - Fire Doors and Windows.
2. NFPA 252 - Fire Tests for Door Assemblies.

F. Steel Door Institute (SDI):

1. SDI 113 - Standard Practice for Determining the Steady-State Thermal Transmittance of Steel Door and Frame Assemblies.
2. SDI 138 - Guidelines for Acoustical Performance of Standard Steel Doors and Frames.
3. SDI A250.3 - Test Procedure and Acceptance Criteria for Factory Applied Finish Coatings for Steel Doors and Frames
4. SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors and Hardware Reinforcings.
5. SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames.
6. SDI A250.8 - Recommended Specifications for Standard Steel Doors and Frames.
7. SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
8. SDI A250.11 - Recommended Erection Instructions for Steel Frames.
9. SDI A250.13 - Testing and Rating of Severe Windstorm Resistant Components for Swinging Door Assemblies for Protection of Building Envelopes.

G. Underwriter's Laboratories, Inc. (UL):

1. UL 9 - Fire Tests of Window Assemblies.
2. UL 10B - Fire Tests of Door Assemblies.
3. UL 10C - Positive Pressure Fire Tests of Door Assemblies.
4. UL 1784 - Air Leakage Tests for Door Assemblies.

1.4. DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

1.5. SUBMITTALS

A. Submit in accordance with Section 01 3300:

1. Manufacturer's Data: Submit manufacturer's data for fabrication and installation instructions.
2. Schedule: Provide a schedule of hollow-metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final Door Hardware Schedule.
3. Shop Drawings:

a. Submit shop drawings for the fabrication and installation of steel doors and frames, using same reference number as on Drawings.

b. Include details of each frame type, elevations of door design types, conditions at openings, details of construction, location and installation requirements of finish hardware and reinforcements, and details of joints and connections.
c. Show anchorage and accessory items.
d. Indicate door elevations internal reinforcement, closure method, and cut outs for glazing and louvers.
e. Details of removable stops and glazing.

4. Product Test Reports: For each type of hollow-metal door and frame assembly, for tests performed by a qualified testing agency.

1.6. DELIVERY, STORAGE, AND HANDLING

A. Deliver, store and handle hollow metal work per manufacturer's requirements.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Protect frames with plastic wrap. Do not use non-vented plastic.

1.7. PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

2. PRODUCTS

2.1. ACCEPTABLE MANUFACTURERS

A. Source Limitations: Obtain hollow metal work from single source from single manufacturer.

B. Products of the following manufacturers, provided they comply with the requirements of the Contract Documents, are considered acceptable:

1. Ceco Door.
2. Curries Manufacturing, Inc.
3. Deansteel Manufacturing, Inc.
4. Mesker Door Inc.
5. Pioneer.
6. Republic.
7. Steelcraft.
8. Substitutions: Under provisions of Section 01 6000.

2.2. GENERAL

A. General:

1. Provide frames of types and styles indicated on the Drawings.
2. Provide hollow-metal frames constructed to comply with SDI A250.8, SDI A250.4, and other indicated standards for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as herein specified.

2.3. INTERIOR STANDARD FRAMES

A. Interior Frames: SDI A250.8, Level 2; SDI A250.4, Level B.

1. Interior Frames: Minimum thickness of 0.053 inches.
2. Borrowed Lite Frames: Minimum thickness of 0.053 inches.

B. Material: Non-galvanized

2.4. FRAME ANCHORS

A. Jamb Anchors:

1. Type: Anchors of minimum size and type required by applicable door and frame standard and suitable for performance level indicated, but not less than 0.042" in thickness.
2. Postinstalled Expansion Anchor: Minimum 3/8-inch-diameter bolts with expansion shields or inserts, with manufacturer's standard pipe spacer.

B. Floor Anchors: Provide floor anchors, for each jamb and mullion that extends to floor.

C. Material: ASTM A879, Commercial Steel (CS), 04Z coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A1008 or ASTM A1011, hot-dip galvanized according to ASTM A153, Class B.

2.5. ACCESSORIES

A. Silencers: Resilient Rubber.

B. Glazing Stops: As specified under "Fabrication".

2.6. MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A1008, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A 1011, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Galvanized Steel Sheets: ASTM A653, Commercial Steel (CS), Type B, G60 zinc coating mill phosphatized.

D. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.

E. Glazing: Comply with requirements in Section 08 8000 - Glazing.

2.7. FABRICATION

A. General:

1. Fabricate steel frame units to be rigid, neat in appearance and free from defects, warp or buckle. Accurately form metal to required sizes and profiles.

2. Wherever practicable, fit and assemble units in the manufacturer's plant. Clearly identify work that cannot be permanently factory-assembled before shipment, to assure proper assembly at the project site.
3. All field assembly of frame parts shall be welded, with joints completely filled and ground smooth.
4. Fabricate frames, concealed stiffeners, reinforcement, edge channels, louvers and moldings from cold-rolled steel.
5. Conceal all fastening unless otherwise indicated.

B. Frames:

1. Welded Frames: All frames to be welded unless otherwise indicated. Fabricate frames with mitered corners, welded continuously and completely, and ground smooth. All metal-to-metal joints shall be completely welded and ground smooth, leaving no open joints at the intersection of the pieces.
2. Profile: Manufacturer's standard profiles, including backbends on all frames
3. Depth: Frame depth is as indicated on drawings.
4. Sidelite and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by welding.
5. Reinforce frames wider than 48" with steel channels fitted tightly into frame head, flush with top.
6. Prepare frame for silencers. Provide three single rubber silencers for single doors and mullions of double doors on strike side, and two single silencers on frame head at double doors without mullions.
7. Provide 0.016 inch minimum thickness welded-in-place plaster/mortar guard boxes as required for frames to be grouted or located in plaster walls.
8. Provide removable shipping spreaders.
9. 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.

C. Hardware Preparation:

1. Frames shall be mortised, machined and prepared for all hardware, including cutouts, reinforcing, drilling and tapping in accordance with SDI A250.6, the final Door Hardware Schedule and templates provided by hardware supplier.
2. Reinforce hollow metal units to receive surface-applied hardware. Drilling and tapping for surface-applied finish hardware may be done at project site.
3. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.
4. Templates for all hardware attachments shall be provided by the hardware supplier to the General Contractor for transmittal to the hollow metal manufacturer.

D. Anchors: Frames shall be provided with manufacturer-approved anchors.

1. Jamb Anchors: Provide minimum of three anchors per jamb for frames up to 90-inches in height, with one additional anchor for frames with no floor anchor. Minimum of four anchors per jamb for frames between 90-inches and 96-inches in height, with one additional anchor for frames with no floor anchor. Provide one additional anchor for each 24 inches of frame height above 96-inches.
2. Floor Anchors: Weld anchors to bottom of jambs and mullions.

E. Applied Glazing Stops: Provide stops around glazed lites and louvers where indicated. Form corners of stops and moldings with butted hairline joints.

1. At Frames: Shall be steel of same gauge as frame material, countersunk to receive exposed screws.
2. Unless indicated otherwise, provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
3. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.
4. Provide stops for installation with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

2.8. FINISHES

A. Shop Prime Finish: All material specified in this Section is to receive shop prime finish unless noted otherwise.

1. Shop Primer: Immediately after cleaning and pretreating, apply manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

3. EXECUTION

3.1. EXAMINATION

A. Examine the areas and conditions, with Installer present, under which steel doors and frames are to be installed. Notify the Architect in writing of all conditions detrimental to the timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.2. PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Coordinate installation of anchorages for hollow metal frames.

3.3. INSTALLATION

A. General: Install hollow-metal work plumb, rigid, properly aligned, and securely fastened in place. Comply with Drawings and manufacturer's written instructions.

B. Placing Frames:

1. Comply with the provisions of SDI A250.11.
2. Place frames prior to construction of enclosing walls and ceilings. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders leaving surfaces smooth and undamaged.
3. Install frames with removable glazing stops located on secure side of opening.
4. Masonry Construction:

a. Refer to Section 04 2000 – Unit Masonry for slushing of hollow metal frames.
b. Slush door jambs and heads at masonry construction unless noted otherwise.
c. Slush full hollow metal frames set in masonry construction as the masonry is laid up.
d. In masonry construction locate a minimum of three wall anchors per jamb at hinge and strike levels. Building in of anchors and grouting of frames is specified in masonry section.

5. In-Place Concrete or Masonry Construction:

a. Secure frames in place with post-installed expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.

C. Frame Tolerances:

1. Installed frames must meet the following tolerances from NAAMM-HMMA 840:

a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
d. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.

D. Glazing: Comply with installation requirements in Section 08 8000 - 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 o.c. and not more than 2 inches o.c. from each corner.

3.4. ADJUST AND CLEAN

A. Final Adjustments: Check and readjust operating door hardware items in hollow metal work just prior to final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including doors or frames which are warped, bowed or otherwise damaged.

B. Remove grout and other bonding material from hollow-metal work immediately after installation.

C. Prime Coat Touchup: Immediately after erection, sand smooth all rusted or damaged areas of prime coat and apply touchup of compatible air drying primer.

D. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END 08 1100

1. GENERAL

1.1. WORK INCLUDES

A. Flush wood doors with hardwood face veneers.

B. Factory Finishing.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 3300 - Submittal Procedures
2. Section 06 1000 - Rough Carpentry
3. Section 06 4000 – Architectural Woodwork
4. Section 08 1100 - Metal Doors and Frames
5. Section 08 1613 - Fiberglass Doors and Frames
6. Section 08 7100 - Hardware
7. Section 08 8000 - Glazing
8. Section 09 9100 - Paints and Coatings

1.3. REFERENCES

A. Publication Dates: Comply with standards in effect as of the date of the Contract Documents unless otherwise indicated.

B. AWS - Architectural Woodwork Standards; Architectural Woodwork Institute (AWI).

C. NFPA 80 - Standard for Fire Doors and Windows; National Fire Protection Association.

D. NFPA 252 - Standard Methods of Fire Tests for Door Assemblies; National Fire Protection Association.

E. Underwriter's Laboratories, Inc.:

1. UL 10C - Positive Pressure Fire Tests of Door Assemblies.
2. UL 1784 - Air Leakage Tests for Door Assemblies.

F. WDMA I.S.1-A – Architectural Wood Flush Doors; Window & Door Manufacturers Association.

G. WDMA I.S.6-A – Architectural Wood Stile and Rail Doors; Window & Door Manufacturers Association.

1.4. SUBMITTALS

A. Submit in accordance with Section 01 3300:

1. Product Data: Submit door manufacturer's product data for each type of wood door, including details of core and edge construction, and trim for openings.
2. Shop Drawings: Submit shop drawings indicating the following:

a. Location and size of each door.

b. Elevation of each kind of door.
c. Details of construction.
d. Location and extent of hardware blocking.
e. Fire ratings.

3. Samples: Submit samples for the following:

a. Door construction: Include faces, edges, and core. Minimum size 6" x 6".
b. Factory finishes applied to actual door face materials, approximately 8 by 10 inches, for each specified material and finish.

1) For each wood species and transparent finish, provide set of three samples showing typical range of color and grain to be expected in the finished work.

1.5. QUALITY ASSURANCE

A. Quality standards: Provide doors complying with the following standards:

1. WDMA I.S.1-A “Architectural Wood Flush Doors” and WDMA I.S.6-A “Architectural Wood Stile and Rail Doors”, published by WDMA.
2. AWI quality standards: “Architectural Woodwork Standards (AWS)”, published by Architectural Woodwork Institute (AWI).

a. General: Comply with AWS Custom Grade for all construction, finishes, and other requirements except as otherwise noted.
b. In case of conflict between the indicated standards and other language in this Section or in the Drawings, notify the Architect in writing prior to performing Work. Wherever a higher standard is indicated, provide the higher standard.

1) Where the AWS standard indicates requirements that conflict with the WDMA standard, comply with AWS.

1.6. DELIVERY, STORAGE, AND HANDLING

A. Protect wood doors during transit, storage, and handling to prevent damage, soiling, and deterioration. Comply with manufacturer’s instructions.

1. Package doors at factory prior to shipping, using manufacturer's standard method.

B. Identify each door with individual opening numbers using temporary, removable, or concealed markings.

1. Correlate door identification with designation system used on shop drawings.

1.7. PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.8. WARRANTIES

A. Door manufacturer's warranty: Submit written agreement on door manufacturer's standard form signed by manufacturer, installer, and Contractor, agreeing to repair or replace defective doors which warp (bow, cup, or twist), which show telegraphing of core construction in face veneers, or which do not conform to tolerance limitations of specified quality standards. This warranty shall be in addition to, and not a limitation of, other rights the Owner may have against the Contractor under the contract documents.

1. Include reinstallation which may be required due to repair or replacement of defective doors where defect was not apparent prior to hanging.
2. Warranty shall be in effect during the following period of time after date of substantial completion: Life of original installation.

2. PRODUCTS

2.1. MANUFACTURER

A. Products of the following manufacturers, provided they comply with requirements of the contract documents, will be considered acceptable:

1. Lambton Doors.
2. Masonite Architectural.
3. Oshkosh Architectural Door Company.
4. VT Industries.
5. Substitutions: Under provisions of Section 01 6000.

2.2. FLUSH DOOR CONSTRUCTION

A. General: 1-3/4" thick; solid core construction; wood veneer faces, fire rated as indicated.

1. WDMA I.S.1-A Performance Grade:

a. Extra Heavy Duty unless otherwise indicated.

2. Solid, Non-Rated:

a. General: Core must be bonded to stiles and rails by water-resistant adhesive.
b. Core Material: Structural composite (engineered) lumber.

B. Veneer:

1. Grade: WDMA premium grade for transparent finish.
2. Construction: Five ply.
3. Species: birch - select white.
4. Cut for transparent finish: Plain sliced, book matched and center balanced.

a. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.

C. Adhesives: AWS, WDMA, Type I, exterior glue.

2.3. ACCESSORIES

A. Glazing stops and lite kits:

1. Non-fire-rated doors: Fabricate glazing stops of cold-rolled steel with countersunk screws.

2.4. FABRICATION

A. Fabricate non-rated doors in accordance with the requirements of AWS Quality Standards and WDMA I.S.1-A or WDMA I.S.6-A as applicable.

B. Exposed vertical edges shall be minimum 1/2" thick hardwood edge strips of wood species to match face veneer.

C. Openings: Cut, trim, and seal openings in doors at the factory.

D. Prefitting: Fabricate and trim doors to size at factory to conform to prefabricated frames as shown on approved frame shop drawings and to floor finishes as indicated in the finish schedule.

E. Premachining: Make all mortises and cutouts required for hardware at the factory to conform to approved hardware schedules, hardware templates, and door frame shop drawings.

2.5. FACTORY FINISHING

A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.

1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.
2. Fill open grained woods.

B. Finish doors at factory unless noted otherwise.

C. Transparent Finish:

1. Grade: AWS Custom.
2. Finish: AWS System 11, catalyzed polyurethane.
3. Staining: Match Onyx (ON18) by VT Industries.
4. Filled Finish for Open-Grain Woods: For open-grain woods, after staining (if any), apply wash-coat sealer. Then apply paste wood filler wipe off excess. Tint filler to match stained wood.
5. Sheen: Satin.

3. EXECUTION

3.1. EXAMINATION

A. Examine door frames after their installation and doors prior to their hanging.

1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with plumb jambs and level heads.
2. Reject doors that are not free of defects.

B. Prepare and submit written report which verifies that examination procedures have been performed and lists conditions not in compliance with requirements.

C. Do not proceed with installation until unsatisfactory conditions have been corrected. Commencement of installation indicates acceptance of conditions.

3.2. INSTALLATION

A. Condition doors to average prevailing humidity in installation area prior to hanging.

B. Hardware installation: Section 08 7100.

1. Pilot drill screw and bolt holes. Use threaded through bolts for half surface hinges.

C. Install wood doors in accordance with manufacturer's instructions and referenced standards.

D. 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 or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.

1. Clearances, Non-Fire-Rated Doors: Provide 1/8 inch at heads, jambs, and between pairs of doors.

a. Floor Clearance, Typical: Provide 3/4 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated.

E. Factory-Fitted Doors: Align in frames for uniform clearance at each edge. Fit to frames and machine for hardware to whatever extent not previously completed at factory and as required for fit and uniform clearance at each edge.

F. Coordinate installation of glass and glazing and applied moldings.

G. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3. CLEANING AND ADJUSTMENT

A. Operation: Rehang or replace doors which do not swing or operate freely, as directed by the Architect.

B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing to the acceptance of the Architect.

C. Institute protective measures as recommended and accepted by door manufacturer to ensure that wood doors will be without damage or deterioration at time of Substantial Completion.

END 08 1400

1. GENERAL

1.1. WORK INCLUDES

A. All-Fiberglass doors and frames, fire rated and non-fire rated.

B. Accessories as required for a complete installation.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 3300 - Submittal Procedures.
2. Section 03 3000 - Concrete.
3. Section 04 2000 - Unit Masonry.
4. Section 06 1000 - Rough Carpentry.
5. Section 08 1400 – Wood Doors.
6. Section 08 4113 – Aluminum Entrances and & Storefronts.
7. Section 08 7100 - Hardware.
8. Section 08 8000 - Glazing.

1.3. REFERENCES

A. AAMA 1304 - Voluntary Specification for Forced Entry Resistance of Side-Hinged Door Systems 2018.

B. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections 2009.

C. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design 2010.

D. ASTM D1308 - Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Coating Systems 2020.

E. ASTM D256 - Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics 2010 (Reapproved 2018).

F. ASTM D543 - Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents 2020.

G. ASTM D570 - Standard Test Method for Water Absorption of Plastics 1998 (Reapproved 2018).

H. ASTM D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position 2018.

I. ASTM D638 - Standard Test Method for Tensile Properties of Plastics 2014.

J. ASTM D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials 2017.

K. ASTM D2583 - Standard Test Method for Indentation Hardness of Rigid Plastics by Means of Barcol Impressor 2013a.

L. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2021a.

M. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen 2004 (Reapproved 2012).

N. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference 2014 (Reapproved 2021).

O. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference 2000 (Reapproved 2016).

P. ASTM E2112 - Standard Practice for Installation of Exterior Windows, Doors and Skylights 2019c.

Q. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames 2014.

R. NFPA 80 - Standard for Fire Doors and Other Opening Protectives 2019.

S. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames 2013.

1.4. ADMINISTRATIVE REQUIREMENTS

A. Coordination: Obtain hardware templates from hardware manufacturer prior to starting fabrication.

1. Include coordination for automatic door control and remote door monitoring/access control system.

1.5. SUBMITTALS

A. Submit in accordance with Section 01 3300.

1. Product Data: Provide manufacturer's standard details, installation instructions, hardware and anchor recommendations.
2. Shop Drawings: Indicate layout and profiles; include assembly methods.

a. Indicate product components, including hardware reinforcement locations and preparations, accessories, finish colors, patterns, and textures.
b. Indicate wall conditions, door and frame elevations, sections, materials, gauges, finishes, location of door hardware by dimension, and details of openings; use same reference numbers indicated on drawings to identify details and openings.

3. Selection Samples: Submit two complete sets of color chips, illustrating manufacturer's available finishes, colors, and textures.
4. Verification Samples: Submit door surface samples for each finish specified, 10 inches by 10 inches in size, illustrating finishes, colors, and textures.

B. Test Reports: Submit certified test reports from qualified independent testing agency indicating doors comply with specified performance requirements.

C. Manufacturer's Qualification Statement.

1.6. QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with not less than ten years ofdocumented experience.

1.7. COORDINATION

A. Coordinate hardware template with framing.

B. Coordinate with requirements for electrically operated doors and hardware.

C. Door and frame assemblies are to be provided by same manufacturer.

1.8. DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer’s original, unopened, undamaged containers with identification labels intact.

B. Deliver pre-assembled doors and frames with packaging as required to prevent damage.

C. Store materials in original packaging, under cover, protected from exposure to harmful weather conditions and from direct contact with water.

1. Store at temperature and humidity conditions recommended by manufacturer.
2. Do not use non-vented plastic or canvas shelters.
3. Immediately remove wet wrappers.

D. Store in position recommended by manufacturer, elevated minimum 4 inches above grade, with minimum 1/4 inch space between doors.

1.9. FIELD CONDITIONS

A. Field Measurements: Verify actual dimension of openings by field measurements before fabrication.

B. Do not install doors until structure is enclosed.

C. Maintain temperature and humidity at manufacturer's recommended levels during and after installation of doors.

2. PRODUCTS

2.1. MANUFACTURERS

A. All-Fiberglass Composite Doors and Frames:

1. Special-Lite, Inc; AF-217

B. Fire-Rated Fiberglass Doors and Frames:

1. Special-Lite, Inc; AF-217FR

2.2. DOOR ASSEMBLIES

A. Door Assemblies: Factory-fabricated, prepared and machined for hardware.

1. Surface Burning Characteristics: Flame spread index (FSI) of 0 to 25, Class A for interior face sheet, and smoke developed index (SDI) of 450 or less, when tested in accordance with ASTM E84.
2. Flammability: Self-extinguishing when tested in accordance with ASTM D635.
3. Sizes: As indicated on drawings.
4. Clearance Between Door and Frame: 1/8 inch, maximum.
5. Clearance Between Bottom of Door and Finished Floor: 3/4 inch, maximum; not less than 1/4 inch clearance to threshold.

2.3. COMPONENTS

A. Doors: Fiberglass construction with reinforced core.

1. Type: As indicated on drawings.
2. Thickness: 1-3/4 inch, nominal.
3. Core Material for non-fire rated doors: Urethane foam.
4. Core Material for fire rated doors (20, 45, 60 and 90min): WSCP-412 proprietary mineral core, 1-1/2" nominal thickness, 18 pcf minimum density.
5. Door Panel Configuration: As indicated on drawings.
6. Subframe and Reinforcements: Provide manufacturer's standard aluminum subframe with 3/8" diameter full-width tie rods through extruded splines top and bottom as standard shaped stiles and rails reinforced to accept hardware as specified..
7. Waterproof Integrity: Provide factory fabricated edges, cut-outs, and hardware preparations of fiberglass reinforced plastic (FRP); provide cut-outs with joints sealed independently of glazing, louver inserts, or trim.
8. Hardware Preparations: Factory reinforce, machine, and prepare for door hardware including field installed items; provide solid blocking for each item; field cutting, drilling or tapping is not permitted; obtain manufacturer's hardware templates for preparation as necessary.

B. All Fiberglass Frames: provide type in compliance with performance requirements specified for all doors.

1. Type: Welded
2. Profiles: As indicated on drawings.
3. Perimeter frame members.

a. ¼" thick pultruded fiberglass open throat with return.
b. Factory fabricated.

4. Integral door stops: 5/8" x 2-1/4"
5. Frame Member to Member Connections.

a. Corners mitered with 4" x 4" x 3/8" pultruded FRP angle reinforcement with interlocking pultruded FRP brackets.
b. Provide hairline butt joint appearance.

6. Reinforcements: ¼" thick pultruded FRP chemically welded to frame at all hinge, strike, and closer locations.
7. Hardware: Pre-machine and reinforce frame members for hardware in accordance with manufacturers standards and door hardware schedule.

C. All Fiberglass Fire Rated Frames Frames: Provide type in compliance with performance requirements specified for doors (45, 60 or 90 minute)

1. Type: Welded

a. Mitered with 4" x 4" x 3/8" pultruded FRP angle reinforcement with interlocking pultruded FRP bracket.

2. Framing: FR-Series Framing
3. Materials

a. ¼" thick, solid, pultruded, FRP profiles.
b. No corrosive components or reinforcements.

4. Solid tectonite filler

a. No steel or aluminum filler

5. Integral Door Stops: 5/8" x 2-1/4"

2.4. PERFORMANCE REQUIREMENTS

A. Provide door assemblies that have been designed and fabricated in compliance with specified performance requirements.

B. Forced Entry Resistance: Pass in accordance with AAMA 1304 test method, 300 pound load applied.

C. Water Leakage: No uncontrolled leakage on interior face when tested in accordance with ASTM E331 at differential pressure of 7.5 psf.

D. Air Leakage: Maximum of 0.1 cu ft/min/sq ft at 6.27 psf differential pressure, when tested in accordance with ASTM E283.

E. Structural Performance: Withstand positive and negative wind loads equal to 1.5 times design wind loads specified by local code without damage or permanent set, when tested in accordance with ASTM E330/E330M, using 10 second duration of maximum load.

F. Thermal Transmittance, Exterior Doors: AAMA 1503, U-value of 0.29, maximum, measured on exterior door in size required for this project.

G. Condensation Resistance, Exterior Doors: AAMA 1503, CRF of not less than 45.

H. Fiberglass Reinforced Plastic (FRP) Face Sheet Properties:

1. Izod Impact Resistance: ASTM D256, 15 ft lbf/inch of width, minimum, with notched izod.
2. Tensile Strength at Break: ASTM D638, 13,250 psi, minimum.
3. Water Absorption: ASTM D570, 0.16 percent, maximum, after 24 hours at 74 degrees F.
4. Flexural Strength: ASTM D790, 27,000 psi, minimum.

5. Barcol Hardness: ASTM D2583, minimum of 40 units.

I. Stain Resistance, ASTM D1308: Face sheet unaffected after exposure to red cabbage, tea, and tomato acid. Stain removed easily with mild abrasive or FRP cleaner when exposed to crayon and crankcase oil.

J. Chemical Resistance, ASTM D543. Excellent rating.

1. Acetic acid, Concentrated.
2. Ammonium Hydroxide, Concentrated.
3. Citric Acid, 10%.
4. Formaldehyde.
5. Hydrochloric Acid, 10%
6. Sodium hypochlorite, 4 to 6 percent solution.

2.5. FRP FINISHES

A. Abuse resistant engineered surface with protective coating and through-molded color.

1. Panel Texture: Pebble Grain.
2. Color: As selected by Architect from manufacturer's full line of colors.

2.6. HARDWARE

A. Door Hardware: See Section 08 7100.

2.7. ACCESSORIES

A. Stops for Glazing and Louver: Fiberglass, unless otherwise indicated or required by fire rating; provided by door manufacturer to fit factory made openings, with color and texture to match door; fasteners shall maintain waterproof integrity.

1. Exterior Doors: Provide non-removable stops on exterior side with continuous compression gasket weatherseal.
2. Glazed Openings: Provide removable stops on interior side.
3. Opening Sizes and Shapes: As indicated on drawings.

B. Glazing: See Section 08 8000.

3. EXECUTION

3.1. EXAMINATION

A. Verify actual dimensions of openings by field measurements before door fabrication.

B. Do not begin installation until substrates have been properly prepared.

C. Verify all require electrical and fire alarm work is completed and ready for installation of door frames.

D. Notify Architect of unsatisfactory preparation before proceeding.

E. Proceed only after unsatisfactory conditions have been corrected. Commencement of work in this section will be an indication of the acceptance of substrate conditions and the Contractor will be held responsible for the satisfactory execution and results of the finished work.

3.2. PREPARATION

A. Prepare surfaces using the methods recommended by the fiberglass door manufacturer for achieving the best result for the substrate under the project conditions.

B. Clean and prepare substrate in accordance with manufacturer's directions.

C. Protect adjacent work and finish surfaces from damage during installation.

3.3. INSTALLATION

A. Install in accordance with manufacturer's instructions and specified quality standard; do not penetrate frames with anchors.

B. Install fire-rated assemblies in accordance with NFPA 80.

C. Install exterior doors in accordance with ASTM E2112.

D. Install door hardware as specified in Section 08 7100. Coordinate with electrically operated hardware as required.

E. Set units plumb, level, and true-to-line, without warping or racking doors, and with specified clearances; anchor in place.

F. Set thresholds in continuous bed of sealant.

G. Separate surfaces from sources of corrosion of electrolytic action at points of contact with other materials with bituminous coatings or another means approved by Architect.

H. Repair or replace damaged installed products.

3.4. TOLERANCES

A. Clearances Between Door and Frame: Comply with related requirements of specified frame standards or custom guidelines indicated in accordance with SDI 117 or NAAMM HMMA 861

B. Maximum Diagonal Distortion: 1/16 in measured with straight edge, corner to corner.

3.5. ADJUSTING

A. Lubricate, test, and adjust doors to operate easily, free from warp, twist or distortion, and to fit watertight for entire perimeter.

B. Adjust hardware for smooth and quiet operation.

C. Adjust doors to fit snugly and close without sticking or binding.

3.6. CLEANING

A. Clean installed products in accordance with manufacturer’s instructions.

3.7. PROTECTION

A. Protect installed products from damage.

END 08 1613

1. GENERAL

1.1. WORK INCLUDES

A. Access doors and frames in wall and ceiling construction as indicated on Drawings.

B. Access doors and frames in wall and ceiling construction as required to access concealed equipment and controls.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 3300 - Submittal Procedures.
2. Section 01 7700 Closeout Procedures.
3. Section 04 2000 - Unit Masonry.
4. Section 06 1000 - Rough Carpentry.
5. Section 07 7200 – Roof Accessories: For roof hatches.
6. Section 09 2100 - Gypsum Board Assemblies.
7. Section 09 5100 – Acoustical Ceilings.
8. Section 09 9100 - Paints and Coatings.

1.3. REFERENCES

A. Publication Dates: Comply with standards in effect as of the date of the Contract Documents except for those having different revision dates as referenced in the codes indicated on the Drawings, or unless otherwise indicated.

B. American Society for Testing and Materials (ASTM):

1. ASTM A36 - Standard Specification for Structural Steel.
2. ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
3. ASTM A240 – Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
4. ASTM A480 - Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip.
5. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
6. ASTM A666 - Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
7. ASTM A879 – Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
8. ASTM A924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
9. 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.
10. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
11. ASTM F2329 – Specification for Zinc Coating, Hot-Dip, Requirements for Application to Carbon and Alloy Steel Bolts, Screws, Washers, Nuts, and Special Threaded Fasteners.

C. National Association of Architectural Metal Manufacturers (NAAMM):

1. NAAMM AMP 500 - Metal Finishes Manual for Architectural and Metal Products.

D. Underwriters Laboratories, Inc. (UL):

1. UL 10B – Fire Tests of Door Assemblies.
2. UL 263 - Fire Tests of Building Construction and Materials.

1.4. SUBMITTALS

A. Submit in accordance with Section 01 3300:

1. Product Data: Submit manufacturer's technical product data for each type of access door and frame assembly.

a. Include material descriptions, dimensions of individual components and profiles, and finishes.
b. Include fire rating information from testing agency where applicable.
c. Include manufacturer’s installation instructions.

2. Shop Drawings: Show fabrication and installation details of access doors and frames for each type of substrate. Include materials, accessories, locking, size, plans, elevations, sections, details, and attachments to other work.

B. Submit in accordance with Section 01 7700:

1. Keys: Submit keys with location identification tags to Owner.

1.5. COORDINATION

A. Inserts and Anchorages: Furnish inserts and anchoring devices which will be built into other work for the installation of access doors and frames. Coordinate delivery with other work to avoid delay.

B. Verification: Determine specific locations and sizes for access doors and frames needed to gain access to concealed equipment or concealed work.

2. PRODUCTS

2.1. MANUFACTURERS

A. Products of the following manufacturers, provided they comply with the requirements of the contract documents, are considered acceptable:

1. Acudor Products Inc.
2. Babcock-Davis.
3. Elmdor/Stoneman.
4. JL Industries.
5. Karp Associates, Inc.
6. Larsen’s Manufacturing Co.
7. Milcor, Inc.
8. Nystrom, Inc.
9. The Williams Brothers Corporation of America.

B. Source Limitations: Obtain access doors and frames for entire project from one source and by a single manufacturer.

C. Size variations: Obtain Architect's acceptance of manufacturer's standard-size units, if they vary slightly from sizes indicated.

2.2. ACCESS DOORS AND FRAMES - GENERAL

A. Furnish access door and frame assemblies manufactured as an integral unit, complete with all parts and ready for installation.

B. Inserts and Anchors: Furnish inserts and anchoring devices of the type required to secure access doors and frames to the types of supports indicated.

C. Fire-Resistance-Rating: Furnish access doors and frames with fire-rating equal to the wall or ceiling assembly into which the access door and frame is to be installed as indicated in Drawings and as required by Code.

D. Size: As indicated on Drawings; minimum size if not indicated – 18-inch x 24-inch.

1. Access door size may be reduced below the minimum size indicated above only if the item to be accessed through the access door is no further from the access door opening than the smallest dimension of the access door, but the access door shall be no smaller than 12-inch x 12-inch.

2.3. ACCESS DOORS AND FRAMES - NON-FIRE RATED TYPES

A. Flush Access Doors with Exposed Flanges:

1. Description: Face of door flush with frame, with exposed flange.
2. Locations: Wall and ceiling surfaces.
3. Material: Metallic-coated steel.

a. Door and Flange Thickness: Nominal 0.079-inch, 14-gauge.
b. Frame Thickness: Nominal 0.064-inch, 16-gauge.

4. Hinges: Flush continuous piano hinge.
5. Latch and Lock: Cam latch, key operated.

2.4. MATERIALS

A. Metallic-Coated Steel Sheet: ASTM A653, Commercial Steel (CS), Type B; with minimum A60 or G60 metallic coating; stretcher-leveled standard of flatness; with minimum thickness indicated representing specified thickness according to ASTM A924.

B. Frame Anchors: Same material as door face.

C. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A153 or ASTM F2329.

2.5. FABRICATION

A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.

B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

C. Doors and Frames: Fabricate units of continuous welded construction, unless otherwise indicated. Grind exposed welds smooth and flush with adjacent surfaces. Furnish mounting holes, attachment devices and fasteners of type required to secure access doors to types of supports indicated.

1. For concealed flanges with drywall bead, provide edge trim for gypsum panels securely attached to perimeter of frames.

D. Latch and Lock Hardware:

1. Quantity: Furnish number of latches and locks required to hold doors tightly closed.
2. Cylinder Locks: Provide manufacturer's standard cylinder lock for each access door.

a. Keys: Furnish two keys per lock and key all locks alike.
b. For recessed access doors, provide sleeves for each locking device. Furnish plastic grommets and install in holes cut through finish.

3. Latching Mechanisms: Furnish number required to hold access doors in flush, smooth plane when closed. If access door is fire rated, access door shall have automatic latching mechanism and automatic spring-type closer.

2.6. FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Slight variations in appearance of adjoining components are acceptable only if they are assembled or installed to minimize contrast.

D. Painted Finishes: Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

1. Factory Primed: Apply manufacturer's standard, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.
2. Finish paint shall be field-applied per Section 09 9100 – Paints and Coatings. Color shall match the surface in which the access door and frame is installed.

3. EXECUTION

3.1. EXAMINATION

A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Notify the Architect in writing of conditions detrimental to the proper and timely completion of the Work.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2. PREPARATION

A. Advise installers of other work about specific requirements relating to access doors and frames installation, including sizes of openings to receive access door and frame, as well as locations of supports, inserts, and anchoring devices. Furnish inserts and anchoring devices for access doors and frames that must be built into other construction. Coordinate delivery with other work to avoid delay.

3.3. INSTALLATION

A. Comply with manufacturer's written instructions for installing access doors and frames.

B. Coordinate installation with work of other trades.

C. Building-in of anchors and grouting of frames is included in Section 04 2000 – Unit Masonry.

D. Set frames accurately in position and securely attach to supports with face of doors and frames plumb or level in relation to adjacent finish surfaces.

3.4. ADJUSTING

A. Adjust hardware and doors, after installation, for proper operation.

B. Remove and replace access doors or frames that are warped, bowed, or otherwise damaged.

END 08 3100

1. GENERAL

1.1. WORK INCLUDES

A. Uninsulated steel sectional overhead doors.

B. Insulated steel sectional overhead doors.

C. Rough-ins and final connections to controls and operators, including conduit, junction boxes and wiring.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 3300 - Submittal Procedures
2. Section 08 1100 - Metal Doors and Frames
3. Section 08 7100 – Hardware
4. Section 08 8000 – Glazing
5. Division 26 - Electrical

1.3. REFERENCES

A. Publication Dates: Comply with standards in effect as of the date of the Contract Documents except for those having different revision dates as referenced in the codes indicated on the Drawings, or unless otherwise indicated.

B. American Architectural Manufacturer's Association (AAMA):

1. AAMA 611 – Specification for Anodized Architectural Aluminum.
2. AAMA 2603 – Specification, Performance Requirements, and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.

C. American Society for Testing and Materials (ASTM):

1. ASTM A36 – Standard Specification for Carbon Structural Steel.
2. ASTM A123 – Standard Specification for Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products.
3. ASTM A229 - Standard Specification for Steel Wire, Oil Tempered for Mechanical Springs.
4. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
5. ASTM A780 – Standard Practice for Repair of Damaged and Uncoated Areas of Hot Dip Galvanized Coatings.
6. ASTM A924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
7. ASTM B209 - Standard Specification for Aluminum and Aluminum Alloy Sheet and Plate.
8. ASTM B221 - Standard Specification for Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
9. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
10. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.

11. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

D. Door & Access Systems Manufacturers Association International (DASMA):

1. DASMA 102 – Specifications for Sectional Doors.
2. DASMA 105 – Test Method for Thermal Transmittance and Air Infiltration of Garage Doors.
3. DASMA 108 – Standard Method for Testing Sectional Garage Doors and Rolling Doors: Determination of Structural Performance Under Uniform Static Air Pressure Difference.

E. National Electrical Manufacturers Association (NEMA):

1. NEMA ICS 1 – Industrial Control and Systems: General Requirements.
2. NEMA ICS 2 - Industrial Control and Systems: Controllers, Contactors, and Overload Relays Rated 600 Volts.
3. NEMA ICS 6 - Industrial Control and Systems: Enclosures.

F. NFPA 70 – National Fire Protection Association (NFPA): National Electric Code.

1.4. SUBMITTALS

A. Submit in accordance with Section 01 3300:

1. Product Data: For each type and size of sectional overhead door and accessory, include the following:

a. Construction details, material descriptions, dimensions of individual components, profiles of panels, and finishes.
b. Rated capacities, operating characteristics, and furnished accessories.
c. Electrical rough-in diagrams and electrical requirements for motorized units.
d. Submit manufacturer's operating instructions and maintenance data.

2. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data. Include plans, elevations, sections, details, and attachments to other work.

a. Detail equipment assemblies, including operators, and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
b. Anchorage methods and spacing.
c. Wiring Diagrams: For power, signal, and control wiring.

3. Samples for Initial Selection: Manufacturer's finish charts showing full range of colors and textures available for units with factory-applied finishes.
4. Samples for Verification: For each finish product specified, provide three (3) samples, minimum size 6 inches square, representing actual product, color, and texture.
5. Certificates:

a. NFRC Label Certificate: For all exterior fenestration products, U-factors per NFRC 100, and Solar Heat Gain Coefficient (SHGC) and Visible Transmittance (VT) per NFRC 200, shall be determined by an accredited, independent laboratory, and labeled and certified by the manufacturer.

B. Submit in accordance with Section 01 7700:

1. Operations and Maintenance Data.

1.5. QUALITY ASSURANCE

A. Source Limitations: Obtain each door as a complete unit from a single source produced by a single manufacturer, including hardware, guides, tracks, accessories, operators, and installation components.

1. Obtain all sectional overhead door units from one manufacturer for the entire project.

B. Installer Qualifications: Installer shall be a manufacturer's authorized installer for the types of units specified.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. Standard for Sectional Doors: Fabricate sectional doors to comply with DASMA 102 unless otherwise indicated.

E. Regulatory Requirements: Products and finished installations to be used by handicapped persons must comply with requirements of the Americans with Disabilities Act (ADA).

1.6. WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of sectional doors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including, but not limited to, excessive deflection.
b. Faulty operation of hardware.
c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use; rust through.

2. Steel Door Warranty Period: One year from date of Substantial Completion.

a. Delamination of exterior or interior facing materials: 10 years from date of Substantial Completion.

B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Steel Door Warranty Period: 10 years from date of Substantial Completion.

2. PRODUCTS

2.1. GENERAL

A. For specific manufacturers and products refer to Sectional Overhead Door Schedule at the end of this Section.

2.2. PERFORMANCE CRITERIA

A. General Performance: Sectional doors shall meet performance requirements specified without failure due to defective manufacture, fabrication, installation, or other defects in construction and without requiring temporary installation of reinforcing components.

1. Door assemblies shall meet or exceed DASMA 102.

B. Structural Performance: Exterior sectional doors shall withstand the effects of gravity loads, and the following loads and stresses within limits and under conditions indicated according to ANSI/DASMA 108.

1. Wind Loads: As indicated on Drawings.
2. Deflection Limits: Design sectional doors to withstand design wind loads without evidencing permanent deformation or disengagement of door components. Deflection of door in horizontal (open) position shall not exceed 1/120 of the door width.

C. Air Infiltration: For exterior doors:

1. Air infiltration shall not exceed 0.40 cfm/sf per DASMA 105, NFRC 400, or ASTM E283 at 1.57 psf.

D. Operation Cycles: Provide sectional door components and operators capable of operating for not less than number of cycles indicated for each door. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.

2.3. DOOR SECTIONS – STEEL

A. General:

1. Sections shall be a nominal 2" thickness.
2. Profile: Exterior section faces shall have deep ribs and/or pencil grooves.

B. Exterior Section Faces and Frames: Fabricate from zinc-coated (galvanized), cold-rolled, commercial steel (CS) sheet, complying with ASTM A653, with indicated zinc coating and thickness.

1. Fabricate section faces from single sheets to provide sections not more than 24 inches high and of indicated thickness. Roll horizontal meeting edges to a continuous, interlocking, keyed, rabbeted, shiplap, or tongue-in-groove weathertight seal, with a reinforcing flange return.
2. For insulated doors, provide sections with continuous thermal-break construction, separating the exterior and interior faces of door.

C. Section Ends and Intermediate Stiles: Enclose open ends of sections with channel end stiles formed from galvanized-steel sheet not less than 0.064-inch-nominal coated thickness and welded to door section. Provide intermediate stiles formed from not less than 0.064-inch-thick galvanized-steel sheet, cut to door section profile, and welded in place. Space stiles not more than 48 inches apart.

D. Reinforce bottom section with a continuous channel or angle conforming to bottom-section profile and allowing installation of astragal.

E. Reinforce sections with continuous horizontal and diagonal reinforcement, as required to stiffen door and for wind loading. Provide galvanized-steel bars, struts, trusses, or strip steel, formed to depth and bolted or welded in place. Ensure that reinforcement does not obstruct vision lites.

F. Provide reinforcement for hardware attachment.

G. Foamed-in-Place Thermal Insulation: Insulate interior of steel sections with door manufacturer's standard CFC-free polyurethane insulation, foamed in place to completely fill interior of section and pressure bonded to face sheets to prevent delamination under wind load, and with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E84. Enclose insulation completely within steel sections that incorporate the following interior facing material, with no exposed insulation:

1. Interior Facing Material: Zinc-coated (galvanized), cold-rolled, commercial steel (CS) sheet, complying with ASTM A653, with indicated thickness.
2. R-Value: 14 minimum.

H. Fabricate sections so finished door assembly is rigid and aligned, with tight hairline joints and free of warp, twist, and deformation.

I. Glazing: Glazing units shall be insulated units when located in insulated doors.

1. Aluminum Full View Section: 1/8” thick DSB (double-strength) glass with aluminum stile and rail frame to fill entire door section; aluminum frame and stops are to be finished to match door faces.

2.4. TRACKS, SUPPORTS, AND ACCESSORIES

A. Tracks: Manufacturer's standard galvanized-steel track system of configuration indicated, sized for door size and weight, designed for lift type indicated and clearances shown on Drawings. Track system shall comply with ASTM A653 for minimum G40 (Z120) zinc coating. Provide complete track assembly including brackets, bracing, and reinforcement for rigid support of ball-bearing roller guides for required door type and size. Slot vertical sections of track spaced 2 inches apart if required for door-drop safety device. Slope tracks at proper angle from vertical or design tracks to ensure tight closure at jambs when door unit is closed.

1. Weld or bolt track to track supports.
2. Track system shall be 2-inch or 3-inch based upon manufacturer’s recommendations for providing a stiff, stable, and durable system.

B. Track Reinforcement and Supports: Galvanized-steel track reinforcement and support members, complying with ASTM A36 and ASTM A123. Secure, reinforce, and support tracks as required for door size and weight to provide strength and rigidity without sag, sway, and vibration during opening and closing of doors.

1. Vertical Track Assembly: Track with continuous reinforcing angle attached to track and attached to wall with jamb brackets.
2. Horizontal Track Assembly: Track with continuous reinforcing angle attached to track and supported at points from curve in track to end of track by laterally braced attachments to overhead structural members at maximum 4' on center.

C. Weatherseals: Replaceable, adjustable, continuous, compressible weather-stripping gaskets of flexible vinyl, rubber, or neoprene fitted to bottom and top of sectional door. Provide flexible full perimeter seal at header and jambs.

1. Provide weatherseals on all sectional doors unless otherwise indicated.

D. Exhaust ports: Provide exhaust port in indicated doors for connection of flexible exhaust fume hose. Ports shall have protective mechanism to prevent excessive air infiltration when not in service.

1. Port Size: 6-inch.

2.5. HARDWARE

A. General: Provide heavy-duty, corrosion-resistant hardware with corrosion-resistant fasteners, to suit door type.

B. Hinges: Heavy-duty, galvanized-steel hinges of not less than 0.079-inch (14 gage) nominal coated thickness at each end stile and at each intermediate stile, according to manufacturer's written recommendations for door size. Attach hinges to door sections through stiles and rails with bolts and lock nuts or lock washers and nuts. Use rivets or self-tapping fasteners where access to nuts is not possible. Provide double-end hinges where required and for doors over 16 feet wide unless otherwise recommended by door manufacturer.

C. Rollers: Heavy-duty rollers with steel ball-bearings in case-hardened steel races, mounted with varying projections to suit slope of track. Extend roller shaft through both hinges where double hinges are required. Provide 2-inch or 3-inch-diameter roller tires sized to fit track.

D. Push/Pull Handles: For push-up or emergency-operated doors, provide galvanized-steel lifting handles on each side of door in the quantity and location recommended by the door manufacturer.

2.6. LOCKING DEVICES

A. Safety Interlock Switch: Equip power-operated doors with safety interlock switch to disengage power supply when door is locked.

2.7. COUNTERBALANCING MECHANISMS

A. Torsion Spring: Counterbalance mechanism consisting of adjustable-tension torsion springs fabricated from steel-spring wire complying with ASTM A229, mounted on torsion shaft made of steel tube or solid steel. Provide springs designed for a minimum of 25,000 cycles of operation.

B. Cable Drums and Shaft for Doors: Cast-aluminum or gray-iron casting cable drums mounted on torsion shaft and grooved to receive door-lifting cables as door is raised. Mount counterbalance mechanism with manufacturer's standard ball-bearing brackets at each end of torsion shaft. Provide one additional midpoint bracket for shafts up to 16 feet long and two additional brackets at one-third points to support shafts more than 16 feet long unless closer spacing is recommended by door manufacturer.

C. Cables: Galvanized-steel lifting cables with cable safety factor of at least 5 to 1.

D. Cable Break Safety Device: Include safety device assembly on each side and designed to automatically stop door if either lifting cable breaks.

E. Bracket: Provide anchor support bracket as required to connect stationary end of spring to the wall and to level the shaft and prevent sag.

F. Provide a spring bumper at each horizontal track to cushion door at end of opening operation.

2.8. ELECTRIC DOOR OPERATORS

A. General: Electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and "operation cycles" requirement specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, remote-control stations, control devices, integral gearing for locking door, and accessories required for proper operation.

1. Comply with NFPA 70.
2. Provide control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6; with NFPA 70, Class 2 control circuit, maximum 24-V AC or DC.
3. Provide operators and control equipment rated for exterior, dusty, and wet, humid conditions where indicated.
4. Provide adequate structural support for electric door operators.

B. Usage Classification: Electric operator and components capable of operating for not less than number of cycles per hour indicated for each door.

C. Door-Operator Type: Unit consisting of electric motor, gears, pulleys, belts, sprockets, chains, and controls needed to operate door and meet required usage classification. Provide one of the following types for each electrically-operated door; manufacturer shall select type that is appropriate based on conditions for each door.

1. Jackshaft, Center Mounted: Jackshaft operator mounted on the inside front wall above door and connected to torsion shaft with an adjustable coupling or drive chain.
2. Jackshaft, Side Mounted: Jackshaft operator mounted on the inside front wall on right or left side of door and connected to torsion shaft with an adjustable coupling or drive chain.
3. Trolley: Trolley operator mounted to ceiling above and to rear of door in raised position and directly connected to door with drawbar.

D. Electric Motors: Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements based upon indicated usage and exposure.

1. Electrical Characteristics:

a. Phase: Three phase.
b. Volts: 460 V.
c. Hertz: 60.

2. Motor Type and Controller: Reversible motor and controller for motor exposure indicated.
3. Motor Size: Minimum size as indicated. If not indicated, large enough to start, accelerate, and operate door in either direction from any position, at a speed not less than 8 in./sec. and not more than 12 in./sec., without exceeding nameplate ratings or service factor.
4. Operating Controls, Controllers (Disconnect Switches), Wiring Devices, and Wiring: Manufacturer's standard unless otherwise indicated.

5. Coordinate wiring requirements and electrical characteristics of motors and other electrical devices with building electrical system and each location where installed.
6. Use adjustable motor-mounting bases for belt-driven operators.

E. Limit Switches: Equip each motorized door with adjustable switches interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.

F. Obstruction Detection Device: Equip motorized door with the following external automatic safety sensor capable of protecting full width of door opening. Activation of device immediately stops and reverses downward door travel.

1. Photoelectric Sensor: Manufacturer's standard system designed to detect an obstruction in door opening without contact between door and obstruction.

a. Self-Monitoring Type: Designed to interface with door operator control circuit to detect damage to or disconnection of sensor device. When self-monitoring feature is activated, door closes only with sustained pressure on close button.

G. Emergency Operation Device: Provide one of the following based upon operator type.

1. Emergency Manual Operation: Equip each electrically powered door with capability for emergency manual operation. Design manual mechanism so required force for door operation does not exceed 35 lbf.
2. Emergency Operation Disconnect Device: Equip operator with hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount mechanism so it is accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.

H. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.

I. Remote-Control Station: Momentary-contact or sustained-contact as indicated in schedule. Three-button control station with push-button controls labeled "Open," "Close," and "Stop."

1. Interior units: Full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.
2. Exterior units: Full-guarded, standard-duty, surface-mounted, weatherproof type, NEMA ICS 6, Type 4 enclosure, key operated.

2.9. GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.10. STEEL FINISHES

A. Factory Prime Finish: Manufacturer's standard primer, compatible with field-applied finish. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.

B. Baked-Enamel or Powder-Coat Finish: Manufacturer's standard baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.

3. EXECUTION

3.1. INSPECTION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.

B. Notify the Architect in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.2. PREPARATION

A. Coordinate necessary framing and blocking.

B. Coordinate installation of electrical service.

3.3. INSTALLATION

A. General: Install door, track, and operating equipment complete with necessary hardware, anchors, inserts, hangers and equipment supports in accordance with approved shop drawings, manufacturer's instructions, and as specified herein.

B. Tracks:

1. Fasten vertical track assembly to opening jambs and framing, spaced not more than 24 inches apart.
2. Hang horizontal or incline track from structural overhead framing with angle or channel hangers, attached to framing by welding or bolting, or both. Provide sway bracing, diagonal bracing, and reinforcement as required for a rigid installation of the track and door operating equipment.

C. Accessibility: Install sectional doors, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.

3.4. STARTUP SERVICES

A. Engage a factory-authorized service representative to perform startup service.
1. Complete installation and startup checks according to manufacturer's written instructions.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.5. ADJUSTING

A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.

B. Lubricate bearings and sliding parts as recommended by manufacturer.

C. Adjust doors and seals to provide weathertight fit around entire perimeter.

D. Align and adjust motors, pulleys, belts, sprockets, chains, and controls according to manufacturer's written instructions.

E. Touch-up Painting: Immediately after welding galvanized materials, clean welds and abraded galvanized surfaces and repair galvanizing to comply with ASTM A780.

3.6. DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain sectional doors.

4. SECTIONAL OVERHEAD DOOR SCHEDULE

4.1. SECTIONAL OVERHEAD DOOR – OHD-1, STEEL, NON-INSULATED

A. Acceptable Manufacturers and Products: The following manufacturers and products, provided they comply with requirements of the Contract Documents, are considered acceptable.

1. C.H.I. Overhead Doors / 3240/3220 Series
2. Overhead Door Corporation / 420 Series
3. Raynor Door / SteelForm Series
4. Wayne-Dalton / 220 Series

B. General: Steel sectional overhead door, uninsulated.

C. Exterior Face: 20 gage, 0.040 inch.

D. Track Configuration: Standard-lift.

E. Windows: None.

F. Electric Door Operator:

1. Usage Classification: Up to 10 cycles per hour.
2. Operator Type: Jackshaft or Trolley.
3. Motor Exposure: Exterior, dusty, wet, or humid.
4. Emergency Manual Operation: Push-up type.
5. Remote-Control Stations: Interior.

a. Control Type: Momentary-contact.

G. Door Finish:

1. Baked-Enamel or Powder-Coated Finish: Color and gloss as selected by Architect from manufacturer's full range.

a. Finish of Interior Facing Material: Finish as selected by Architect from manufacturer's full range.

H. Door Texture: Texture as selected by Architect from manufacturer's full range of standard textures.

4.2. SECTIONAL OVERHEAD DOOR – OHD-2, STEEL, INSULATED

A. Acceptable Manufacturers and Products: The following manufacturers and products, provided they comply with requirements of the Contract Documents, are considered acceptable.

1. C.H.I. Overhead Doors / 3216 Series
2. Overhead Door Corporation / Thermacore 590 Series
3. Raynor Door / TC Series
4. Wayne-Dalton / Thermospan 200 Series

B. General: Steel sectional overhead door, insulated.

C. Exterior Face: 28 gage, 0.015 inch, minimum.

D. Track Configuration: High-lift.

1. Equip with cable break safety device.

E. Windows: Aluminum Full View Section.

1. Location and Quantity: As indicated on Drawings.

F. Exhaust Ports: Equip door with one exhaust port.

G. Electric Door Operator:

1. Usage Classification: Up to 10 cycles per hour.
2. Operator Type: Jackshaft or Trolley.
3. Motor Exposure: Interior, clean, and dry.
4. Emergency Manual Operation: Chain type.
5. Remote-Control Stations: Where shown on Drawings.

a. Control Type: Momentary-contact.

H. Door Finish:

1. Factory Prime Finish: Manufacturer's standard color.
2. Baked-Enamel or Powder-Coated Finish: Color and gloss as selected by Architect from manufacturer's full range.

a. Finish of Interior Facing Material: Finish as selected by Architect from manufacturer's full range.

I. Door Texture: Texture as selected by Architect from manufacturer's full range of standard textures.

END 08 3613

1. GENERAL

1.1. WORK INCLUDES

A. Exterior and interior entrance systems.

B. Exterior and interior storefront systems.

1.2. RELATED WORK

A. Specified elsewhere:

1. Section 01 3300 – Submittal Procedures
2. Section 01 4000 – Quality Requirements: Testing responsibility.
3. Section 07 9200 – Joint Sealants: for joint sealants installed as part of aluminum entrance and storefront systems.
4. Section 08 1613 - Fiberglass Doors and Frames
5. Section 08 7100 – Hardware
6. Section 08 8000 – Glazing

1.3. REFERENCES

A. Publication Dates: Comply with standards in effect as of the date of the Contract Documents except for those having different revision dates as referenced in the codes indicated on the Drawings, or unless otherwise indicated.

B. Aluminum Association (AA): DAF-45, Designation System for Aluminum Finishes.

C. American Architectural Manufacturers Association (AAMA):

1. AAMA/WDMA/CSA 101/I.S.2/A440 (NAFS) - North American Fenestration Standard/Specification for Windows, Doors, and Skylights.
2. AAMA 501.1 - Test Method for Water Penetration of Windows, Curtain Walls, and Doors Using Dynamic Pressure.
3. AAMA 501.2 - Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems.
4. AAMA 501.5 - Methods of Tests for Exterior Walls.
5. AAMA 608.1 - Specification and Inspection Methods for Electrolytically Deposited Color Anodic Finishes for Architectural Aluminum.
6. AAMA 611 - Specification for Anodized Architectural Aluminum.
7. AAMA 701 - Specification for Pile Weatherstripping.
8. AAMA 800 - Specification and Test Methods for Sealants.
9. AAMA 1503.1 - Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections.
10. AAMA 2605 - Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.

D. American Society for Testing and Materials (ASTM):

1. ASTM A36 - Structural Steel.
2. ASTM A123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
3. ASTM A153 - Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

4. ASTM A1008 - Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy.
5. ASTM A1011 - Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy.
6. ASTM B209 - Aluminum and Aluminum-Alloy Sheet and Plate.
7. ASTM B221 - Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes.
8. ASTM B308 - Aluminum-Alloy 6061-T6 Standard Structural Shapes, Rolled or Extruded.
9. ASTM B429 - Aluminum-Alloy Extruded Structural Pipe and Tube.
10. ASTM C920 - Elastomeric Joint Sealants.
11. ASTM D2000 - Classification System for Rubber Products in Automotive Applications.
12. ASTM D2244 - Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.
13. ASTM D2287 - Standard Specification for Nonrigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Components.
14. ASTM D4214 – Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films.
15. ASTM E283 - Rate of Air Leakage through Exterior Windows, Curtain Walls, and Doors.
16. ASTM E330 - Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
17. ASTM E331 - Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
18. ASTM E699 - Practice for Evaluation of Agencies Involved in Testing, Quality Assurance, and Evaluating Building Components
19. ASTM E1105 - Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors and Curtain Walls by Uniform or Cyclic Static Air Pressure Difference.

E. National Association of Architectural Metal Manufacturers (NAAMM): Metal Finishes Manual for Architectural and Metal Products.

F. National Fenestration Rating Council (NFRC):

1. NFRC 100 - Procedure for Determining Fenestration Product U-Factors.
2. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence.
3. NFRC 400 – Procedure for Determining Fenestration Product Air Leakage.
4. NFRC 500 - Procedure for Determining Fenestration Product Condensation Resistance Values.

G. Structural Engineering Institute/American Society of Civil Engineers:

1. SEI/ASCE 7: Minimum Design Loads for Buildings and Other Structures.

1.4. SUBMITTALS

A. Submit in accordance with Section 01 3300:

1. Product Data: Include details of construction relative to materials, dimensions of individual components, profiles, and finishes.
2. Performance Data:

a. Certification by independent testing laboratory that products comply with performance requirements listed herein.

b. Energy Performance Data: The following values shall be individually calculated for each exterior opening, demonstrating compliance with the required values indicated in this Section:

1) System Thermal Transmittance (U-factor).
2) Solar Heat Gain Coefficient.

c. NFRC Label Certificate: For all exterior fenestration products, U-factors per NFRC 100, and Solar Heat Gain Coefficient (SHGC) and Visible Transmittance (VT) per NFRC 200, shall be determined by an accredited, independent laboratory, and labeled and certified by the manufacturer.

3. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components, attachments to other work, and provisions for drainage of moisture in the system to the exterior and for expansion and contraction.

a. For entrance systems, include hardware schedule and indicate operating hardware types, quantities, and locations.

4. Delegated-Design Submittal: Include analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

a. Detail fabrication and assembly of aluminum-framed systems.
b. Include design calculations.
c. Engineer shall review and seal the shop drawings.

5. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for units with factory-applied color finishes.
6. Samples for Verification: For each type of exposed finish required, provide a minimum of two (2) 4" square pieces. Where finishes involve normal color and texture variations, include Sample sets showing the full range of variations expected.
7. Warranty Certificates: Submit copies of written warranty signed by the manufacturer and Contractor.

1.5. QUALITY ASSURANCE

A. Installer Qualifications: Certified in writing by system manufacturer as qualified for specified systems. Installer must have a minimum of ten years of experience with this type of construction indicating successful completion of contracts for projects of similar size and scope. Documentation of experience and qualifications shall be made available upon request.

B. Source Limitations: Obtain each type of entrance and storefront system through one source from a single manufacturer.

C. Engineering Responsibility: Prepare data for entrance and storefront systems, including shop drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this project.

1.6. DELIVERY, STORAGE, AND HANDLING

A. Make arrangements with General Contractor for storage of materials and equipment to be installed in project. Protection and security for stored materials and equipment, on and offsite is solely contractor's responsibility.

1.7. PROJECT CONDITIONS

A. Field Measurements: Verify dimensions by field measurements before fabrication and indicate measurements on shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.8. WARRANTY

A. Special Assembly Warranty: Standard form in which Manufacturer and Installer agree to repair or replace components of glazed aluminum entrances and storefront that do not comply with requirements or that fail in materials or workmanship within specified warranty period.

1. Failure of materials or workmanship shall include, but are not limited to, excessive leakage or air infiltration, excessive deflections, faulty deterioration of finish or metal in excess of normal weathering, and defects in weatherstripping and other components of the work.
2. Warranty Period: Five years from date of Substantial Completion.

2. PRODUCTS

2.1. MANUFACTURERS / PRODUCTS

A. Basis-of-Design: Kawneer, Trifab VersaGlaze 451/451T.

B. Acceptable Manufacturers: The following manufacturers, provided they comply with requirements of the Contract Documents and their product is comparable to that specified in this Section as determined by the Architect, are considered acceptable:

1. EFCO
2. Oldcastle
3. Substitutions: Under provisions of Section 01 6000.

2.2. SYSTEM DESCRIPTION

A. Design requirements: 4-1/2" overall depth framing. Sightline dimensions to be 2". Glass shall be retained mechanically on all sides by continuous gaskets inserted into framing members.

1. System to be center-glazed as indicated on Drawings.
2. Exterior Storefront Framing requirements:

a. Shall have thermally broken construction.
b. System Modifications: System design may be modified slightly to meet Performance Requirements provided in this Section if such modifications are deemed necessary by the manufacturer and approved by the Architect. Proposed modifications shall be submitted with the following supporting information; if all of the listed information is not provided, the modifications will not be considered valid:

1) Statement of the reasons for the proposed modifications.
2) Identification of the specific differences.
3) Clear and adequate supporting information for the modifications.
4) A specific request for approval of the Architect.

2.3. PERFORMANCE REQUIREMENTS

A. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed systems representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.

1. Aluminum-framed systems shall withstand movements of supporting structure indicated on Drawings including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
2. Dimensional tolerances of building frame and other adjacent construction.
3. Failure also includes the following:

a. Thermal stresses transferring to building structure.
b. Glass breakage.
c. Noise or vibration created by wind and thermal and structural movements.
d. Loosening or weakening of fasteners, attachments, and other components.
e. Failure of operating units.

B. Design Wind Loads: As indicated on Drawings.

C. Structural-Test Performance: Test according to ASTM E330 as follows:

1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
3. Test Durations: As required by design wind velocity, but not less than 10 seconds.

D. Deflection of Framing Members: At design wind pressure, as follows:

1. Deflection Normal to Wall Plane: Limited to one of the following, whichever is less:

a. Edge of glass in a direction perpendicular to glass plane not exceeding L/175 of the glass edge length for each individual glazing lite.
b. 1/175 of clear span for spans up to 13 feet 6 inches and to 1/240 of clear span plus 1/4 inch for spans greater than 13 feet 6 inches.
c. An amount that restricts edge deflection of individual glazing lites to 3/4 inch.

2. Deflection Parallel to Glazing Plane: Limited to L/360 of clear span or 1/8 inch, whichever is smaller.

a. Operable Units: Provide a minimum 1/16-inch clearance between framing members and operable units.

E. Water Penetration under Static Pressure: No evidence of water penetration through fixed glazing and framing areas when tested according to ASTM E331 at a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 12 lbf/sq. ft.

F. Thermal Movements: Allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures:

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

G. Energy Performance: Aluminum-framed systems shall have certified and labeled energy performance ratings in accordance with NFRC.

1. System Thermal Transmittance (U-factor): System value including framing specified in this Section and glazing specified in Section 08 8000. The system design must comply for each exterior opening specified by this Section:

a. Fixed Glazing/Framing Areas: 0.38 Btu/sq. ft. x h x deg F maximum when tested in accordance with NFRC 100.
b. Glazed Swinging Entrances: 0.77 Btu/sq. ft. x h x deg F as maximum per NFRC 100.

2. Solar Heat Gain Coefficient: Fixed glazing and framing areas shall have a solar heat gain coefficient of no greater than 0.40 when tested in accordance with NFRC 200.
3. Air Infiltration:

a. Fixed Glazing/Framing Areas: 0.06 cfm/sq. ft. maximum when tested in accordance with NFRC 400 or ASTM E283 at 1.57 psf.
b. Glazed Swinging Entrances: 1.00 cfm/sq. ft. maximum when tested in accordance with NFRC 400 or ASTM E283 at 1.57 psf.

4. Condensation Resistance: Fixed glazing and framing areas shall have an NFRC- certified condensation resistance rating of no less than 60 when tested in accordance with NFRC 500.

2.4. MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated, complying with the requirements of standards indicated below.

1. Sheet and Plate: ASTM B209.
2. Extruded Bars, Rods, Shapes, and Tubes: ASTM B221.
3. Extruded Structural Pipe and Tubes: ASTM B429.
4. Structural Profiles: ASTM B308.

B. Steel Reinforcement: Manufacturer shall select shapes and sizes to suit project.

1. Structural Shapes, Plates, and Bars: ASTM A36.
2. Cold-Rolled Sheet and Strip: ASTM A1008.
3. Hot-Rolled Sheet and Strip: ASTM A1011.

C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding fasteners and accessories compatible with adjacent materials.

1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
2. Reinforce members as required to receive fastener threads.
3. Exposed fasteners: Use of exposed fasteners should be avoided. Where necessary, fasteners shall be countersunk Phillips screw heads finished to match framing system.

D. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A123 or ASTM A153 requirements.

E. Shims: Structural plastic.

F. Concealed Flashing: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding flashing compatible with adjacent materials.

G. Brake Metal Panels: Sheet aluminum, 0.063” minimum thickness unless indicated otherwise on Drawings.

1. Brake metal panels shall be installed with a backbend and held in place with spring clips or as shown on Drawings. Double-stick tape will not be an acceptable means of installation.

H. Sealants: Use only non-hardening, non-shrinking, and non-migrating materials.

1. For nonworking, metal-to-metal joints: Small joint sealant conforming to AAMA 800.
2. For joints between other components: Suitable for application.
3. For joints between curtain wall and other building components: Provide products specified in Section 07 9200.
4. For glazing: Provide products specified in Section 08 8000.

I. Dissimilar Metal Coating: Cold-applied asphalt mastic, zinc chromate paint, or other nonconductive, non-absorptive coating.

2.5. GLASS AND GLAZING ACCESSORIES

A. Refer to Section 08 8000 - Glazing.

2.6. ENTRANCE DOOR SYSTEMS

A. Provide manufacturer's standard 2” to 2 1/4” thick thermally broken glazed doors with minimum 0.125” thick, extruded tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deep penetration and fillet welded or that incorporate concealed tie-rods.

1. Glazing Stops and Gaskets: Provide manufacturer's standard snap-on extruded-aluminum glazing stops and preformed gaskets.
2. Thermal Construction: High-performance plastic connectors separate aluminum members exposed to the exterior from members exposed to the interior.
3. Stile Design: Wide stile; 5" nominal width. Provide 10” bottom rail.

2.7. HARDWARE

A. Finish exposed parts to match door finish, unless otherwise indicated. Coordinate all other hardware as specified in Section 08 7100 – Hardware.

2.8. FABRICATION

A. Take accurate field measurements to verify required dimensions prior to fabrication.

B. Form or extrude aluminum shapes before finishing.

C. Fabricate components in accord with approved shop drawings.

D. Fabricate components that, when assembled, have the following characteristics:

1. Profiles which are sharp, straight, and free of defects or deformations.

2. Accurately fitted joints with ends coped or mitered. Remove burrs and ease edges.
3. Internal guttering system or other means to drain water passing joints, condensation occurring 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.

    a. Expansion mullions, where provided, shall not be spaced less than 20 feet on center unless required by the manufacturer.

6. Thermally-broken Construction: Fabricate frame members with integral, concealed, low-conductance materials that separates exterior surfaces from interior member, without any metal-to-metal contact.
7. Provisions for field replacement of glazing from exterior.
8. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

E. Fabricate components that, when assembled, will have accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

F. Provide internal structural reinforcing within framing members where required to maintain rigidity and accommodate design loads.

G. Separate dissimilar metals with protective coating or preformed separators to prevent contact and corrosion.

H. Storefront: Fabricate framing in profiles indicated for flush glazing without projecting stops. Provide subframes and reinforcing of types indicated or, if not indicated, as required for a complete system. Factory assemble components to greatest extent possible to minimize field cutting, splicing, and assembly. Disassemble components only as necessary for shipment and installation.

I. Entrances: Fabricate door framing in profiles indicated. Reinforce doors and framing for door hardware installation and as required to support loads imposed by door operation. Factory assemble door and frame units to greatest extent possible. Cut, drill, and tap for factory-installed hardware before finishing components.

1. Exterior Doors: Provide compression weather stripping at fixed stops. At other locations, provide sliding weather stripping retained in adjustable strip mortised into door edge.
2. Interior Doors: Provide ANSI/BHMA A156.16 silencers at stops to prevent metal to metal contact. Provide 3 silencers on strike jamb of single-door frames and 2 silencers on head of double-door frames.
3. Hardware: Install all hardware, except surface-mounted hardware, at the fabrication plant. Remove only as required for final finishing operations, and for delivery and installation of the work at the project site.

2.9. ALUMINUM FINISHES

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes.

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 the 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.

1. Appearance shall be defined as color, sheen, and texture.

C. Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.

D. Class I, Color Anodic Finish: AA-M12C22A42/A44 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 611.

1. Color: Dark bronze

3. EXECUTION

3.1. EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of entrance and storefront systems. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2. INSTALLATION

A. General:

1. Install in accordance with approved shop drawings, Construction Documents, and manufacturer’s instructions and recommendations.
2. Comply with manufacturer's written instructions for protecting, handling, and installing entrance and storefront systems.
3. Do not install damaged components.
4. Fit frame joints to produce hairline joints free of burrs and distortion.
5. Rigidly secure non-movement joints.
6. Seal joints watertight.
7. Install components plumb and true in alignment without warp or rack of framing members.
8. Shims shall not intrude into depth required for sealant and backer rod specified.

B. Metal Protection:

1. Where aluminum will contact pressure treated wood blocking, protect against galvanic action by applying self-adhesive ice and water barrier membrane as a separation.
2. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.
3. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Install components to drain condensation occurring in glazing channels, condensation occurring within framing members, and moisture migrating within the system to the exterior.

D. Entrance Doors: Install doors to produce smooth operations and tight fit at contact points. Install exterior doors to produce weathertight enclosure.

E. Entrance Door Hardware:

1. Lubricate operating hardware and other moving parts according to hardware manufacturers' written instructions.
2. Install surface-mounted hardware according to manufacturer's written instructions using concealed fasteners to greatest extent possible.

F. Install glazing according to shop drawings. Comply with requirements of Section 08 8000 - Glazing, unless otherwise indicated.

G. Install sealant and backer rod according to shop drawings. Comply with requirements of Section 07 9200 - Joint Sealers, unless otherwise indicated.

3.3. TOLERANCES

A. Erection Tolerances: Install entrance and storefront systems to comply with the following maximum tolerances:

1. Plumb: 1/8" in 10'; 1/4" in 40'.
2. Level: 1/8" in 20'; 1/4" in 40'.
3. Alignment:

a. Where surfaces abut in line, limit offset from true alignment to 1/16".
b. Where surfaces meet at corners, limit offset from true alignment to 1/32".

4. Diagonal Measurements: Limit difference between diagonal measurements to 1/8".

B. System will be considered defective if the work does not meet these tolerances.

3.4. CLEANING AND PROTECTION

A. Clean aluminum surfaces promptly after installation, exercising care to avoid damage of the protective coating. Remove excess sealant and glazing compounds, dirt, and other substances.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, which ensure entrance and storefront systems are without damage or deterioration at the time of Substantial Completion.

END 08 4113

1. GENERAL

1.1. WORK INCLUDES

A. Aluminum, interior sliding service windows.

1.2. RELATED WORK

A. Specified elsewhere:

1. Section 01 3300 – Submittal Procedures
2. Section 08 1100 – Wood Doors.
3. Section 08 4113 – Aluminum Entrances and Storefronts.
4. Section 08 7100 - Hardware
5. Section 08 8000 - Glazing

1.3. SUBMITTALS

A. Submit in accordance with Section 01 3300:

1. Product Data: Submit Manufacturer's technical product data substantiating that products comply.
2. Shop drawings: Submit for fabrication and installation of windows. Include details, elevations and installation requirement of finish hardware and cleaning.
3. Certification: Provide printed data in sufficient detail to indicate compliance with the contract documents.

1.4. DELIVERY, STORAGE, AND HANDLING

A. Deliver windows crated to provide protection during transit and job storage

B. Inspect windows upon delivery for damage. Unless minor defects can be made to meet the Architect's specifications and satisfaction, damaged parts should be removed and replaced.

C. Store windows at building site under cover in dry location.

1.5. PROJECT CONDITIONS

A. Field measurements: Check opening by accurate field measurement before fabrication. Show recorded measurements on shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of work.

1.6. WARRANTY

A. All material and workmanship shall be warranted against defects for a period of one (1) year from the original date of purchase.

2. PRODUCTS

2.1. ACCEPTABLE MANUFACTURERS

A. Basis of design: C.R. Laurence Co., Inc.

B. Substitutions: Under provisions of Section 01 6000.

2.2. MATERIALS

A. Frames: Aluminum frame modules shall be constructed of 6063-T5 extruded aluminum. Window rolls on top-hung ball bearing rollers. Catch locks included with all interior windows. Overall frame sizes are to be in accordance with the contract drawings.

B. Finish: All aluminum to be duranodic bronze.

C. Glazing vinyl: 1/4" glazing thickness.

D. Options: Keyed lock, Overhead track.

E. Models: Daisy (XX), and, Arlene (XOX). X = sliding panel, O = fixed panel, as viewed from clerks side.

3.EXECUTION

3.1. INSTALLATION

A. Install window in accordance with manufacturer's printed instructions and recommendations. Repair damaged units as directed (if approved by the manufacturer and the architect) or replace with new units.

3.2. CLEANING

A. Clean frame and glazing surfaces after installation, complying with requirements contained in the manufacturer's instructions. Remove excess glazing sealant compounds, dirt or other substances.

3.3. PROTECTION

A. Institute protective measures required throughout the remainder of the construction period to ensure that all the windows do not incur any damage or deterioration, other than normal weathering, at the time of acceptance.

END 08 5800

1. GENERAL

1.1. WORK INCLUDES

A. Mechanical and electrified door hardware

B. Section excludes:

1. Windows
2. Cabinets (casework), including locks in cabinets
3. Signage
4. Toilet accessories
5. Overhead doors

1.2. RELATED SECTIONS:

1. Division 01 Section “Alternates” for alternates affecting this section.
2. Division 06 Section “Rough Carpentry”
3. Division 06 Section "Finish Carpentry”
4. Division 07 Section “Joint Sealants” for sealant requirements applicable to threshold installation specified in this section.
5. Division 08 Sections for Doors and Frames.
6. Division 26 Sections for Electrical
7. Division 28 Section for Access Control Systems

1.3. REFERENCES

A. UL - Underwriters Laboratories

1. UL 10B - Fire Test of Door Assemblies
2. UL 10C - Positive Pressure Test of Fire Door Assemblies
3. UL 1784 - Air Leakage Tests of Door Assemblies
4. UL 305 - Panic Hardware

B. DHI - Door and Hardware Institute

1. Sequence and Format for the Hardware Schedule
2. Recommended Locations for Builders Hardware
3. Keying Systems and Nomenclature
4. Installation Guide for Doors and Hardware

C. NFPA – National Fire Protection Association

1. NFPA 70 – National Electric Code
2. NFPA 80 – 2016 Edition – Standard for Fire Doors and Other Opening Protectives
3. NFPA 101 – Life Safety Code
4. NFPA 105 – Smoke and Draft Control Door Assemblies
5. NFPA 252 – Fire Tests of Door Assemblies

D. ANSI - American National Standards Institute

1. ANSI A117.1 – 2017 Edition – Accessible and Usable Buildings and Facilities

2. ANSI/BHMA A156.1 - A156.29, and ANSI/BHMA A156.31 - Standards for Hardware and Specialties
3. ANSI/BHMA A156.28 - Recommended Practices for Keying Systems
4. ANSI/WDMA I.S. 1A - Interior Architectural Wood Flush Doors
5. ANSI/SDI A250.8 - Standard Steel Doors and Frames.
6. ANSI/DHI A115.IG – Installation Guide for Doors and Hardware

E. ICC – International Code Council, Inc

1. ICC/ANSI A117.1 – Accessible and Usable Buildings and Facilities.
2. ICC IBC – International Building Code

F. NFPA – National Fire Protection Agency

1. NFPA 101 - Life Safety Code
2. NFPA 80 - Fire Doors and Windows

G. Builders Hardware Manufacturing Association (BHMA)

H. Americans with Disabilities Act Accessibility Guidelines (ADAAG)

1.4. SUBMITTALS

A. General:

1. Submit in accordance with Conditions of Contract and Division 01 Submittal Procedures.
2. Prior to forwarding submittal:

a. Comply with procedures for verifying existing door and frame compatibility for new hardware, as specified in PART 3, "EXAMINATION" article, herein.
b. Review drawings and Sections from related trades to verify compatibility with specified hardware.
c. Highlight, encircle, or otherwise specifically identify on submittals: deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.

B. Action Submittals:

1. Product Data: Submit technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
2. Samples for Verification: If requested by Architect, submit production sample of requested door hardware unit in finish indicated and tagged with full description for coordination with schedule.

a. Samples will be returned to supplier. Units that are acceptable to Architect may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.

3. Door Hardware Schedule:

a. Submit concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate fabrication of other work critical in Project construction schedule.

b. Submit under direct supervision of a Door Hardware Institute (DHI) certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule published by DHI.
c. Indicate complete designations of each item required for each opening, include:

1) Door Index: door number, heading number, and Architect's hardware set number.
2) Quantity, type, style, function, size, and finish of each hardware item.
3) Name and manufacturer of each item.
4) Fastenings and other pertinent information.
5) Location of each hardware set cross-referenced to indications on Drawings.
6) Explanation of all abbreviations, symbols, and codes contained in schedule.
7) Mounting locations for hardware.
8) Door and frame sizes and materials.
9) Degree of door swing and handing.
10) Operational Description of openings with electrified hardware covering egress, ingress (access), and fire/smoke alarm connections.

4. Key Schedule:

a. After Keying Conference, provide keying schedule that includes levels of keying, explanations of key system's function, key symbols used, and door numbers controlled.
b. Use ANSI/BHMA A156.28 "Recommended Practices for Keying Systems" as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
c. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
d. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
e. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion. Forward bitting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.
f. Prepare key schedule by or under supervision of supplier, detailing Owner's final keying instructions for locks.

C. Informational Submittals:

1. Provide Qualification Data for Supplier, Installer and Architectural Hardware Consultant.
2. Provide Product Data:

a. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
b. Include warranties for specified door hardware.

D. Closeout Submittals:

1. Operations and Maintenance Data: Provide in accordance with Division 01 and include:

a. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
b. Catalog pages for each product.
c. Final approved hardware schedule edited to reflect conditions as installed.

d. Final keying schedule
e. Copy of warranties including appropriate reference numbers for manufacturers to identify project.
f. As-installed wiring diagrams for each opening connected to power, both low voltage and 110 volts.

E. Inspection and Testing:

1. Submit written reports to the Owner and Authority Having Jurisdiction (AHJ) of the results of functional testing and inspection for:

a. fire door assemblies, in compliance with NFPA 80.
b. required egress door assemblies, in compliance with NFPA 101.

1.5. QUALITY ASSURANCE

A. Qualifications and Responsibilities:

1. Supplier: Recognized architectural hardware supplier with a minimum of 5 years documented experience supplying both mechanical and electromechanical door hardware similar in quantity, type, and quality to that indicated for this Project. Supplier to be recognized as a factory direct distributor by the manufacturer of the primary materials with a warehousing facility in the Project's vicinity. Supplier to have on staff, a certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) available to Owner, Architect, and Contractor, at reasonable times during the Work for consultation.
2. Installer: Qualified tradesperson skilled in the application of commercial grade hardware with experience installing door hardware similar in quantity, type, and quality as indicated for this Project.
3. Architectural Hardware Consultant: Person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and meets these requirements:

a. For door hardware: DHI certified AHC or DHC.
b. Can provide installation and technical data to Architect and other related subcontractors.
c. Can inspect and verify components are in working order upon completion of installation.
d. Capable of producing wiring diagram and coordinating installation of electrified hardware with Architect and electrical engineers.

4. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.

B. Certifications:

1. Fire-Rated Door Openings:

a. Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction.
b. Provide only items of door hardware that are listed products tested by Underwriters Laboratories, Intertek Testing Services, or other testing and inspecting organizations acceptable to authorities having jurisdiction for use on types and sizes of doors indicated, based on testing at positive pressure and

according to NFPA 252 or UL 10C and in compliance with requirements of fire-rated door and door frame labels.

2. Smoke and Draft Control Door Assemblies:

    a. Provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105
    b. Comply with the maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at tested pressure differential of 0.3-inch wg (75 Pa) of water.

3. Electrified Door Hardware

    a. Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction.

4. Accessibility Requirements:

    a. Comply with governing accessibility regulations cited in “REFERENCES” article 087100, 1.02.D3 herein for door hardware on doors in an accessible route. This project must comply with all Federal Americans with Disability Act regulations and all Local Accessibility Regulations.

C. Pre-Installation Meetings

1. Keying Conference

    a. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:

        1) Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
        2) Preliminary key system schematic diagram.
        3) Requirements for key control system.
        4) Requirements for access control.
        5) Address for delivery of keys.

2. Pre-installation Conference

    a. Not more than 2 weeks prior to beginning door, frame and hardware installation, installing contractor shall meet with the door hardware manufacturer to review installation and adjustment procedures, as well as UL and NFPA compliance, for all major types (locks, closers and exit devices).
    b. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
    c. Inspect and discuss preparatory work performed by other trades.
    d. Inspect and discuss electrical roughing-in for electrified door hardware.
    e. Review sequence of operation for each type of electrified door hardware.
    f. Review required testing, inspecting, and certifying procedures.
    g. Review questions or concerns related to proper installation and adjustment of door hardware.

1.6. DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site. Promptly replace products damaged during shipping.

B. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package. Deliver each article of hardware in manufacturer’s original packaging.

C. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.

D. Provide secure lock-up for door hardware delivered to Project. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.

E. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.

1.7. COORDINATION

A. Installation Templates: Distribute for doors, frames, and other work specified to be factory or shop prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

B. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.

1.8. WARRANTY

A. Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Beginning from date of Substantial Completion, for durations indicated.

a. Closers:

1) Mechanical: 30 years

b. Exit Devices:

1) Mechanical: 3 years.

c. Locksets:

1) Mechanical: 10 years

d. Key Blanks: Lifetime

2. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.

2.PRODUCTS

2.1. MANUFACTURERS

A. The Owner requires use of certain products for their unique characteristics and project suitability to ensure continuity of existing and future performance and maintenance standards. After investigating available product offerings, the Awarding Authority has elected to prepare proprietary specifications. These products are specified with the notation: “No Substitute.”

1. Where “No Substitute” is noted, submittals and substitution requests for other products will not be considered.

B. Approval of manufacturers and/or products other than those listed as “Scheduled Manufacturer” or “Acceptable Manufacturers” in the individual article for the product category shall be in accordance with QUALITY ASSURANCE article, herein.

C. Approval of products from manufacturers indicated in “Acceptable Manufacturers” is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer’s product.

D. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Architect's approval.

2.2. MATERIALS

A. Fabrication

1. Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. provide screws according to manufacturer’s recognized installation standards for application intended.
2. Finish exposed screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.
3. Provide concealed fasteners wherever possible for hardware units exposed when door is closed. Coordinate with “Metal Doors and Frames”, “Flush Wood Doors”, “Fiberglass Doors and Frames” to ensure proper reinforcements. Advise the Architect where visible fasteners, such as thru bolts, are required.

B. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.

1. Where fasteners are exposed to view: Finish to match adjacent door hardware material.

2.3. HINGES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: Ives 5BB series.
2. Acceptable Manufacturers and Products: Hager BB series, McKinney TA/T4A series, Stanley FBB Series.

B. Requirements:

1. Provide hinges conforming to ANSI/BHMA A156.1.

2. 1-3/4 inch (44 mm) thick doors, up to and including 36 inches (914 mm) wide:

    a. Exterior: Standard or heavy weight, bronze or stainless steel, 4-1/2 inches (114 mm) high
    b. Interior: Standard or heavy weight, steel, 4-1/2 inches (114 mm) high

3. 1-3/4 inch (44 mm) thick doors over 36 inches (914 mm) wide:

    a. Exterior: Heavy weight, bronze/stainless steel, 5 inches (127 mm) high
    b. Interior: Heavy weight, steel, 5 inches (127 mm) high

4. 2 inches or thicker doors:

    a. Exterior: Heavy weight, bronze or stainless steel, 5 inches (127 mm) high
    b. Interior: Heavy weight, steel, 5 inches (127 mm) high

5. Provide minimum three hinges per door leaf for doors 90 inches (2286 mm) or less in height, and one additional hinge for each 30 inches (762 mm) of additional door height.
6. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:

    a. Steel Hinges: Steel pins
    b. Non-Ferrous Hinges: Stainless steel pins
    c. Out-Swinging Exterior Doors: Non-removable pins
    d. Out-Swinging Interior Lockable Doors: Non-removable pins
    e. Interior Non-lockable Doors: Non-rising pins

7. Width of hinges: 4-1/2 inches (114 mm) at 1-3/4 inch (44 mm) thick doors, and 5 inches (127 mm) at 2 inches (51 mm) or thicker doors. Adjust hinge width as required for door, frame, and wall conditions to allow proper degree of opening.
8. Provide hinges with electrified options as scheduled in the hardware sets. Provide with sufficient number and wire gage to accommodate electric function of specified hardware. Locate electric hinge at second hinge from bottom or nearest to electrified locking component.
9. Provide mortar guard for each electrified hinge specified.

2.4. CYLINDRICAL LOCKS – GRADE 1

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:

    a. Best 9K series – No Substitutions

B. Requirements:

1. Provide cylindrical locks conforming to ANSI/BHMA A156.2 Series 4000, Grade 1, and UL Listed for 3-hour fire doors.
2. Cylinders: Refer to “KEYING” article, herein.
3. Provide locks with standard 2-3/4 inches (70 mm) backset, unless noted otherwise, with 1/2-inch latch throw. Provide proper latch throw for UL listing at pairs.
4. Provide locksets with separate anti-rotation thru-bolts, and no exposed screws.
5. Provide independently operating levers with two external return spring cassettes mounted under roses to prevent lever sag.
6. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
7. Provide electrified options as scheduled in the hardware sets.

8. Lever Trim: Solid cast levers without plastic inserts and wrought roses on both sides.

2.5. CYLINDRICAL LOCKS – GRADE 1 INDICATOR LOCKS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:

a. Schlage ND series

2. Acceptable Manufacturers and Products:

a. No Substitute

B. Requirements:

1. Provide cylindrical locks conforming to ANSI/BHMA A156.2 Series 4000, Grade 1, and UL Listed for 3-hour fire doors.
2. Indicators: Where specified, provide escutcheon with lock status indicator window on top of lockset rose:

a. Escutcheon height (including rose) 6.05 inches high by 3.68 inches wide.
b. Indicator window measuring a minimum 3.52-inch by .60 inch with 1.92 square-inches of front facing viewing area and 180-degree visibility with a total of .236 square-inches of total viewable area.
c. Provide snap-in serviceable window to prevent tampering. Lock must function if indicator is compromised.
d. Provide messages color-coded with full text and symbol, as scheduled, for easy visibility.
e. Unlocked and Unoccupied message will display on white background, and Locked and Occupied message will display on red background.

3. Cylinders: Refer to ''KEYING'' article, herein.
4. Provide locks with standard 2-3/4 inches (70 mm) backset, unless noted otherwise, with 1/2-inch latch throw. Provide proper latch throw for UL listing at pairs.
5. Provide locksets with separate anti-rotation thru-bolts, and no exposed screws.
6. Provide independently operating levers with two external return spring cassettes mounted under roses to prevent lever sag.
7. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
8. Provide electrified options as scheduled in the hardware sets.
9. Lever Trim: Solid cast levers without plastic inserts and wrought roses on both sides.

a. Provide levers that return to within 1/2 inch (13 mm) of door face.

2.6. EXIT DEVICES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:

a. Von Duprin 99/33A series

2. Acceptable Manufacturers and Products:

a. No Substitute

B. Requirements:

1. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1 and UL listed for Panic Exit or Fire Exit Hardware.
2. Cylinders: Refer to “KEYING” article, herein.
3. Provide grooved touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
4. Touchpad must extend a minimum of one half of door width. No plastic inserts are allowed in touchpads.
5. Provide exit devices with deadlatching feature for security and for future addition of alarm kits and/or other electrified requirements.
6. Provide exit devices with weather resistant components that can withstand harsh conditions of various climates and corrosive cleaners used in outdoor pool environments.
7. Provide flush end caps for exit devices.
8. Provide exit devices with manufacturer’s approved strikes.
9. Provide exit devices cut to door width and height. Install exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect.
10. Mount mechanism case flush on face of doors or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.
11. Provide cylinder or hex-key dogging as specified at non fire-rated openings.
12. Removable Mullions: 2 inches (51 mm) x 3 inches (76 mm) steel tube. Where scheduled as keyed removable mullion, provide type that can be removed by use of a keyed cylinder, which is self-locking when re-installed.
13. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and where noted in hardware sets.
14. Provide electrified options as scheduled.
15. Top latch mounting: double- or single-tab mount for steel doors, face mount for aluminum doors eliminating requirement of tabs, and double tab mount for wood doors.
16. Provide exit devices with optional trim designs to match other lever and pull designs used on the project.

2.7. CYLINDERS

A. Manufacturers:

1. Scheduled Manufacturer and Product:

a. Best SFIC

2. Acceptable Manufacturers and Products:

a. Falcon SFIC

B. Requirements:

1. Provide SFIC cylinders/cores to match Owner’s existing key system, compliant with ANSI/BHMA A156.5; latest revision; cylinder face finished to match lockset, manufacturer’s series as indicated. Refer to “KEYING” article, herein.

C. Construction Keying:

1. Replaceable Construction Cores.

a. Provide temporary construction cores replaceable by permanent cores, furnished in accordance with the following requirements.

1) 3 construction control keys
2) 12 construction change (day) keys.

b. Replace temporary construction cores with permanent cores unless directed otherwise by Owner.

2.8. KEYING

A. Provide cylinders/cores keyed into Owner's existing keying system. Comply with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.

B. Requirements:

1. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.

a. Master Keying system as directed by the Owner.

2. Forward bitting list and keys separately from cylinders, by means as directed by Owner. Failure to comply with forwarding requirements will be cause for replacement of cylinders/cores involved at no additional cost to Owner.
3. Provide keys with the following features:

a. Material: Nickel silver; minimum thickness of .107-inch (2.3mm)

4. Identification:

a. Mark permanent cylinders/cores and keys with applicable blind code for identification. Do not provide blind code marks with actual key cuts.
b. Identification stamping provisions must be approved by the Architect and Owner.
c. Stamp cylinders/cores and keys with Owner's unique key system facility code as established by the manufacturer; key symbol and embossed or stamped with "DO NOT DUPLICATE" along with the "PATENTED" or patent number to enforce the patent protection.
d. Failure to comply with stamping requirements will be cause for replacement of keys involved at no additional cost to Owner.
e. Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.

5. Quantity: Furnish in the following quantities.

a. Change (Day) Keys: 3 per cylinder/core.
b. Permanent Control Keys: 3.
c. Master Keys: 6.

2.9. DOOR CLOSERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:

a. LCN 4040XP series

2. Acceptable Manufacturers and Products:

    a. No Substitute

B. Requirements:

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. ISO 9000 certify closers. Stamp units with date of manufacture code.
2. Provide door closers with fully hydraulic, full rack and pinion action with high strength cast iron cylinder, and full complement bearings at shaft.
3. Cylinder Body: 1-1/2-inch (38 mm) diameter with 5/8-inch (16 mm) diameter double heat-treated pinion journal.
4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck.
7. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers.
8. Pressure Relief Valve (PRV) Technology: Not permitted.
9. Finish for Closer Cylinders, Arms, Adapter Plates, and Metal Covers: Powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI Standard A156.4 and ASTM B117, or has special rust inhibitor (SRI).
10. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

2.10. PROTECTION PLATES

A. Manufacturers:

1. Scheduled Manufacturer:

    a. Ives

2. Acceptable Manufacturers:

    a. Burns
    b. Trimco
    c. Rockwood

B. Requirements:

1. Provide protection plates with a minimum of 0.050 inch (1 mm) thick, beveled four edges as scheduled. Furnish with sheet metal or wood screws, finished to match plates.
2. Sizes plates 2 inches (51 mm) less width of door on single doors, pairs of doors with a mullion, and doors with edge guards. Size plates 1 inch (25 mm) less width of door on pairs without a mullion or edge guards.
3. At fire rated doors, provide protection plates over 16 inches high with UL label.

2.11. OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS

A. Manufacturers:

1. Scheduled Manufacturers:

a. Glynn-Johnson

2. Acceptable Manufacturers:

a. Rixson
b. Sargent
c. ABH

B. Requirements:

1. Provide overhead stop at any door where conditions do not allow for a wall stop or floor stop presents tripping hazard.
2. Provide friction type at doors without closer and positive type at doors with closer.

2.12. DOOR STOPS AND HOLDERS

A. Manufacturers:

1. Scheduled Manufacturer:

a. Ives

2. Acceptable Manufacturers:

a. Trimco
b. Burns
c. Rockwood

B. Provide door stops at each door leaf:

1. Provide wall stops wherever possible. Provide concave type where lockset has a push button of thumbturn.
2. Where a wall stop cannot be used, provide universal floor stops.
3. Where wall or floor stop cannot be used, provide overhead stop.
4. Provide roller bumper where doors open into each other and overhead stop cannot be used.

2.13. THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

A. Manufacturers:

1. Scheduled Manufacturer:

a. Zero International

2. Acceptable Manufacturers:

a. National Guard
b. Reese

c. Legacy
d. Pemko

B. Requirements:

1. Provide thresholds, weather-stripping, and gasketing systems as specified and per architectural details. Match finish of other items.
2. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
3. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.
4. Size thresholds 1/2 inch (13 mm) high by 5 inches (127 mm) wide by door width unless otherwise specified in the hardware sets or detailed in the drawings.

2.14. SILENCERS

A. Manufacturers:

1. Scheduled Manufacturer:

a. Ives

2. Acceptable Manufacturers:

a. Burns
b. Rockwood
c. Trimco

B. Requirements:

1. Provide "push-in" type silencers for hollow metal or wood frames.
2. Provide one silencer per 30 inches (762 mm) of height on each single frame, and two for each pair frame.
3. Omit where gasketing is specified.

3.EXECUTION

3.1. EXAMINATION

A. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance. Verify doors, frames, and walls have been properly reinforced for hardware installation.

B. Field verify existing doors and frames receiving new hardware and existing conditions receiving new openings. Verify that new hardware is compatible with existing door and frame preparation and existing conditions.

C. Submit a list of deficiencies in writing and proceed with installation only after unsatisfactory conditions have been corrected.

3.2. INSTALLATION

A. Mount door hardware units at heights to comply with the following, unless otherwise indicated or required to comply with governing regulations.

1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
2. Custom Steel Doors and Frames: HMMA 831.
3. Interior Architectural Wood Flush Doors: ANSI/WDMA I.S. 1A
4. Installation Guide for Doors and Hardware: DHI TDH-007-20

B. Install door hardware in accordance with NFPA 80, NFPA 101 and provide post-install inspection, testing as specified in section 1.03.E unless otherwise required to comply with governing regulations.

C. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.

D. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.

E. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.

F. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

G. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.

H. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated.

I. Lock Cylinders:

1. Install construction cores to secure building and areas during construction period.
2. Replace construction cores with permanent cores as indicated in keying section.

J. Door Closers: Mount closers on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Mount closers so they are not visible in corridors, lobbies and other public spaces unless approved by Architect.

K. Closer/Holders: Mount closer/holders on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.

L. Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings or in equipment room, or alternate location as directed by Architect.

M. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."

N. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they may impede traffic or present tripping hazard.

O. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

P. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

Q. Door Bottoms and Sweeps: Apply to bottom of door, forming seal with threshold when door is closed.

3.3. ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.

B. Occupancy Adjustment: Approximately three to six months after date of Substantial Completion, examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors and door hardware.

3.4. CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items per manufacturer's instructions to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.5. DOOR HARDWARE SCHEDULE

A. The intent of the hardware specification is to specify the hardware for interior and exterior doors, and to establish a type, continuity, and standard of quality. However, it is the door hardware supplier's responsibility to thoroughly review existing conditions, schedules, specifications, drawings, and other Contract Documents to verify the suitability of the hardware specified.

B. Discrepancies, conflicting hardware, and missing items are to be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application.

C. Hardware items are referenced in the following hardware schedule. Refer to the above specifications for special features, options, cylinders/keying, and other requirements.

D. Hardware Sets:

1. The hardware sets listed below represent design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process.

Hardware Group No. 00.1

For use on Door #(s):

129A	129B	129E	129F	136C	139D
140B	141				

Provide each RU door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	NOTE	ALL HARDWARE BY DOOR/GATE MANUFACTURER	UNF	BYO

Hardware Group No. 01.01

For use on Door #(s):

100A 128A

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER			FINISH	MFR
1	EA	CONT. HINGE	112XY			313AN	IVE
1	EA	CONT. HINGE	112XY EPT			313AN	IVE
1	EA	POWER TRANSFER	EPT10 CON			695	VON
1	EA	REMOVABLE MULLION	KR4954			695	VON
1	EA	INTERCOM/PUSHBUTTON	BY OWNER				UNK
1	EA	PANIC HARDWARE	CD-99-EO			626	VON
1	EA	ELEC PANIC HARDWARE	RX-LC-QEL-99-NL-OP-110MD-CON-24VDC			626	VON
2	EA	MORT CYL HOUSING	AS REQ'D			626	SCH
1	EA	RIM CYL HOUSING	AS REQ'D			626	SCH
3	EA	PERMANENT CORE	as required			626	BES
3	EA	SFIC KEYED CONST CORE	AS REQUIRED				BES
2	EA	90 DEG OFFSET PULL	8190EZHD 12" O			630-316	IVE
1	EA	SURFACE CLOSER	4040XP SCUSH MC			695	LCN
1	EA	SURF. AUTO OPERATOR	4642 WMS 120 VAC			695	LCN
2	EA	ACTUATOR	8310-853T/8310-818T AS REQ'D			630	LCN
1	EA	RAIN DRIP	142D			D	ZER
1	EA	MULLION SEAL	8780NBK PSA			BK	ZER
1	SET	WEATHER STRIPPING	BY DOOR/FRAME MFR.				UNK
2	EA	DOOR SWEEP	39D			D	ZER
1	EA	THRESHOLD	655A-223			A	ZER
1	EA	WIRE HARNESS	CON X LENGTH AS REQ'D				SCH
1	EA	WIRE HARNESS	CON-6W				SCH
2	EA	DOOR CONTACT	7764			628	SCE
1	EA	POWER SUPPLY	PS902 900-4RL 120/240 VAC			LGR	SCE
2	EA	CLOSER TEMPLATING, BRACKETS, SHOES, SPACERS, ETC	AS REQUIRED				
			CARD READER BY OWNER				

OPERATIONAL DESCRIPTION
ACTIVE LEAF
RIM EXIT DEVICE. FREE EGRESS AT ALL TIMES BY PRESSING PUSHBAR. ENTRY BY PULL AFTER RETRACTING LATCHBOLT WITH KEY. LATCHBOLT CAN BE RETRACTED ELECTRICALLY FOR EITHER MOMENTARY OR EXTENDED PERIODS OF TIME ALLOWING DOOR TO BE PUSH/PULL FUNCTION. ACCESS CONTROL SOFTWARE, INTERCOM/ PUSH BUTTON OR PRESENTING AUTHORIZED CREDENTIAL SHALL RETRACT LATCHBOLT ELECTRICALLY ALLOWING DOOR TO BE OPENED. RX SWITCH MONITORS THE DEPRESSION OF THE PUSHBAR.
AUTO OPERATOR - PUSHING EITHER INTERIOR OR EXTERIOR ACTUATOR BUTTON TO CYCLE AUTO OPERATOR AFTER RETRACTING LATCHBOLT ELECTRICALLY. EXTERIOR ACTUATOR BUTTON ONLY ENERGIZED WHEN ACCESS CONTROL SOFTWARE, INTERCOM/ PUSH BUTTON OR AUTHORIZED CREDENTIAL RETRACTS LATCHBOLT ELECTRICALLY. AUTO DOOR OPENER TO BE SEQUENCED WITH INTERIOR DOOR TO CYCLE INTERIOR DOOR AFTER PROGRAMMED TIME.

INACTIVE LEAF
RIM EXIT DEVICE. FREE EGRESS AT ALL TIMES BY PRESSING PUSHBAR. ENTRY BY PULL WHEN DEVICE DOGGED DOWN. DOGGING BY KEYED CYLINDER LOCKS DOWN THE PUSHBAR SO THE LATCHBOLT REMAINS RETRACTED AND DOOR FUNCTIONS AS A PUSH/PULL.
SELF-CLOSING. SPRING LOADED STOP INCLUDED. PUSH SIDE MOUNTED.

KEYED REMOVABLE MULLION
DOOR POSITION SWITCH(S) MONITOR WHETHER THE DOOR IS OPEN OR CLOSED.

Hardware Group No. 02.01

For use on Door #(s):

100B 128B

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	CONT. HINGE	112XY		313AN	IVE
2	EA	DUMMY PUSH BAR	330		626	VON
2	EA	90 DEG OFFSET PULL	8190EZHD 12" O		630-316	IVE
1	EA	SURFACE CLOSER	4040XP SCUSH MC		695	LCN
1	EA	SURF. AUTO OPERATOR	4642 WMS 120 VAC		695	LCN
2	EA	ACTUATOR	8310-853T/8310-818T AS REQ'D		630	LCN
1	SET	WEATHER STRIPPING	BY DOOR/FRAME MFR.			UNK
2	EA	CLOSER TEMPLATING, BRACKETS, SHOES, SPACERS, ETC	AS REQUIRED			

OPERATIONAL DESCRIPTION

ACTIVE LEAF

DUMMY EXIT DEVICE. FREE EGRESS AT ALL TIMES BY PRESSING PUSHBAR. ENTRY BY PULL. NON-LOCKING, NON-LATCHING.

AUTO OPERATOR - PUSHING EITHER INTERIOR OR EXTERIOR ACTUATOR BUTTON TO CYCLE AUTO OPERATOR. AUTO DOOR OPENER TO BE SEQUENCED WITH EXTERIOR DOOR TO CYCLE OUTSIDE DOOR AFTER PROGRAMMED TIME.

INACTIVE LEAF

DUMMY EXIT DEVICE. FREE EGRESS AT ALL TIMES BY PRESSING PUSHBAR. ENTRY BY PULL. NON-LOCKING, NON-LATCHING.

SELF-CLOSING. SPRING LOADED STOP INCLUDED. PUSH SIDE MOUNTED.

Hardware Group No. 03.01

For use on Door #(s):

129C 129D 135B 136B 139B 140A

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	112XY		313AN	IVE
1	EA	CYLINDRICAL LOCK - ENTRANCE	9K37AB 14D L/C		626	BES
1	EA	PERMANENT CORE	as required		626	BES
1	EA	SFIC KEYED CONST CORE	AS REQUIRED			BES
1	EA	SURFACE CLOSER	4040XP SCUSH MC		695	LCN
1	EA	RAIN DRIP	142D		D	ZER
1	SET	WEATHER STRIPPING	BY DOOR/FRAME MFR.			UNK
1	EA	DOOR SWEEP	39D		D	ZER
1	EA	THRESHOLD	655A-223		A	ZER
1	EA	DOOR CONTACT	7764		628	SCE
1	EA	CLOSER TEMPLATING, BRACKETS, SHOES, SPACERS, ETC	AS REQUIRED			

OPERATIONAL DESCRIPTION
OFFICE LOCK - TURN/PUSH-BUTTON LOCKING; PUSHING AND TURNING BUTTON LOCKS OUTSIDE LEVER, REQUIRING USE OF KEY UNTIL BUTTON IS MANUALLY UNLOCKED. PUSHBUTTON LOCKING; PUSHING BUTTON LOCKS OUTSIDE LEVER UNTIL UNLOCKED BY KEY OR BY TURNING INSIDE LEVER. INSIDE LEVER IS ALWAYS FREE FOR IMMEDIATE EGRESS.
SELF-CLOSING. SPRING LOADED STOP INCLUDED. PUSH SIDE MOUNTED.

DOOR POSITION SWITCH(S) MONITOR WHETHER THE DOOR IS OPEN OR CLOSED.

Hardware Group No. 03.02

For use on Door #(s):

119C 124B

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	112XY		313AN	IVE
1	EA	PANIC HARDWARE	CD-99-NL-OP-110MD		626	VON
1	EA	MORT CYL HOUSING	AS REQ'D		626	SCH
1	EA	RIM CYL HOUSING	AS REQ'D		626	SCH
2	EA	PERMANENT CORE	as required		626	BES
2	EA	SFIC KEYED CONST CORE	AS REQUIRED			BES
1	EA	90 DEG OFFSET PULL	8190EZHD 12" O		630-316	IVE
1	EA	SURFACE CLOSER	4040XP SCUSH MC		695	LCN
1	EA	RAIN DRIP	142D		D	ZER
1	SET	WEATHER STRIPPING	BY DOOR/FRAME MFR.			UNK
1	EA	DOOR SWEEP	39D		D	ZER
1	EA	THRESHOLD	655A-223		A	ZER
1	EA	DOOR CONTACT	7764		628	SCE
1	EA	CLOSER TEMPLATING, BRACKETS, SHOES, SPACERS, ETC	AS REQUIRED			

OPERATIONAL DESCRIPTION

RIM EXIT DEVICE. FREE EGRESS AT ALL TIMES BY PRESSING PUSHBAR. ENTRY BY PULL AFTER RETRACTING LATCHBOLT WITH KEY.

DOGGING BY KEYED CYLINDER LOCKS DOWN THE PUSHBAR SO THE LATCHBOLT REMAINS RETRACTED AND DOOR FUNCTIONS AS A PUSH/PULL.

SELF-CLOSING. SPRING LOADED STOP INCLUDED. PUSH SIDE MOUNTED.

DOOR POSITION SWITCH(S) MONITOR WHETHER THE DOOR IS OPEN OR CLOSED.

Hardware Group No. 04.01

For use on Door #(s):

132 133

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	112XY		313AN	IVE
1	EA	PUSH PLATE	8200 4" X 16"		630	IVE
1	EA	PULL PLATE	8303 10" 4" X 16"		630	IVE
1	EA	SURFACE CLOSER	4040XP RW/PA MC		695	LCN
1	EA	WALL STOP	WS406/407CCV		630	IVE
1	SET	WEATHER STRIPPING	BY DOOR/FRAME MFR.			UNK
	EA	CLOSER TEMPLATING, BRACKETS, SHOES, SPACERS, ETC	AS REQUIRED			

OPERATIONAL DESCRIPTION
FREE EGRESS AND ENTRY AT ALL TIMES BY PUSH PLATE OR PULL. NON-LOCKING, NON-LATCHING. SELF CLOSING.

Hardware Group No. 04.02

For use on Door #(s):

121 122

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5		640	IVE
1	EA	PUSH PLATE	8200 4" X 16"		630	IVE
1	EA	PULL PLATE	8303 10" 4" X 16"		630	IVE
1	EA	SURFACE CLOSER	4040XP RW/PA MC		695	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		695	IVE
1	EA	WALL STOP	WS406/407CCV		630	IVE
1	EA	GASKETING	488SBK PSA		BK	ZER

OPERATIONAL DESCRIPTION
FREE EGRESS AND ENTRY AT ALL TIMES BY PUSH PLATE OR PULL. NON-LOCKING, NON-LATCHING. SELF CLOSING.

Hardware Group No. 05.01

For use on Door #(s):

131 135A 136A 138 139A

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	112XY		313AN	IVE
1	EA	CYLINDRICAL LOCK - PASSAGE	9K30N 14D		626	BES
1	EA	SURFACE CLOSER	4040XP RW/PA MC		695	LCN
1	EA	WALL STOP	WS406/407CCV		630	IVE
1	SET	WEATHER STRIPPING	BY DOOR/FRAME MFR.			UNK
1	EA	CLOSER TEMPLATING, BRACKETS, SHOES, SPACERS, ETC	AS REQUIRED			

OPERATIONAL DESCRIPTION
PASSAGE LOCK – NEITHER LEVER LOCKABLE. BOTH LEVERS ALWAYS FREE FOR IMMEDIATE INGRESS OR EGRESS. SELF CLOSING.

Hardware Group No. 05.02

For use on Door #(s):

137

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	HINGES/PIVOTS AS REQUIRED	BY DOOR MFR			
1	EA	CYLINDRICAL LOCK - PASSAGE	9K30N 14D		626	BES
1	EA	SURFACE CLOSER	4040XP RW/PA MC		695	LCN
1	EA	WALL STOP	WS406/407CCV		630	IVE
1	EA	GASKETING, SWEEP, THRESHOLD, ETC	BY DOOR/FRAME MFR			UNK

FIRE RATED OPENING

OPERATIONAL DESCRIPTION
PASSAGE LOCK – NEITHER LEVER LOCKABLE. BOTH LEVERS ALWAYS FREE FOR IMMEDIATE INGRESS OR EGRESS. SELF CLOSING.

Hardware Group No. 05.03

For use on Door #(s):

134

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	CONT. HINGE	112XY		313AN	IVE
2	EA	MANUAL FLUSH BOLT HM	FB457		US10B	IVE
1	EA	DUST PROOF STRIKE	DP2		US10B	IVE
1	EA	CYLINDRICAL LOCK - PASSAGE	9K30N 14D		626	BES
1	EA	OH STOP & HOLDER	100H		US10B	GLY
1	EA	SURFACE CLOSER	4040XP SHCUSH MC		695	LCN
1	SET	WEATHER STRIPPING	BY DOOR/FRAME MFR.			UNK
2	EA	CLOSER TEMPLATING, BRACKETS, SHOES, SPACERS, ETC	AS REQUIRED			

OPERATIONAL DESCRIPTION
ACTIVE LEAF
PASSAGE LOCK – NEITHER LEVER LOCKABLE. BOTH LEVERS ALWAYS FREE FOR IMMEDIATE INGRESS OR EGRESS. SELF-CLOSING. SPRING LOADED STOP AND HOLD OPEN INCLUDED. PUSH SIDE MOUNTED.

INACTIVE LEAF
MANUAL FLUSH BOLTS.
CONCEALED OVERHEAD STOP WITH HOLD OPEN

Hardware Group No. 05.04

For use on Door #(s):

110

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5		640	IVE
1	EA	CYLINDRICAL LOCK - PASSAGE	9K30N 14D		626	BES
1	EA	WALL STOP	WS406/407CCV		630	IVE
3	EA	SILENCER HM	SR64		GRY	IVE

OPERATIONAL DESCRIPTION
PASSAGE LOCK – NEITHER LEVER LOCKABLE. BOTH LEVERS ALWAYS FREE FOR IMMEDIATE INGRESS OR EGRESS.

Hardware Group No. 05.05

For use on Door #(s):

116

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5		640	IVE
1	EA	CYLINDRICAL LOCK - PASSAGE	9K30N 14D		626	BES
1	EA	SURFACE CLOSER	4040XP H MC		695	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		695	IVE
1	EA	WALL STOP	WS406/407CCV		630	IVE
3	EA	SILENCER HM	SR64		GRY	IVE

OPERATIONAL DESCRIPTION
PASSAGE LOCK – NEITHER LEVER LOCKABLE. BOTH LEVERS ALWAYS FREE FOR IMMEDIATE INGRESS OR EGRESS.
SELF CLOSING. HOLD OPEN ARM

Hardware Group No. 06.01

For use on Door #(s):

114 115

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5		640	IVE
1	EA	CORRIDOR LOCK W/ OUTSIDE INDICATOR	ND73BD RHO OS-OCC		626	SCH
1	EA	PERMANENT CORE	as required		626	BES
1	EA	DISP CONST CORE	AS REQUIRED			BES
1	EA	SURFACE CLOSER	4040XP RW/PA MC		695	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		695	IVE
1	EA	WALL STOP	WS406/407CCV		630	IVE
1	EA	GASKETING	488SBK PSA		BK	ZER

OPERATIONAL DESCRIPTION
CORRIDOR LOCK - PUSH-BUTTON LOCKING. TURNING INSIDE LEVER OR CLOSING DOOR RELEASES BUTTON. WHEN LOCKED BY KEY, CAN ONLY BE UNLOCKED BY KEY. INSIDE LEVER IS ALWAYS FREE FOR IMMEDIATE EGRESS.
VISUAL INDICATOR DISPLAYS OCCUPIED/VACANT ON OUTSIDE FACE OF DOOR.
SELF CLOSING.

Hardware Group No. 07.01

For use on Door #(s):

130

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	112XY		313AN	IVE
1	EA	CYLINDRICAL LOCK - ENTRANCE	9K37AB 14D L/C		626	BES
1	EA	PERMANENT CORE	as required		626	BES
1	EA	DISP CONST CORE	AS REQUIRED			BES
1	EA	WALL STOP	WS406/407CCV		630	IVE
1	SET	WEATHER STRIPPING	BY DOOR/FRAME MFR.			UNK

OPERATIONAL DESCRIPTION

OFFICE LOCK - TURN/PUSH-BUTTON LOCKING; PUSHING AND TURNING BUTTON LOCKS OUTSIDE LEVER, REQUIRING USE OF KEY UNTIL BUTTON IS MANUALLY UNLOCKED. PUSHBUTTON LOCKING; PUSHING BUTTON LOCKS OUTSIDE LEVER UNTIL UNLOCKED BY KEY OR BY TURNING INSIDE LEVER. INSIDE LEVER IS ALWAYS FREE FOR IMMEDIATE EGRESS.

Hardware Group No. 07.02

For use on Door #(s):

113

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	112XY		313AN	IVE
1	EA	PANIC HARDWARE	CD-99-L-NL-06		626	VON
1	EA	THUMB TURN MORT CYL	09-904NH 114		626	SCH
1	EA	RIM CYL HOUSING	AS REQ'D		626	SCH
1	EA	PERMANENT CORE	as required		626	BES
1	EA	DISP CONST CORE	AS REQUIRED			BES
1	EA	SURFACE CLOSER	4040XP RW/PA MC		695	LCN
1	EA	WALL STOP	WS406/407CVX		630	IVE
1	SET	WEATHER STRIPPING	BY DOOR/FRAME MFR.			UNK
1	EA	CLOSER TEMPLATING, BRACKETS, SHOES, SPACERS, ETC	AS REQUIRED			

OPERATIONAL DESCRIPTION

RIM EXIT DEVICE. FREE EGRESS AT ALL TIMES BY PRESSING PUSHBAR. ENTRY BY FIXED LEVER AFTER RETRACTING LATCHBOLT WITH KEY. LEVER ALWAYS FIXED.

DOGGING BY THUMB TURN CYLINDER LOCKS DOWN PUSHBAR SO THE LATCHBOLT REMAINS RETRACTED AND DOOR FUNCTIONS AS A PUSH/PULL.

SELF CLOSING.

Hardware Group No. 07.03

For use on Door #(s):

105 106 107 108 109 126 127

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5		640	IVE
1	EA	CYLINDRICAL LOCK - ENTRANCE	9K37AB 14D L/C		626	BES
1	EA	PERMANENT CORE	as required		626	BES
1	EA	DISP CONST CORE	AS REQUIRED			BES
1	EA	WALL STOP	WS406/407CCV		630	IVE
3	EA	SILENCER HM	SR64		GRY	IVE

OPERATIONAL DESCRIPTION

OFFICE LOCK - TURN/PUSH-BUTTON LOCKING; PUSHING AND TURNING BUTTON LOCKS OUTSIDE LEVER, REQUIRING USE OF KEY UNTIL BUTTON IS MANUALLY UNLOCKED. PUSHBUTTON LOCKING; PUSHING BUTTON LOCKS OUTSIDE LEVER UNTIL UNLOCKED BY KEY OR BY TURNING INSIDE LEVER. INSIDE LEVER IS ALWAYS FREE FOR IMMEDIATE EGRESS.

Hardware Group No. 07.04

For use on Door #(s):

112 117 125

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5		640	IVE
1	EA	CYLINDRICAL LOCK - ENTRANCE	9K37AB 14D L/C		626	BES
1	EA	PERMANENT CORE	as required		626	BES
1	EA	DISP CONST CORE	AS REQUIRED			BES
1	EA	SURFACE CLOSER	4040XP RW/PA MC		695	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		695	IVE
1	EA	WALL STOP	WS406/407CCV		630	IVE
3	EA	SILENCER HM	SR64		GRY	IVE

OPERATIONAL DESCRIPTION

OFFICE LOCK - TURN/PUSH-BUTTON LOCKING; PUSHING AND TURNING BUTTON LOCKS OUTSIDE LEVER, REQUIRING USE OF KEY UNTIL BUTTON IS MANUALLY UNLOCKED. PUSHBUTTON LOCKING; PUSHING BUTTON LOCKS OUTSIDE LEVER UNTIL UNLOCKED BY KEY OR BY TURNING INSIDE LEVER. INSIDE LEVER IS ALWAYS FREE FOR IMMEDIATE EGRESS.

SELF CLOSING.

Hardware Group No. 07.05

For use on Door #(s):

111

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5		640	IVE
1	EA	CYLINDRICAL LOCK - ENTRANCE	9K37AB 14D L/C		626	BES
1	EA	PERMANENT CORE	as required		626	BES
1	EA	DISP CONST CORE	AS REQUIRED			BES
1	EA	OH STOP	100S		US10B	GLY
1	EA	SURFACE CLOSER	4040XP MC ST-1630		695	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		695	IVE
3	EA	SILENCER HM	SR64		GRY	IVE
1	EA	CLOSER TEMPLATING, BRACKETS, SHOES, SPACERS, ETC	AS REQUIRED			

OPERATIONAL DESCRIPTION
OFFICE LOCK - TURN/PUSH-BUTTON LOCKING; PUSHING AND TURNING BUTTON LOCKS OUTSIDE LEVER, REQUIRING USE OF KEY UNTIL BUTTON IS MANUALLY UNLOCKED. PUSHBUTTON LOCKING; PUSHING BUTTON LOCKS OUTSIDE LEVER UNTIL UNLOCKED BY KEY OR BY TURNING INSIDE LEVER. INSIDE LEVER IS ALWAYS FREE FOR IMMEDIATE EGRESS.
SELF CLOSING. PULL SIDE MOUNTED.
CONCEALED OVERHEAD STOP

Hardware Group No. 09.01

For use on Door #(s):

119A 119B

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	112XY		313AN	IVE
1	EA	PANIC HARDWARE	CD-99-NL-OP-110MD		626	VON
1	EA	THUMB TURN MORT CYL	09-904NH 114		626	SCH
1	EA	RIM CYL HOUSING	AS REQ'D		626	SCH
1	EA	PERMANENT CORE	as required		626	BES
1	EA	DISP CONST CORE	AS REQUIRED			BES
1	EA	90 DEG OFFSET PULL	8190EZHD 12" O		630-316	IVE
1	EA	SURFACE CLOSER	4040XP SCUSH		695	LCN
1	SET	WEATHER STRIPPING	BY DOOR/FRAME MFR.			UNK
1	EA	CLOSER TEMPLATING, BRACKETS, SHOES, SPACERS, ETC	AS REQUIRED			

OPERATIONAL DESCRIPTION
RIM EXIT DEVICE. FREE EGRESS AT ALL TIMES BY PRESSING PUSHBAR. ENTRY BY FIXED PULL AFTER RETRACTING LATCHBOLT WITH KEY. PULL ALWAYS FIXED.
DOGGING BY THUMB TURN CYLINDER LOCKS DOWN THE PUSHBAR SO THE LATCHBOLT REMAINS RETRACTED AND DOOR FUNCTIONS AS A PUSH/PULL. DEVICE IS EITHER DOGGED DOWN (UNLOCKED) OR UNDOGGED (LOCKED).
SELF-CLOSING. SPRING LOADED STOP.

Hardware Group No. 09.02

For use on Door #(s):

118

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5		640	IVE
1	EA	CYLINDRICAL LOCK - STOREROOM	9K37D 14D L/C		626	BES
1	EA	PERMANENT CORE	as required		626	BES
1	EA	DISP CONST CORE	AS REQUIRED			BES
1	EA	SURFACE CLOSER	4040XP RW/PA MC		695	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		695	IVE
1	EA	WALL STOP	WS406/407CCV		630	IVE
3	EA	SILENCER HM	SR64		GRY	IVE

OPERATIONAL DESCRIPTION
STOREROOM LOCK - OUTSIDE LEVER FIXED. ENTRANCE BY KEY ONLY. INSIDE LEVER ALWAYS UNLOCKED. INSIDE LEVER IS ALWAYS FREE FOR IMMEDIATE EGRESS.
SELF-CLOSING.

Hardware Group No. 09.03

For use on Door #(s):

124A

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
6	EA	HINGE	5BB1 4.5 X 4.5		640	IVE
1	EA	REMOVABLE MULLION	KR4954		695	VON
1	EA	PANIC HARDWARE	CD-99-L-DT-06		626	VON
1	EA	PANIC HARDWARE	CD-99-L-NL-06		626	VON
3	EA	MORT CYL HOUSING	AS REQ'D		626	SCH
1	EA	RIM CYL HOUSING	AS REQ'D		626	SCH
4	EA	PERMANENT CORE	as required		626	BES
4	EA	DISP CONST CORE	AS REQUIRED			BES
2	EA	SURFACE CLOSER	4040XP SCUSH MC		695	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS		695	IVE
2	EA	SILENCER HM	SR64		GRY	IVE

OPERATIONAL DESCRIPTION

ACTIVE LEAF
RIM EXIT DEVICE. FREE EGRESS AT ALL TIMES BY PRESSING PUSHBAR. ENTRY BY FIXED LEVER AFTER RETRACTING LATCHBOLT WITH KEY. LEVER ALWAYS FIXED. DOGGING BY KEYED CYLINDER LOCKS DOWN THE PUSHBAR SO THE LATCHBOLT REMAINS RETRACTED AND DOOR FUNCTIONS AS A PUSH/PULL.
SELF-CLOSING. SPRING LOADED STOP INCLUDED. PUSH SIDE MOUNTED.

INACTIVE LEAF
RIM EXIT DEVICE. FREE EGRESS AT ALL TIMES BY PRESSING PUSHBAR. ENTRY BY LEVER WHEN DEVICE DOGGED DOWN. LEVER ALWAYS FIXED. DOGGING BY KEYED CYLINDER LOCKS DOWN THE PUSHBAR SO THE LATCHBOLT REMAINS RETRACTED AND DOOR FUNCTIONS AS A PUSH/PULL.
SELF-CLOSING. SPRING LOADED STOP INCLUDED. PUSH SIDE MOUNTED.

KEYED REMOVABLE MULLION

END 08 7100

1. GENERAL

1.1. WORK INCLUDES

A. Glazing for the following products and applications, including those specified in other Sections and shown on Drawings, where glazing requirements are specified by reference to this Section:

1. Vision lites.
2. Interior borrowed lites.
3. Entrances and other doors.
4. Storefront construction.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 3300 - Submittal Procedures
2. Section 07 9200 – Joint Sealants: Sealants at the perimeters of windows and other glazed framing systems.
3. Section 08 1613 - Fiberglass Doors and Frames
4. Section 08 4113 - Aluminum Entrance and Storefronts.
5. Section 10 2800 – Toilet and Bath Accessories: Factory-assembled/framed mirrors.

1.3. DEFINITIONS

A. Manufacturer denotes the producer of primary glass, or raw glass, plastic, or panel components.

B. Fabricator indicates the producer who takes the Primary product and in turn tempers, laminates, insulates, cuts, breaks, drills, forms, or otherwise assembles and fabricates various Primary components into fabricated glazing products or Manufactured Units.

1.4. REFERENCES

A. Publication Dates: Comply with standards in effect as of the date of the Contract Documents except for those having different revision dates as referenced in the codes indicated on the Drawings, or unless otherwise indicated.

B. American Society for Testing and Materials (ASTM):

1. ASTM C509: Specification for Elastomeric Cellular Preformed Gasket and Sealing Material.
2. ASTM C542: Specification for Lock-Strip Gaskets.
3. ASTM C716: Specification for Installing Lock-Strip Gaskets and Infill Glazing Material.
4. ASTM C719: Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement.
5. ASTM C864: Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.
6. ASTM C920: Specification for Elastomeric Joint Sealants.
7. ASTM C1036: Specification for Flat Glass.
8. ASTM C1048: Specification for Heat-Treated Flat Glass - Kind HS, Kind FT Coated and Uncoated Glass.

9. ASTM C1115: Specification for Dense Elastomeric Silicone Rubber Gaskets and Accessories.
10. ASTM C1172: Specification for Laminated Architectural Flat Glass.
11. ASTM E119: Test Methods for Fire Tests of Building Construction.
12. ASTM E152: Methods of Fire Tests of Door Assemblies.
13. ASTM E163: Fire Tests of Window Assemblies.
14. ASTM E1300: Standard Practice for Determining Load Resistance of Glass in Buildings.
15. ASTM E1886: Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials
16. ASTM E1996: Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes
17. ASTM E2190: Standard Specification for Insulating Glass Unit Performance and Evaluation.

C. CPSC 16 CFR Part 1201: Safety Standard for Architectural Glazing Materials.

D. FGMA Glazing Manual.

E. IGCC (Insulating Glass Certification Council).

F. IGMA (Insulating Glass Manufacturers Alliance) - TM 3000-90: Vertical Glazing Guidelines.

G. Underwriters Laboratories - BP-1154.

H. UL 972 - Standard for Burglary - Resisting Glazing Material.

1.5. PERFORMANCE REQUIREMENTS

A. General: Provide glazing systems that are produced, fabricated, and installed to withstand normal thermal movement, wind loading, and impact loading (where applicable), without failure including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; and other defects in construction.

B. Glass Design: Glass thicknesses indicated on Drawings or in this Section are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites for the various size openings in the thicknesses and strengths (annealed or heat-treated) to meet or exceed the following criteria:

1. Minimum glass thickness, nominally, of lites in exterior walls is 1/4 inch.
2. Tinted and heat-absorbing glass thicknesses for each tint indicated are the same throughout Project.
3. Minimum glass thicknesses of lites, whether composed of annealed or heat-treated glass, are selected so the worst-case probability of failure does not exceed the following:

    a. 8 lites per 1000 for lites set vertically or not over 15 degrees off vertical and under wind action. Determine minimum thickness of monolithic annealed glass according to ASTM E1300. For other than monolithic annealed glass, determine thickness per glass manufacturer's standard method of analysis including applying adjustment factors to ASTM E1300 based on type of glass.
    b. 1 lite per 1000 for lites set over 15 degrees off vertical and under action of wind or snow.

C. Normal thermal movement results from the following maximum change (range) in ambient and surface temperatures acting on glass-framing members and glazing components. Base engineering calculation on materials' actual surface temperatures due to both solar heat gain and nighttime sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.6. SUBMITTALS

A. Submit in accordance with Section 01 3300:

1. Manufacturer's Data – Glazing:

a. Submit manufacturer's specifications and installation instructions for each type of glass required.
b. Include test data substantiating that glass complies with specified requirements.

2. Manufacturer's Data - Glazing Materials: Submit manufacturer's specifications and installation instructions for each type of glazing sealant and compound, gasket and associated miscellaneous material required. Include manufacturer's published data, or letter of certification, or certified test laboratory report indicating that each material complies with the requirements and is suitable for the applications shown.
3. Samples for verification:

a. Glazing: Submit 12" square samples of each type of glass indicated except for clear monolithic glass products.

4. Compatibility test report from manufacturer of insulating glass edge sealant indicating that glass edge sealants were tested for compatibility with other glazing materials including sealants, glazing tape, gaskets, setting blocks, and edge blocks.
5. Product test reports for each type of glazing sealant and gasket indicated, evidencing compliance with requirements specified.
6. Certificates: Fabricator certification for argon filled insulated glazing units in accordance with Quality Assurance article in this Section.

B. Submit in accordance with Section 01 7700:

1. Maintenance data for glass and other glazing materials to include in Operating and Maintenance Manual specified in Division 01.

1.7. QUALITY ASSURANCE

A. Manufacturer and Fabricator Qualifications:

1. Manufacturers shall be producers of the specified products for this project for a minimum of five years prior to the release date of these contract documents. Fabricators shall be producers of the specified products for this project for a minimum of five years prior to the release date of these contract documents.
2. Consistency and quality of the finished products are sought. Whenever the fabricated products are used, the Fabricator and Installer shall arrange to make all fabricated products from the same Primary Manufacturer's batch or order to assure consistent color and quality throughout the project.

3. Argon Filled Insulated Glazing Units: Fabricator shall be IGCC/IGMA Certified for argon fill and perform argon testing at an IGCC/IGMA accredited laboratory at least annually. All argon filled units shall be permanently marked with this certification.

B. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, except where more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. Glass Association of North America (GANA) Publications: "Glazing Manual" and "Laminated Glazing Reference Manual".
2. AAMA Publications: AAMA TIR-A7 "Sloped Glazing Guidelines" and "Glass Design for Sloped Glazing."
3. IGMA Publications: TM-3000 "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial & Residential Use" and TB-3001 "Guidelines for Sloped Glazing."

C. Safety Glass: Products complying with 16 CFR Part 1201.

1. Where safety glazing is indicated or required, provide each piece of safety glass permanently marked with certification label of Safety Glazing Certification Council (SGCC) or other certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

D. Fire Protection-Rated Glazing Labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, test standard, whether glazing is for use in fire doors or other opening, whether or not glazing passes hose-stream test, whether or not glazing has a temperature rise rating of 450 deg F, and the fire-resistance rating in minutes.

E. Insulating Glass Certification Program: Provide insulating glass units permanently marked either on spacers or at least one component lite of units with appropriate certification label of inspecting and testing agency indicated below:

1. Insulating Glass Certification Council (IGCC).
2. Associated Laboratories, Inc. (ALI).
3. National Certified Testing Laboratories (NCTL).

F. Glazier Qualifications: Engage an experienced glazer who has completed glazing similar in material, design, and extent to that indicated for Project with a record of successful in-service performance.

G. Single-Source Responsibility for Glass: Obtain glass from one source for each product indicated below:

1. Primary glass of each (ASTM C1036) type and class indicated.
2. Heat-treated glass of each (ASTM C1048) condition indicated.
3. Insulating glass of each construction indicated.

H. Single-Source Responsibility for Glazing Accessories: Obtain glazing accessories from one source for each product and installation method indicated.

1.8. DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials to comply with manufacturer’s directions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

1. Where insulating glass units will be exposed to substantial altitude changes, comply with insulating glass fabricator’s recommendations for venting and sealing to avoid hermetic seal ruptures.

1.9. PROJECT CONDITIONS

A. Environmental Conditions: Do not proceed with glazing when ambient and substrate temperature conditions are outside the limits permitted by glazing materials manufacturer or when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1. Install liquid sealants at ambient and substrate temperatures above 40 deg F.

B. Measurement Procedures: Glass products shall be field-measured from the assembled frames by the furnishing and installing technicians after framing is installed on-site unless rough openings, frame sizes, and glass have been predetermined. When it has been determined by the contractor that predetermined glass sizes are desired to meet the project schedule, it shall be the responsibility of the contractor to guarantee that the required opening sizes will be constructed, in accordance with the reviewed shop drawings.

1.10. WARRANTY

A. General: Warranties specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under requirements of the Contract Documents.

B. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard Form 1n which coated-glass manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.

1. Warranty Period: Manufacturer’s standard but not less than 5 years after date of Substantial Completion.

C. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard Form 1n which insulating-glass manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1. Warranty Period: Manufacturer’s standard but not less than 10 years after date of Substantial Completion.

2. PRODUCTS

2.1. GLASS PRODUCTS, GENERAL

A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.

1. Minimum Glass Thickness for Exterior Lites: Not less than 1/4".
2. Thickness of Tinted Glass: Provide same thickness for each tint color indicated throughout Project.

B. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened glass is indicated, provide Kind HS heat-treated float glass or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.

C. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:

1. For monolithic-glass lites, properties are based on units with lites 1/4" thick.
2. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
3. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F.
4. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
5. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.2. GLASS PRODUCTS

A. Float Glass: ASTM C1036, Type I, Quality-Q3, Class 1 (clear) unless otherwise indicated.

B. Heat-Treated Float Glass: ASTM C1048; Type I; Quality-Q3; Class 1 (clear) unless otherwise indicated; of kind and condition indicated.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
2. For uncoated glass, comply with requirements for Condition A.
3. For coated vision glass, comply with requirements for Condition C (other coated glass).

C. Low-E Coated Glass: Low-emissivity transparent coating consisting of microscopically thin, metal oxide layers designed to decrease heat transfer through the glazing. Unless specified elsewhere in the Contract Documents, the coating may be applied by either pyrolytic or vacuum deposition (sputter-coating) process and applied on either the second or third surface of insulating glass units as required to meet the performance requirements in this Section.

1. Use of Low-E coatings on the #4 surface of glazing shall not be permitted.

2.3. INSULATING GLASS

A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E2190, and complying with other requirements specified.

1. Sealing System: Dual seal, with manufacturer's recommended primary and secondary seal materials.
2. Argon Fill: Argon filled units shall meet the following requirements:

a. Contain not less than 90% argon.
b. Fabricator shall be IGCC/IGMA Certified for argon fill and perform argon testing at an IGCC/IGMA accredited laboratory at least annually. All argon filled units shall be permanently marked with this certification.

3. Spacer: Manufacturer's standard warm-edge technology spacer material and construction.
4. Desiccant: Molecular sieve or silica gel, or blend of both.

B. Glass: Comply with applicable requirements in "Glass Products" Article as indicated by designations in "Insulating-Glass Types" Article at the end of this Section.

2.4. FIRE-PROTECTION-RATED GLAZING

A. Fire-Protection-Rated Glazing, General: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252 for door assemblies.

B. Laminated Ceramic Glazing: Laminated glass made from 2 plies of clear, ceramic flat glass; 5/16-inch total nominal thickness; complying with testing requirements in 16 CFR 1201 for Category II materials.

1. Products: Subject to compliance with the requirements of this Section, provide one of the following:

a. Technical Glass Products; FireLite Plus. Premium Grade
b. Schott North America, Inc.; PYRAN Platinum L.
c. Vetrotech Saint-Gobain; SGG Keralite FR-L.

2.5. GLAZING GASKETS

A. Dense Compression Gaskets: Molded or extruded gaskets of profile and hardness required to maintain watertight seal, made from one of the following:

1. EPDM complying with ASTM C864.
2. Silicone complying with ASTM C1115.
3. Thermoplastic polyolefin rubber complying with ASTM C1115.

B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned EPDM, silicone or thermoplastic polyolefin rubber gaskets complying with ASTM C509, Type II, black; of profile and hardness required to maintain watertight seal.

1. Application: Use where soft compression gaskets will be compressed by inserting dense compression gaskets on opposite side of glazing or pressure applied by means of pressure-glazing stops on opposite side of glazing.

2.6. GLAZING SEALANTS

A. General: Provide products of type indicated, complying with the following requirements:

1. Applications: The sealants specified in this Section shall be used for installation of glazing. These sealants are not acceptable for use at the perimeter of windows and other glazed framing systems; sealants for use at the perimeters of windows and other glazed framing systems are specified in Section 07 9200 – Joint Sealants.
2. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
3. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
4. Elastomeric Glazing Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealants that comply with ASTM C920 and other requirements indicated for each elastomeric glazing sealant, including those referencing ASTM C920 classifications for Type, Grade, Class and Uses related to exposure and joint substrates.
5. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer’s full range.

B. Sealant Types: Subject to compliance with the requirements of this Section, Contractor may at their option choose from the following sealants:

1. SEALANT ES-4: Single-Component Silicone Sealant: Manufacturer's standard, single component, neutral-curing; low modulus type.

a. Acceptable products/manufacturers:

1) 756 SMS / Dow Corning
2) 795 / Dow Corning
3) Sikasil WS-295 / Sika Corp.

b. Grade: NS (Non-Sag)
c. Class: 50
d. Uses Related to Exposure: NT (Non-Traffic)

2. SEALANT ES-5: Single-Component Silicone Sealant: Manufacturer's standard, single component, neutral-curing; high modulus type.

a. Acceptable products/manufacturers:

1) 799 / Dow Corning
2) SilPruf SCS2000 / GE Momentive
3) Sikasil N Plus / Sika Corp.
4) Spectrem 2 / Tremco

b. Grade: NS (Non-Sag)
c. Class: 25

d. Uses Related to Exposure: NT (Non-Traffic)

C. Glazing Sealants for Fire-Rated Glazing Products: Products that are approved by testing agencies that listed and labeled fire-resistant glazing products with which they are used for applications and fire-protection ratings indicated.

2.7. GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100% solids, elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C1281 and AAMA 800 for products indicated below:

1. AAMA 804.3 tape, where indicated.
2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:

1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.8. MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

F. Cylindrical Glazing Sealant Backing: ASTM C1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

2.9. FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

B. Exposed Glazing Edges:

1. Butt-Glazed Lites: Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.
2. Other: Grind smooth and polish exposed glass edges and corners.

3. EXECUTION

3.1. EXAMINATION

A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, offsets at corners.
2. Presence and functioning of weep systems.
3. Minimum required face or edge clearances.
4. Effective sealing between joints of glass-framing members.

B. Do not proceed with glazing until unsatisfactory conditions have been corrected.

3.2. PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings that are not firmly bonded to substrates.

B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that will leave visible marks in the completed work.

3.3. GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, except where more stringent requirements are indicated, including those in referenced glazing publications.

B. Adjust glazing channel dimensions as required by Project conditions during installation to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.

E. Install elastomeric setting blocks in sill rabbets, sized and located to comply with referenced glazing standard, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

G. Provide spacers for glass sizes larger than 50 united inches (length plus height) as follows:

1. Locate spacers inside, outside, and directly opposite each other. Install correct size and spacing to preserve required face clearances, except where gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and comply with system performance requirements.
2. Provide 1/8" minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

J. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

K. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

L. Square cut wedge-shaped gaskets at corners and install gaskets in manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4. TAPE GLAZING

A. Position tapes on fixed stops so that when compressed by glass their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously but not in one continuous length. Do not stretch tapes to make them fit opening.

C. Where framing joints are vertical, cover these joints by applying tapes to heads and sills first and then to jambs. Where framing joints are horizontal, cover these joints by applying tapes to jambs and then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until just before each glazing unit is installed.

F. Apply heel bead of elastomeric sealant.

G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5. GASKET GLAZING (DRY)

A. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Secure compression gaskets in place with miter cut joints located at corners to compress gaskets producing a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

E. Install gaskets so they protrude past face of glazing stops.

3.6. SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass. Install pressurized gaskets to protrude slightly out of channel to eliminate dirt and moisture pockets.

3.7. PROTECTION AND CLEANING

A. Protect exterior glass from breakage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove them immediately as recommended by glass manufacturer.

C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for build-up of dirt, scum, alkali deposits, or stains, and remove as recommended by glass manufacturer.

D. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged in any way, including natural causes, accidents and vandalism, during construction period.

E. Wash glass on both faces in each area of Project not more than 4 days prior to date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended by glass manufacturer.

4. GLAZING SCHEDULE

4.1. GENERAL

A. Safety Glazing:

1. Safety glazing complying with 16 CFR Part 1201 shall be provided where indicated, where required by code, and in the following conditions:

a. All glazing in doors.
b. Glazing within a 24" radius of either door jamb where the bottom edge of the glazing is less than 60" above the walking surface.
c. Glazing that meets all of the following conditions:

1) Individual pane is greater than 9 square feet.
2) Bottom edge of glazing is less than 18" above the floor.
3) Top edge of glazing is greater than 36" above the floor.
4) Walking surfaces within 36" horizontally of the plane of the glazing.
5) Exception: If the glass is insulating glass or multiple pane glazing where the bottom edge of the glazing is 25 feet or more above any grade, roof, or walking surface, then it does not need to be safety glazing.

d. Glazing adjacent to stairways, landings, and ramps when the bottom edge of the glazing is less than 60" above the walking surface.

4.2. MONOLITHIC-GLASS TYPES

A. Glass Type GL-A: Clear float glass.

1. Thickness: 1/4".

B. Glass Type GL-B: Clear fully tempered float glass compliant with CPSC 16 CFR 1201.

1. Thickness: 1/4".
2. Provide safety glazing labeling.

4.3. INSULATING-GLASS TYPES

A. Glass Type GL-C: Low-E-coated, clear insulating glass.

1. Overall Unit Thickness: 1 inch.
2. Thickness of Each Glass Lite: 1/4".
3. Outdoor Lite: Float glass.
4. Interspace Content: Argon.
5. Indoor Lite: Float glass.
6. Winter Nighttime U-Factor: 0.25 maximum.
7. Summer Daytime U-Factor: 0.21 maximum.
8. Solar Heat Gain Coefficient: 0.28maximum.
9. Visible Light Transmittance: 62% minimum.
10. Provide safety glazing labeling.

B. Glass Type GL-D: Low-E-coated, fully tempered, clear insulating glass.

1. Overall Unit Thickness: 1 inch.
2. Thickness of Each Glass Lite: 1/4".
3. Outdoor Lite: fully tempered float glass compliant with CPSC 16 CFR 1201] [Ultraclear float glass.
4. Interspace Content: As required to meet performance requirements.
5. Indoor Lite: fully tempered float glass compliant with CPSC 16 CFR 1201
6. Low-E Coating: Pyrolytic or sputtered on second or third surface.
7. Winter Nighttime U-Factor: 0.25 maximum.
8. Summer Daytime U-Factor: 0.21 maximum.
9. Solar Heat Gain Coefficient: 0.28 maximum.
10. Visible Light Transmittance: 62% minimum.
11. Provide safety glazing labeling.

4.4. FIRE-PROTECTION-RATED GLAZING TYPES

A. Glass Type GL-E: 45-minute fire-rated glazing; Laminated Ceramic Glazing.

1. Provide safety glazing labeling.

END 08 8000

1. GENERAL

1.1. WORK INCLUDES

A. Gypsum board metal support system at ceilings, soffits, partitions, and as otherwise indicated.

B. Gypsum board finishing.

C. Interior gypsum board.

D. Tile backing panels.

E. Exterior gypsum board.

F. Direct exterior finishing system (DEFS).

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 3300 – Submittal Procedures
2. Section 05 4100 – Cold-Formed Metal Framing: Non Load-bearing metal framing.
3. Section 06 1000 – Rough Carpentry
4. Section 07 2100 – Building Insulation: Sound batt insulation; thermal insulation.
5. Section 07 9200 – Joint Sealants: Acoustic sealants.
6. Section 09 3000 – Tile: Tile backing panels.

1.3. REFERENCES

A. Publication Dates: Comply with standards in effect as of the date of the Contract Documents except for those having different revision dates as referenced in the codes indicated on the Drawings, or unless otherwise indicated.

B. American National Standards Institute (ANSI):

1. ANSI A108.11 – Interior Installation of Cementitious Backer Units.
2. ANSI A118.9 - Cementitious Backer Units.

C. American Society for Testing and Materials (ASTM):

1. ASTM A641 - Standard Specification for Zinc Coated (Galvanized) Carbon Steel Wire.
2. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
3. ASTM A1003 - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members.
4. ASTM C475 - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
5. ASTM C557 - Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing.
6. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members.
7. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw Attached Gypsum Panel Products.

8. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board.
9. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications.
10. ASTM C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
11. ASTM C1177 - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
12. ASTM C1178 – Standard Specification for Coated Glass Mat Water Resistant Gypsum Backing Panel.
13. ASTM C1325 - Standard Specification for Non-Asbestos Fiber Mat Reinforced Cementitious Backer Units.
14. ASTM C1396 – Standard Specification for Gypsum Board.
15. ASTM C1629 - Standard Specification for Abuse Resistant Nondecorated Interior Gypsum Panel Products and Fiber Reinforced Cement Panels.
16. ASTM D3273 – Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
17. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
18. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.

D. Gypsum Association:

1. GA-214 – Recommended Levels of Gypsum Board Finish.
2. GA-216 – Application and Finishing of Gypsum Panel Products.
3. GA-600 – Fire Resistance Design Manual.
4. GA-801 – Handling and Storage of Gypsum Panel Products.

E. Gypsum Construction Handbook; USG Corporation.

1.4. SUBMITTALS

A. Submit in accordance with Section 01 3300:

1. Manufacturer's Data: Submit manufacturer's product specifications and installation instructions for each product, including any additional data to show compliance with these specifications.
2. For Direct Exterior Finish Systems (DEFS):

a. Shop Drawings: For DEFS canopies and soffits provide shop drawings showing locations of all joints and trim accessories. Provide details illustrating joints and interfaces with other materials.
b. Samples for Initial Selection: For DEFS provide manufacturer's samples showing colors and textures.
c. Samples for Verification:

1) For each DEFS color and texture, provide samples 12 inches by 12 inches.
2) For each DEFS trim, provide samples 6 inches in length.

1.5. QUALITY ASSURANCE

A. Applicator: Company specializing in gypsum board systems work with minimum of five years successful documented experience.

B. Source Limitations: Obtain each type of gypsum board, trim accessory, adhesive and joint treatment product from a single manufacturer, or from manufacturers recommended by the prime manufacturer of each type of gypsum board.

1.6. DELIVERY, STORAGE, AND HANDLING

A. Comply with GA-801. Deliver gypsum assembly materials in sealed containers and bundles, fully identified with manufacturer's name, brand, type and grade; store in a dry, well ventilated space, protected from the weather, under cover and off the ground.

1.7. FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C840 requirements, gypsum board manufacturer's written recommendations, or the following, whichever are most stringent.

1. Temperature: Maintain temperature in areas of installation at not less than 55 deg. F. for at least 24 hours before installation begins and for not less than 48 hours after joint finishing has been completed.
2. Ventilation: Provide controlled ventilation during joint finishing operations, to eliminate excessive moisture. Avoid drafts during hot, dry weather to prevent excessively fast drying of joint compound.

B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.

2. PRODUCTS

2.1. METAL SUPPORT MATERIALS

A. Acceptable manufacturers:

1. ClarkDietrich Building Systems.
2. Marino\Ware.
3. MBA Metal Framing.
4. MRI Steel Framing

B. General: Comply with ASTM C754 as specified and recommended for metal system supporting gypsum board work.

C. Drywall Furring Suspension System:

1. Main Tee: 12' long, 1-1/2" high x 15/16” wide face, cold rolled, hot dipped galvanized steel main tee beams at 48" o.c.
2. Cross Tees: 4’ long, 1-1/2" high x 1 ½” wide face, cold rolled, hot dipped galvanized steel cross tees at 24" o.c., stamped locks on each end designed to fit corresponding slots in the Main Tee. Screw surfaces are knurled for proper and fast screw insertion. At Contractor’s option, Furring Channels may be used at cross members.
3. Furring Channels: 4’ long, 7/8" high with 1 ½” face, hat shaped sections of 25 gauge hot dipped galvanized steel, stamped locks on each end designed to fit corresponding slots in the Main Tee. Screw surfaces are knurled for proper and fast screw insertion.
4. Angle Mold: Not less than 1” x 1 ½” flanges, hot dipped galvanized steel.

5. Hanger Wire: ASTM A641, soft, Class I galvanized, prestretched; 0.062-inch- diameter wire, or double strand of 0.048-inch-diameter wire.
6. Hanger Anchorage Devices: Size for three times calculated loads, except size direct-pull concrete inserts for five times calculated loads.
7. Product/manufacturer:

    a. DGS-Drywall Grid System / Armstrong
    b. Drywall Grid System / Chicago Metallic Corp.
    c. Drywall Suspension System / USG Corporation

D. Sheet metal members: Provide miscellaneous custom fabricated wall framing shapes as shown or required from galvanized sheet metal.

E. Fasteners for Metal Framing: As recommended by framing manufacturer and of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

2.2. GYPSUM BOARD, GENERAL

A. General: Comply with ASTM C1396, as specified and recommended.

1. Sheet Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.
2. Acceptable manufacturers:

    a. CertainTeed Gypsum
    b. Georgia Pacific
    c. National Gypsum Co.
    d. USG Corporation

2.3. INTERIOR GYPSUM BOARD

A. Interior Gypsum Board, Typical:

1. Location: Use above 8’ in all locations unless indicated otherwise.
2. Thickness: 5/8".
3. Type X.
4. Long Edges: Tapered.

B. Abuse-Resistant Gypsum Board: Compliant with ASTM C1629. Manufactured to produce greater resistance to surface indentation and through-penetration (impact resistance) than standard Type X gypsum board.

ASTM C1629 Minimum Values (note, higher numbers are better)		
Surface Abrasion	Indentation Resistance	Soft-Body Impact
2	1	1

1. Location: Provide up to 8' in all location unless indicated otherwise.
2. Thickness: 5/8".
3. Type X.
4. Long Edges: Tapered.
5. Acceptable Products: The following products, provided they comply with all requirements of the Contract Documents, will be considered acceptable:

a. AirRenew Extreme Abuse / CertainTeed Gypsum
b. ToughRock AR or DensArmor Plus Abuse / Georgia Pacific
c. Hi-Abuse XP / National Gypsum Co.
d. Sheetrock AR Firecode / USG

2.4. TILE BACKING PANELS

A. Moisture and Mold-Resistant Gypsum Tile Backer Board: Complying with ASTM C1178 and with a rating of 10 per ASTM D3273.

1. Location: Provide behind tile finishes where cement board is not indicated.
2. Thickness: 5/8".
3. Type X.
4. Long Edges: Square.
5. Acceptable Products: The following products, provided they comply with all requirements of the Contract Documents, will be considered acceptable

a. Diamondback Tile Backer / CertainTeed Gypsum
b. DensShield / Georgia Pacific
c. e2XP Tile Backer / National Gypsum Co.
d. Fiberock Aqua-Tough Interior / USG

2.5. EXTERIOR GYPSUM BOARD

A. Exterior Gypsum Board Sheathing: Water resistant, paperless, fiberglass wrapped gypsum sheathing complying with ASTM C1177.

1. Location: Provide where indicated on Drawings.

a. Parapets: Where exterior gypsum board sheathing is indicated as a roofing substrate on the roof-side of parapets, verify and provide the type of exterior gypsum board sheathing required by the roofing manufacturer.

2. Thickness: 5/8”.
3. Core: Regular.
4. Acceptable Products: The following products, provided they comply with all requirements of the Contract Documents, will be considered acceptable:

a. GlasRoc Sheathing / CertainTeed Gypsum
b. DensGlass Gold Exterior Guard / Georgia-Pacific
c. Gold Bond e2XP / National Gypsum Co.
d. Securock Glass Mat Sheathing / USG

2.6. TRIM ACCESSORIES

A. General: Comply with ASTM C1047. Manufacturer's standard galvanized steel beaded units with flanges for concealment in joint compound, including corner beads, edge trim and control joints; except provide semi-finishing type (flange not concealed) where indicated.

1. Control joint.
2. Gypsum board Edges: LC-Bead: J-shaped; exposed long flange receives joint compound.
3. Vinyl trim will not be acceptable unless noted otherwise.
4. Pre-taped metal trim is acceptable.

2.7. JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C475 and GA-216; type recommended by the manufacturer for the application indicated.

1. Joint Tape:

a. Interior, unless noted otherwise: Type recommended by panel manufacturer.
b. Interior, abuse- and impact-resistant board: Glass mesh.
c. Interior, tile backer board: Alkali resistant glass mesh.
d. Exterior: Glass mesh.

2. Joint Compound:

a. Interior, unless noted otherwise: Type(s) recommended by panel manufacturer.
b. Interior, abuse- and impact-resistant board:

1) Embedding and First Coat: Setting-type (chemical-hardening-type).
2) Additional and Final Coats: Ready-mixed vinyl-type or non-casein-type (all-purpose type).

c. Interior, moisture and mold-resistant gypsum board provide:

1) All coats: Setting-type (chemical-hardening-type) with a rating of 10 per ASTM D3273.

d. Interior, tile backer board provide:

1) Latex modified Portland cement mortar used for tile setting, as recommended by manufacturer.

e. Exterior: Type(s) recommended by sheathing manufacturer.

2.8. AUXILIARY MATERIALS

A. General: Provide auxiliary materials for gypsum board work of the type and grade recommended by the manufacturer of the gypsum board.

1. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
2. Gypsum Board Fasteners: Comply with GA-216, Phillips head screws.
3. Tile Backer Board Fasteners: Use screws of type and size recommended by panel manufacturer.
4. Sound Attenuation Blankets: Refer to Specification Section 07 2100 - Building Insulation.
5. Thermal Insulation: Refer to Specification Section 07 2100 - Building Insulation.

2.9. DIRECT EXTERIOR FINISHING SYSTEM (DEFS)

A. General: System manufacturer’s direct-applied standard acrylic finish coat system for exterior gypsum board soffits. System must be a composite wall finish system consisting of base coat, reinforcing mesh, and finish coat. Finish coat shall feature dirt pick-up resistance technology.

B. Acceptable Products:

1. Dryvit Finish System for Exterior Soffits / Dryvit
2. Direct Finish System / Senergy
3. StoQuik Gold / Sto Corporation
4. Substitutions: Under provisions of Section 01 6000.

C. Color: Color to be selected by Architect from system manufacturer's standard colors.

D. Finish/Texture: Texture to be selected by Architect from system manufacturer's standard textures.

E. Reinforcing Fabric Mesh: System manufacturer's standard balanced, alkali-resistant, open-weave glass fiber reinforcing mesh.

F. Miscellaneous Materials: Use PVC/plastic or extruded aluminum accessories as recommended by finish system manufacturer.

1. Required Extrusions:

a. Drip Reveal
b. Edge bead with drip edge
c. Corner bead

3. EXECUTION

3.1. EXAMINATION

A. Examine the areas and the spaces with Installer present. Notify the Architect, in writing, of conditions detrimental to the proper and timely completion of the work. Do not proceed with the installation until unsatisfactory conditions have been corrected.

3.2. INSTALLATION OF METAL SUPPORT SYSTEMS

A. Comply with ASTM C754, ASTM C840, and manufacturer's instructions.

B. Furnish concrete inserts, steel deck hanger clips, and similar devices to other crafts for installation well in advance of time needed for coordination with other work.

C. Space ceiling suspension main runners 4'-0" o.c., and space hangers as indicated or, at 4'-0" o.c. along runners. Locate main runners parallel with long axis of recessed light fixtures, unless otherwise directed by the Architect.

D. Do not anchor hanger wires to metal roof deck. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other effective means.

1. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with the location of hangers required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.

3.3. GYPSUM BOARD INSTALLATION REQUIREMENTS

A. General: In addition to compliance with ASTM C840 and GA-216, comply with manufacturer's instructions and requirements for indicated STC and fire-resistance ratings.

1. Insure that sound attenuation blankets, wall insulation, and vapor barriers, as indicated, are installed prior to gypsum board installation.

B. Install ceiling boards in the direction and manner which will minimize the number of end-butt joints, and which will avoid end joints in the central area of each ceiling. Stagger end joints at least 1'-0".

C. Install wall/partition board vertically and avoid end-butt joints wherever possible. At stairwells and similar high walls, install boards horizontally with end joints staggered over studs.

D. Unless otherwise noted, install boards on one side of studs completely to metal floor and roof deck above at each room. Provide one coat tape and compound treatment in non-exposed area above ceiling. Seal boards tight to underside of roof or floor deck and seal all penetrations. Where insulation occurs in stud walls, install boards on both sides of studs to deck above.

1. Boards not extending to deck above shall be a minimum of 4" above ceiling.

E. Fit gypsum panels around ducts, pipes, and conduits. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch-wide joints to install sealant.

F. Control Joints: Form control joints with space between edges of boards, prepared to receive trim accessories. Install control or expansion joints as indicated on the drawings. When not shown, provide control joints at 30'-0" maximum intervals in both directions, and in conjunction with door heads. Coordinate locations with other work and with Architect.

G. Fasteners: Space fasteners in gypsum board accordance with GA-216 and manufacturer's recommendations.

1. Vertical Deflection: At partitions designed to allow vertical deflection of the building structure, no wallboard anchoring screws may be driven into the top runners.

3.4. GYPSUM BOARD APPLICATION

A. Single-Layer Ceilings, Soffits, and Partitions:

1. Fasten with screws at metal support.
2. Fasten to wood supports with adhesive and screws.
3. Provide gypsum board finishing as specified herein.

B. Multilayer Application:

1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.

2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.

C. Adhesive Application of Gypsum Board to Concrete and Masonry Walls.

1. Interior surfaces to which gypsum board is to be adhered should be free from any foreign matter, projections, or depressions that will impair bond.

a. Scarify slick or glossy surfaces.

2. Install in accordance with manufacturer's installation instructions or as follows:

a. Apply adhesive directly to back of gypsum board or on wall in continuous beads spaced not to exceed 12” o.c. or daubs spaced not to exceed 16" when applying gypsum board to monolithic concrete, brick, or concrete block. Beads should not be less than 3/8" in diameter to provide continuous bond between gypsum board and wall surface and daubs should not be less than 2" diameter x 1/2" thick with a row centered at all vertical joint locations.
b. Position gypsum board to provide a tight fit at abutting edges or ends. Do not slide board. Press the panels into place to achieve maximum contact. Use mechanical fasteners or temporary bracing as required to support gypsum board until adhesive sets or adequate bond strength is attained.
c. Allow adhesive to cure a minimum of 24 hours prior to application of joint treatment, base coat and finish.

D. Curved Surfaces:

1. Install panels horizontally (perpendicular to supports) and unbroken, to extent possible, across curved surface plus 12-inch-long straight sections at ends of curves and tangent to them.
2. For double-layer construction, fasten base layer to studs with screws 16 inches o.c. Center gypsum board face layer over joints in base layer, and fasten to studs with screws spaced 12 inches o.c.
3. Flexible Gypsum Board: Apply in double-layers, 1/4” and 3/8” thicknesses combined to equal 5/8” total thickness, unless indicated otherwise.

3.5. TILE BACKERBOARD APPLICATION

A. General: Comply with ANSI A108.11.

B. Single-Layer Walls:

1. Precut boards to required sizes and make necessary cut-outs. Stagger end joints in successive courses. Install all joints snugly.
2. Position all ends and edges of panels over framing. Where not possible, provide fire treated 2x wood back blocking at ends and edges of all panels.
3. Fasten with screws at minimum of 6" o.c. at metal supports.
4. Provide manufacturer recommend sealant at all joints and corners.
5. Embed 2” alkali resistant fiberglass mesh tape in a skim coat of latex modified Portland cement mortar over all joints and corners.

3.6. INSTALLATION OF GYPSUM BOARD TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Trim Locations:

1. Cornerbead: Use at outside corners.
2. Control Joint: Where indicated or as directed by Architect.
3. LC-Bead: Use at exposed panel edges.

C. Install acoustical sealants per manufacturer’s written instructions.

3.7. INSTALLATION OF GYPSUM BOARD FINISHING

A. General: Gypsum board finish for exposed gypsum board shall not begin until temperatures can be maintained above 55 deg. F.

1. For gypsum board applied to concrete masonry with adhesive, joint treatment should not be applied until gypsum board is firmly bonded and adhesive has hardened.
2. Prefill open joints, rounded or beveled edges, and minor damaged surface areas, using type of compound recommended by manufacturer.
3. Tile Backer Units: Finish according to manufacturer's written instructions.

B. Level of Finish: Provide GA-214 Level 4 finish to all gypsum board unless indicated otherwise.

1. Partial Finishing (Level 2 finish): Omit third coat and sanding on concealed gypsum board work which is indicated for gypsum board finishing, including sound, fire, air, smoke-rated work and partitions above suspended ceilings.

3.8. DIRECT EXTERIOR FINISHING SYSTEM INSTALLATION

A. General: Install system and accessories in accordance with system manufacturer's instructions. Apply finish coat using sufficient manpower and equipment to insure a continuous operation without cold joints, scaffolding lines, etc.

1. Unless indicated otherwise, provide expansion joints at 20 feet on center maximum.
2. Provide 1/4 inch minimum perimeter sealant joints at penetrations through the system, including light fixtures, columns, and vents.

B. Finish coat colors and texture shall match approved sample.

C. Apply sealant at finish perimeter and expansion joints in accordance with Section 07 9200 – Joint Sealants.

3.9. FIELD QUALITY CONTROL

A. Tolerances: Following are the acceptable tolerances for gypsum board work. Work not meeting these tolerances will be considered defective.

1. Maximum Variation From True Position: 1/4".
2. Maximum Variation of any Member from Plane: 1/4".
3. Maximum Variation from True Flatness: 1/8" in 10' in any direction.

4. Maximum Joint Camber (concave or convex): 1/16”.

3.10. PROTECTION OF WORK

A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

B. Protect gypsum board work from damage and deterioration during the remainder of the construction period.

END 09 2100

1. GENERAL

1.1. WORK INCLUDES

A. Tile wall and floor finishes.

B. Accessories.

C. Maintenance Stock.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 3300 - Submittal Procedures
2. Section 01 7700 - Closeout Procedures
3. Section 03 3000 – Concrete: Slab tolerances.
4. Section 07 9200 - Joint Sealants
5. Section 09 2100 - Gypsum Board Assemblies: Tile backing panels.
6. Section 09 6513 - Resilient Base, Stair Accessories, & Flooring Accessories: Flooring transition accessories.
7. Section 09 6800 – Carpet: Flooring transition accessories.
8. Division 22: Plumbing Fixtures

1.3. REFERENCES

A. Publication Dates: Comply with standards in effect as of the date of the Contract Documents unless otherwise indicated:

B. American National Standards Institute (ANSI):

1. ANSI A108.02 – General Requirements: Materials, Environmental, and Workmanship.
2. ANSI A108.1A - Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar.
3. ANSI A108.1B - Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex Portland Cement Mortar.
4. ANSI A108.4 - Installation of Ceramic Tile with Organic Adhesives or Water Cleanable Tile-Setting Epoxy Adhesive.
5. ANSI A108.5 – Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex Portland Cement Mortar.
6. ANSI A108.6 – Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy.
7. ANSI A108.10 – Installation of Grout in Tilework.
8. ANSI A108.13 – Installation of Load Bearing, Bonded, Waterproof Membranes for Thin Set Ceramic Tile and Dimension Stone.
9. ANSI A108.17 – Installation of Crack Isolation Membranes for Thin-Set Ceramic Tile and Dimension Stone.
10. ANSI A118.1 - Dry-Set Portland Cement Mortar.
11. ANSI A118.3 - Chemical Resistant, Water Cleanable Tile-Setting and Grouting Epoxy and Water Cleanable Tile-Setting Epoxy Adhesive.
12. ANSI A118.4 - Latex-Portland Cement Mortar.
13. ANSI A118.6 - Standard Cement Grouts for Tile Installation.

14. ANSI A118.7 - Polymer Modified Tile Grouts for Tile Installation.
15. ANSI A118.9 - Cementitious Backer Units.
16. ANSI A118.10 - Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation.
17. ANSI A118.12 - Standard Specifications for Crack Isolation membranes for Thin-Set Ceramic Tile and Dimension Stone Installation.
18. ANSI A136.1 - Organic Adhesives for Installation of Ceramic Tile.
19. ANSI A137.1 - Specifications for Ceramic Tile.

C. American Society for Testing and Materials (ASTM):

1. ASTM C920 – Standard Specification for Elastomeric Joint Sealants.
2. ASTM C1028 - Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method.

D. TCNA (Tile Council of North America) Handbook – TCNA Handbook for Ceramic, Glass, and Stone Tile Installation.

1.4. SUBMITTALS

A. Submit in accordance with Section 01 3300:

1. Submit shop drawings indicating tile layout, expansion and control joints, patterns, color arrangement, trim locations, perimeter conditions, junctions with dissimilar materials, and setting details.
2. Submit product data:

a. Tile and Accessories.
b. Setting materials and Grouts: Include material specifications, characteristics, and instructions for installation.

3. Samples for Verification: Submit full-size samples of each type and color listed.
4. Samples of expansion joint strips in 6” lengths.

B. Submit in accordance with Section 01 7700:

1. Maintenance Instructions: Submit manufacturer's recommended maintenance practices for each type of product specified.
2. Provide Maintenance Stock materials to Owner as specified in this Specification. Provide the Architect/Engineer an itemized letter of transmittal of material delivery signed by the Owner.

1.5. QUALITY ASSURANCE

A. Source Limitations for Tile: Obtain tile of each type and color or finish from one source or producer.

1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.

B. Source Limitations for Other Products: Obtain each of the other products specified in this Section from a single manufacturer for each product.

C. Installer qualifications:

1. Engage an Installer who has a minimum of 3 years experience in completed tile applications similar in material and extent to that indicated for this Project with a record of successful in-service performance. Provide a list of successful projects including a contact list if requested.

1.6. DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site under provisions of Section 01 6000. Deliver packaged materials and store in original containers with seals unbroken and labels intact until time of use in accordance with manufacturer's directions.

B. Store and protect products under provisions of Section 01 6000.

C. Protect liquid materials from freezing or overheating in accordance with manufacturer's instructions.

1.7. PROJECT CONDITIONS

A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

1.8. MAINTENANCE STOCK

A. Provide an extra stock of 3% of tile, trim units, and grout of each material and color installed under this section. Deliver to Owner in unopened cartons (minimum 3% but not less than one carton) and grout in unopened bags. Submit under provisions of Section 01 7700 for Owner's maintenance stock.

1.9. PRE-INSTALLATION CONFERENCE

A. Contractor shall convene a pre-installation conference a minimum of one week prior to commencing work of this Section. Conference shall be attended by all parties directly affecting work of this Section. Review conditions of preparation, installation, and coordination required with related work.

2. PRODUCTS

2.1. PRODUCTS, GENERAL

A. Colors: Where colors have not been indicated, colors shall be selected by the Architect from the manufacturer’s full range of standard available colors.

B. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

2.2. CERAMIC TILE - TL-1 / TL-2 /TL-3 / TL-4 / TL-5

A. Manufacturer/Style Name:

1. (Basis of Design) Daltile / Color Wheel Linear
2. Substitutions: Under provisions of Section 01 6000.

B. Tile Color:

1. Daltile:

a. TL-1: Navy K189 - matte
b. TL-2: Navy K189 - Gloss
c. TL-3: Desert Grey - Gloss
d. TL-4: Arctic White - Gloss
e. TL-5: Navy K189 - Gloss

2. Substitutions: Under provisions of Section 01 6000.

C. Size:

1. TL-1- TL-4: 6" x 18"
2. TL-5: 2" x 8"

D. Thickness: 3/8"

E. Mortar Type: Medium Bed

F. Grout Color: Grey hue, color selected by Architect from manufacturer's full color range.

G. Grout Joint Width: 1/16”

H. Layout: As indicated on Drawings.

I. Tile Trim: Provide sizes/heights to coordinate with depth of field tile.

1. Corner Edge Trim: Quadec aluminum trim by Schluter Systems.
2. Cove Trim: DILEX-AHK trim by Schluter Systems

2.3. SETTING MATERIALS

A. General: Select setting materials based upon project conditions.

1. Mortar for large format wall tile shall be sag- or slip-resistant.
2. White mortar shall be used with glass tile, and marble and light colored natural stone tiles.

B. Mortar, Thin Set: Latex-Portland Cement Mortar: ANSI A118.4; Portland cement, sand, latex additive, and water; minimum 28-day shear bond strength 300 psi.

1. Acceptable manufacturers/products:

a. Bostik / ReFlex Thin Set
b. Custom Building Products / Flex-Bond Thin-Set
c. Mapei / UltraFlex 3

C. Mortar, Medium Bed: Medium-bed, polymer-modified, single-component mortar complying with ANSI A118.4.

D. Mortar, Thickset: Portland Cement Mortar: ANSI A108.1; Portland cement, sand, and water. Include galvanized, welded wire fabric, cleavage membrane, and latex mortar additives as required by project conditions and recommended by TCNA Handbook.

2.4. GROUT MATERIALS

A. General:

1. Color: Unless indicated otherwise, as selected by the Architect from manufacturer's full range of color options.

B. Polymer-Modified Grout: Compliant with ANSI A118.7; cementitious type with polymer-modification to increase durability and reduce porosity of surface; provide unsanded for joints less than 1/8"; provide sanded for joints 1/8" wide or greater.

1. Acceptable manufacturers/products:

a. Bostik / Hydroment Ceramic Tile Grout with Hydroment 425 Multi-Purpose Acrylic Latex Admixture
b. Custom Building Products / Prism
c. Mapei / Ultra-Color Plus
d. TEC / AccuColor XT

2.5. MISCELLANEOUS MATERIALS

A. Tile Backing Panels: Refer to Section 09 2100 – Gypsum Board Assemblies.

B. Trowelable Underlayment and Patching Compounds: Latex-modified, Portland cement-based formulation provided or approved by the manufacturer of tile-setting materials and suitable for installations indicated.

C. Crack Isolation Membrane: Product shall comply with ANSI A118.12 and be recommended by the manufacturer for the application indicated. Product shall be acceptable to the tile and tile-setting material manufacturers.

D. Waterproofing Membrane: Waterproofing membranes compliant with ANSI A118.12 may also be utilized as crack isolation membranes.

1. One-part liquid applied urethane, trowel-applied, compliant with ANSI A118.10.

a. Acceptable Manufacturers/Products:

1) Bostik / Ultra-Set Advanced
2) Substitutions: Under provisions of Section 01 6000.

2. [Liquid-latex rubber or elastomeric polymer, trowel-applied, compliant with ANSI A118.10 and A118.12. Select products acceptable to manufacturers for substrates encountered.

a. Acceptable Manufacturers/Products:

1) Bostik / GoldPlus
2) Custom Building Products / RedGard
3) MAPEI / Mapelastic AquaDefense
4) TEC / HydraFlex

3. Accessories:

a. Fiberglass mesh tape or membrane reinforcing fabric.

b. Other accessories as recommended by membrane manufacturer.

E. Expansion Joints:

1. Field-Fabricated: Sealant and backer rod applied between back-to back edge strips. Flexible and compressible type of closed-cell foam polyethylene backer rod and sealant. Sealant type shall be as follows:

a. Polyurethane sealant complying with Section 07 9200 - Joint Sealants.

1) Sealant Color: To be selected by Architect from manufacturer's full range of colors.

2. Pre-Manufactured: Manufactured expansion strip with metallic anchor angles and a resilient connector.

a. Metal and Resilient Connector Finishes: To be selected by Architect from manufacturer's full range of metallic materials, colors, and finishes.
b. Acceptable manufacturer/product: Schluter DILEX, or Architect approved equal.

F. Transition and Edge Strips: Metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications. Architect to select metallic material and finish from manufacturer's full range of materials.

1. Transition strips: To be selected by Architect from complete selection of standard profiles.
2. Edge strips: Manufacturer's standard angle or L-shape.

G. Control Joint Sealants: Provide grout manufacturer's color-matched sealants; sealants must be mold and mildew resistant; provide sanded and unsanded types.

1. Color: Match color of adjacent grout.
2. Texture: Sanded or unsanded to match texture of adjacent grout.

3. EXECUTION

3.1. INSPECTION

A. Examine substrates, areas, and conditions 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, free of coatings that are incompatible with tile-setting materials including curing compounds and other substances that contain soap, wax, oil, or silicone.
2. Verify substrates comply with flatness tolerances required by ANSI A108.01 for installations indicated.
3. Verify that concrete substrates for tile floors installed with adhesives, bonded mortar bed, or thin set mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.
4. Verify that joints and cracks in tile substrates are coordinated with tile expansion joint locations; if not coordinated, adjust joint locations in consultation with Architect.
5. 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.

B. Notify the Architect in writing of all conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

1. Beginning of installation means Installer accepts condition of existing surfaces and substrate.

3.2. PREPARATION

A. Protect surrounding work from damage or disfiguration.

B. Prior to installing tile, remove dust, oil, and other foreign substances from surfaces. Vacuum clean existing surfaces and substrate, and damp clean.

C. Prepare substrates in accordance with manufacturer recommendations and ANSI A108 Series of tile installation standards.

1. Mechanically scarify surfaces that have a steel trowel finish.
2. Fill holes, depressions and minor cracks with trowelable underlayment and patching compound according to tile-setting material manufacturer's written instructions.
3. Remove protrusions, bumps, and ridges by sanding or grinding.

D. Crack Isolation Membrane: Install crack isolation membrane over major cracks to comply with ANSI A108.17 and manufacturer’s written instructions to produce a membrane bonded securely to substrate. Do not install tile or setting materials over membrane until membrane has cured.

E. Waterproofing Membrane: Install waterproofing membrane to comply with ANSI A108.13 and manufacturer’s instructions. Reinforce joints and corners with fiberglass mesh tape or membrane reinforcing fabric. Do not install tile or setting materials over membrane until membrane has cured. Install waterproofing membrane at the following locations:

1. Shower and Toilet Rooms: All rooms containing showers or toilets shall have waterproofing membrane extend the entire floor surface and turn vertically up 4 inches minimum on wall surfaces. If walls are not tiled, the vertical height of the membrane shall be ½ inch less than the height of the wall base. Waterproofing membrane shall never remain exposed.

a. Shower Stalls: Waterproof walls of shower stalls to a minimum height of 7 feet.
b. Shower Curbs: Curbs of showers shall be completely waterproofed.
c. Shower Pans: The waterproofing membrane shall lap a minimum of 1 inch onto flanges of factory-fabricated shower pans.

3.3. INSTALLATION – GENERAL

A. Install setting materials, tile, accessories, and grout in accordance with manufacturer's instructions, TCNA Handbook, and ANSI standard installation specifications A108 series, as applicable.

1. For the following installations, follow procedures in the ANSI A108 Series of tile installation standards for providing 95 percent mortar coverage: Tile floors in wet areas.

B. Extend tile work into recesses and under equipment and fixtures, to form a complete covering without interruptions, except as otherwise shown. Terminate work neatly at obstructions, edges, and corners without disruption of pattern of joint alignment.

C. Layout: Layout tile work according to the following unless indicated otherwise on the Drawings or elsewhere in this Section:

1. Lay tile to pattern indicated. Do not interrupt tile pattern around openings.
2. Layout tile work and center tile fields both directions in each space or on each wall area.
3. Adjust to minimize tile cutting.
4. Align wall, base, and floor joints.
5. Provide uniform joint widths.
6. Locate expansion joints prior to beginning tile work.
7. Indicate position of tile accessories before beginning tile work.
8. Minimize tile cuts that are less than 1/2 tile in size.
9. Position tile cuts in walls and floors so as not to be obvious.
10. Lay out tile wainscot height to next full tile.
11. Assure wall joints are straight with uniform grout lines that are level and plumb.
12. Assure floor joints are straight with uniform grout lines that are parallel to the walls.
13. Form corners and bases neatly.
14. When using glazing tile sheets, minimize tearing sheets apart by drilling pipe holes as much as possible.
15. Fit tile sheets with joints that are the same width as joints within the interior of the sheets.

D. Grout Joint widths: Unless indicated otherwise, provide the following joint widths:

1. Porcelain Ceramic Tile: 3/8 inch.
2. Ceramic Tile: 1/16 inch.
3. Quarry Tile: 3/8 inch.

E. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Smooth out all exposed cut tile edges. Carefully grind cut edges of tile abutting trim, finish, or built in items for straight, aligned joints.

1. Fit tile closely to electrical outlets, piping, and fixtures so that plates, collars, escutcheons, or covers overlap tile.
2. Form internal angles square coved and external angles bullnosed and square.

F. Expansion Joints:

1. Provide expansion joints where indicated on Drawings and as follows:

    a. Interior Slab on Grade: 20 feet maximum spacing.
    b. Interior Elevated Slab: 8 feet maximum spacing.
    c. Interior Walls: 20 feet maximum spacing.
    d. Interior Surfaces Exposed to Direct Sunlight or Moisture: 8 feet maximum spacing.
    e. Provide additional expansion joints over slab control and movement joints, and changes in substrate materials.

2. Expansion Joint Width:

    a. Interior Joints: Same as grout joint, but not less than 1/8 inch.
    b. Joints through tilework over structural joints shall be not less than the width of the structural joint.

3. Form expansion joints as follows:

    a. Do not saw-cut joints after installing tiles.

b. Field-Fabricated: Form expansion joints by raking out mortar bed as work proceeds, providing a ¼" slot extending clear through. Maintain a clean slot while installing tile and grout. Install per tile and sealant manufacturer requirements, Section 07 9200, and the TCNA Handbook.
c. Pre-Manufactured: Install specified expansion joint strips.

G. Control Joints: Provide control joints at the intersection of walls, ceilings, inside corners, column and other penetration points, and floor-to-wall joints.

1. Control Joint Width: Same as grout joint, but not less than 1/8 inch.
2. Form control joints as follows: Maintain a clean slot while installing tile. Form control joints by raking out grout as work proceeds. Install control joint sealant per sealant manufacturer requirements and Section 07 9200.

H. Install transition/edge strips where edge of tile is exposed and where flooring meets carpet, wood, or other flooring or where indicated on Drawings.

3.4. GROUT AND SEALANT INSTALLATION

A. Allow tile to set for a minimum of 48 hours prior to grouting.

B. Grout tile joints. Fill joints full. No setting material shall be visible in the grout joints. Joint surfaces shall be level or slightly concave with no holes or voids.

C. Apply sealant to expansion joints, control joints, at junction of tile and dissimilar materials, and at junction of dissimilar planes.

3.5. FIELD QUALITY CONTROL

A. Sound tile and ceramic accessories after setting. Replace hollow sounding units.

B. Installed tile shall not exhibit excessive lippage per TCNA Handbook or have raised edges that may create trip hazards.

3.6. CLEANING

A. Clean work under provisions of Section 01 7700.

B. Clean grout and setting materials from face of tile while materials are workable. Leave tile face clean and free of all foreign matter.

C. Unglazed Tile: Unglazed tile may be cleaned with acid solutions only when permitted by the tile and grout manufacturer's printed instructions, but not sooner than 14 days after installation. Protect metal surfaces, cast iron, and vitreous plumbing fixtures from effects of acid cleaning. Flush the surface with clean water before and after cleaning.

D. Finished Tile Work: Leave finished installation clean and free of cracked, chipped, broken, unbonded, or otherwise defective tile work. Remove all grout smears and haze from tile faces.

3.7. PROTECTION

A. When recommended by tile manufacturer, apply a protective coat of neutral protective cleaner to completed tile floors.

B. Protect installed tile work with Kraft paper or other heavy covering during the construction period to prevent damage and wear.

C. Prohibit all foot and wheel traffic from using tiled floors for at least 7 days after grouting is completed.

D. Before final inspection, remove protective coverings and rinse neutral cleaner from all tile surfaces.

END 09 3000

1. GENERAL

1.1. WORK INCLUDES

A. Suspended metal grid ceiling system.

B. Acoustical ceiling panels as shown on drawings and in schedules.

C. Maintenance Stock.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 3100 - Project Coordination
2. Section 01 3300 - Submittal Procedures
3. Section 01 7700 - Closeout Procedures
4. Section 09 2100 - Gypsum Board Assemblies
5. Section 09 9100 - Paints and Coatings
6. Division 21: Sprinkler Heads in Ceiling System
7. Division 23: Air Outlets and Inlets: Air Diffusers in Ceiling System.
8. Division 26: Interior Building Lighting: Light Fixtures in Ceiling System.

1.3. REFERENCES

A. Publication Dates: Comply with standards in effect as of the date of the Contract Documents except for those having different revision dates as referenced in the codes indicated on the Drawings, or unless otherwise indicated.

B. American Society of Civil Engineers (ASCE):

1. ASCE/SEI 7 - Minimum Design Loads for Buildings and Other Structures.

C. American Society for Testing and Materials (ASTM):

1. ASTM A641 - Standard Specification for Zinc–Coated (Galvanized) Carbon Steel Wire.
2. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
3. ASTM A1008 - Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
4. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus.
5. ASTM C635 - Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
6. ASTM C636 - Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.
7. ASTM D610 - Standard Practice for Evaluating Degree of Rusting on Painted Steel Surfaces.
8. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
9. ASTM D3274 - Standard Test Method for Evaluating Degree of Surface Disfigurement of Paint Films by Fungal or Algal Growth, or Soil and Dirt Accumulation.
10. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
11. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Material.

12. ASTM E580 - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions.
13. ASTM E1264 - Standard Classification for Acoustical Ceiling Products.
14. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

D. Ceiling & Interior Systems Construction Association (CISCA).

1. CISCA Seismic Zones 0-2 - Seismic Recommendations for Direct-hung Acoustical Tile and Lay-in Ceilings, Seismic Zones 0-2.

E. International Code Council Evaluation Service (ICC-ES).

1. ICC-ES AC156 - Acceptance Criteria for Seismic Certification by Shake-table Testing of Nonstructural Components.
2. ICC-ES AC184 – Acceptance Criteria for Attachment Devices for Recessed Lighting Fixtures (Luminaires) in Suspended Ceiling Systems.
3. ICC-ES AC368 – Acceptance Criteria for Suspended Ceiling Framing Systems.

1.4. SUBMITTALS

A. Submit in accordance with Section 01 3300:

1. Product Data: For each type of product.

a. Include manufacturer's installation instructions.

2. Samples: For each component indicated and for each exposed finish required, of sizes indicated below:

a. Acoustical Panels: Two 6-inch-square Samples of each type, color, pattern, and texture.

3. Qualification Data: For Installer - Signed by system manufacturer certifying that installers comply with requirements specified in the Quality Assurance section.
4. Product Test Reports: For each acoustical panel ceiling, for tests performed by a qualified testing agency.
5. Evaluation Reports: For each acoustical panel ceiling suspension system, anchor and fastener type, from ICC-ES certifying that system compiles with specified regulatory requirements.

B. Submit in accordance with Section 01 7700:

1. Maintenance Data: Submit maintenance data for each specified product to include in operations and maintenance manuals.
2. Maintenance Stock: Provide Maintenance Stock materials to Owner as specified in this Section. Provide the Architect/Engineer an itemized letter of transmittal of material delivery signed by the Owner.
3. Warranty Documentation: Submit executed copies of written warranty signed by the manufacturer as indicated in this Section.

1.5. QUALITY ASSURANCE

A. Installer Qualifications: The installation of acoustical ceilings shall be by an experienced installation firm which is certified by the manufacturer of the acoustical units.

B. Regulatory Requirements:

1. Building Code Compliance: Provide a system evaluated by ICC-ES to meet seismic requirements of building code in effect for the Project, ASCE/SEI 7, ICC-ES AC156, and ICC-ES AC368.

1.6. 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.

B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

1.7. PROJECT CONDITIONS

A. Maintain a uniform temperature of a minimum 60 degrees F. and humidity of 20 to 40% prior to, during, and after installation.

B. Do not install acoustical ceilings until spaces are enclosed and weathertight, sufficient heat is provided, wet-work in spaces is complete and dry, dust generating activities have terminated, and overhead work is completed, tested, and approved.

1.8. WARRANTY

A. Manufacturer's System Warranty: Provide manufacturer's standard written warranty, to replace materials that fail due to defects in materials and factory workmanship during the warranty period, on manufacturer's standard form warranting acoustical ceiling systems.

1. Failure of material includes, but is not limited to, the following:

a. Sagging and warping.
b. Delamination.
c. Occurrence of 50% red rust on suspension system as defined by ASTM D610 or ASTM B117 test procedures.
d. Growth of mold and mildew.

2. The warranty period shall be a minimum of fifteen (15) years from the date of Substantial Completion.

1.9. MAINTENANCE STOCK

A. At time of completing installation, deliver a stock of extra ceiling panels to the Owner equal to at least 3% of each type of ceiling panels used in Project. Panels shall be packaged with protective covering for storage and identified with appropriate labels.

2. PRODUCTS

2.1. MANUFACTURERS

A. Source Limitations: Obtain each type of acoustical ceiling panel and its supporting suspension system from single source from single manufacturer.

2.2. PERFORMANCE REQUIREMENTS

A. Delegated Design: Design of seismic restraints for ceiling systems shall be in accordance with manufacturer's tested seismic system that has an associated ICC-ES Report stating the system meets the requirements of ASCE/SEI 7 for the seismic design category and ASTM E580, without requiring stabilizer bars.

B. Seismic Performance: Suspended ceilings shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. Seismic Design Category: As indicated on structural Drawings.

C. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: Class A with a flame-spread of 25 or less according to ASTM E1264 when tested according to ASTM E84.
2. Smoke-Developed Index: 50 or less.

2.3. ACOUSTICAL PANELS

A. Acoustical Panel Standard: Provide manufacturer's standard panels according to ASTM E1264 and designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.

B. Type ACT-1:

1. Product/Manufacturer:

a. Ultima #1914 / Armstrong.
b. Substitutions: Under provisions of section 01 6000.

2. Type and Form: Type IV, mineral base with membrane-faced overlay; Form 2, water felted; with glass fiber overlay.
3. Pattern: E (Lightly Textured).
4. Color: White.
5. Light Reflectance (LR) Coefficient: Not less than 0.88.
6. Noise Reduction Coefficient (NRC): Not less than 0.75.
7. Ceiling Attenuation Class (CAC): Not less than 35.
8. Edge/Joint Detail: Reveal.
9. Thickness: 3/4-inch minimum.
10. Modular Size: 24-inch x 48-inch.
11. Suspension Grid Type: ACT-G1.
12. Suspension Grid Face Dimension: 15/16-inch.
13. Recycled Content: Not less than 62%.
14. Sag Resistance: Panels shall be constructed to resist sagging due to humid conditions.

15. Antimicrobial Treatment: Manufacturer's standard broad spectrum, antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D3273, ASTM D3274, or ASTM G21 and evaluated according to ASTM D3274 or ASTM G21.

2.4. METAL SUSPENSION SYSTEM

A. Acceptable Manufacturers: Same as acoustical unit manufacturer:

1. Armstrong.
2. CertainTeed.
3. USG Interiors, Inc.

B. Metal Suspension-System Standard: Provide manufacturer's direct-hung metal suspension system and accessories according to ASTM C635 and designated by type, structural classification, and finish indicated.

C. Type ACT-G1: Wide-Face, Capped, Double-Web, Non-Fire-Rated, Steel Suspension System: Main and cross runners roll formed from commercial quality cold-rolled steel sheet; die cut and interlocking; prepainted, electrolytically zinc coated, or hot-dip galvanized, G30 coating designation; with prefinished 15/16-inch-wide metal caps on flanges.

1. Structural Classification: Intermediate-duty, with a minimum main runner splice strength and main runner and cross runner intersection strength of 60 lbs.
2. Face Design: Flat, flush.
3. Cap Material: Steel or aluminum.
4. Cap Finish: White.

2.5. METAL EDGE MOLDINGS AND TRIM

A. General: Sheet metal edge moldings and trim required for suspended grid system. Comply with seismic design requirements.

B. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material as that used for exposed flanges of suspension-system grid.

1. Finish: White.
2. Edge Molding Type: Manufacturer’s standard angle moldings with 7/8-inch minimum bottom leg that comply with seismic design requirements.
3. Provide prefabricated corner trims at all outside corners, including radiused pieces as required for radiused corners such as bull-nosed concrete masonry units.
4. For penetrations of ceiling, provide edge moldings or trim fabricated to dimensions required to allow for 3/8-inch clearance from penetrating item and 3/8-inch movement on all sides of penetration.

C. Extruded Aluminum Perimeter Trim: Where indicated on Drawings, provide manufacturer's extruded-aluminum perimeter trim, including splice plates, corner pieces, diagonal bracing, and attachment and other clips, complying with seismic design requirements and the following:

1. Product / Manufacturer:

a. Axiom Classic / Armstrong.
b. Cloud Perimeter Trim / CertainTeed.
c. Compässo Elite / USG Interiors, Inc.

2. Finish: White.
3. Dimensions: 3/4-inch nominal horizontal legs, 6-inch vertical face unless indicated otherwise.

2.6. ACCESSORIES

A. General: Wire hangers, braces, ties, stabilizer bars, clips, grid load transfer brackets, splices, impact clips and hold down clips required for suspended grid system. Size for five times the design load indicated in ASTM C635, Table 1, Direct Hung. Comply with seismic design requirements.

B. Wire Hangers, Braces, and Ties: Provide wires as follows:

1. Zinc-Coated, Carbon-Steel Wire: ASTM A641, Class 1 zinc coating, soft temper, pre-stretched.
2. Size: Wire diameter sufficient for its stress at three times hanger design load (ASTM C635, Table 1, "Direct Hung") will be less than yield stress of wire, but not less than 12-gauge (0.106-inch diameter) wire, with a maximum deflection of L/360.

C. Hold-Down Clips: Manufacturer's standard hold-down clips.

D. Seismic Perimeter Clips: Manufacturer's standard seismic clips designed to accommodate movement and secure acoustical grid in place during a seismic event.

1. Product / Manufacturer:

a. BERC2 / Armstrong.
b. CTSPC-2 / CertainTeed.
c. ACM7 & MAC2 / USG Interiors, Inc.

2.7. ACOUSTICAL SEALANT

A. Acoustical Sealant: Refer to Section 07 9200 – Joint Sealants.

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 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 unless shown otherwise on reflected ceiling plans. 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

A. General: Install acoustical panel ceilings according to ASTM C636, ASTM E580, and manufacturer's written instructions.

B. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.

C. Suspend ceiling hangers from building's structural members and as follows:

1. Install system capable of supporting imposed loads to a deflection of L/360 maximum.
2. Locate hangers near each end, no greater than 8-inches from wall, and spaced at a maximum of 4-foot along each carrying channel or direct-hung runners, leveling to a tolerance of 1/8-inch in 12-feet.
3. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system. Hangers shall not be suspended from ducts, pipes, and conduit.
4. Splay hangers only where required and, if permitted with fire-resistance-rated ceilings, to miss obstructions according to seismic design requirements; where hangers are greater than 1 in 6 out of plumb offset resulting horizontal forces by countersplaying.

5. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
6. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
7. Secure wire hangers to ceiling-suspension members and to supports above with a minimum of three tight turns within a 3-inch length. Connect hangers directly to structure or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
8. Each wire shall be one continuous piece. If splices are required, they shall be fabricated using grid manufacturer’s standard wire splice.
9. Secure bracing wires to ceiling suspension members and to supports with a minimum of three full tight turns within a 3-inch length. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.
10. Cross Bracing at Ceilings not Bounded by Walls on all Sides: Where ceilings are not bounded by walls on all sides, provide cross bracing at the perimeter of the ceiling to limit movement during a seismic event as follows:

    a. Install cross bracing wires to minimize visual impact from below.
    b. Install cross bracing wires at all corners of the ceiling.

c. Install cross bracing wires so they do not exceed 45° from the horizontal axis.
d. Install cross bracing in opposite directions and extend to the structure.
e. Install multiple linear cross bracing assemblies for large ceilings.
f. Install cross bracing wires taut.
g. Cross bracing requirements are independent of any other suspension requirements.

11. Cross Bracing at Ceilings Elevation Changes: Where ceiling elevations change occur and are not bounded by rigidly braced bulkheads, provide cross bracing at the elevation change to limit movement during a seismic event as follows:

a. Install cross bracing splay wires at all suspension points along the elevation change at the upper ceiling where the lower ceiling is rigidly attached to the upper ceiling.
b. Install cross bracing splay wires at all suspension points along the elevation change at both the upper and lower ceiling where the ceilings are not rigidly attached to each other.
c. Install cross bracing wires so they do not exceed 45-degrees from the horizontal axis.
d. Install cross bracing wires taut.
e. Cross bracing requirements are independent of any other suspension requirements.

D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels. Install edge molding at intersection of ceiling and vertical surfaces, using longest practical lengths. Cut and bend moldings to conform to outside corners and install prefabricated corner trims. Cut and butt or miter at inside corners to provide hairline joints or use prefabricated corner trims to accept molding from each direction.

1. Screw attach moldings to substrate at intervals not more than 16 inches on center and not more than 3 inches from ends.
2. Do not use exposed fasteners, including pop rivets, on moldings and trim.

E. Locate system on room axis leaving equal border units, unless indicated otherwise on Drawings.

F. Coordinate installation of fixtures, components, and work of other trades with the grid installation. Do not support fixtures and components on main runners or cross runners if weight causes total dead load to exceed deflection capability.

1. Support fixtures and components independently of the grid if required elsewhere in the Contract Documents. Where not shown, support fixture/component loads by supplementary hangers located within 6" of each fixture/component corner [in accordance with seismic requirements.

G. Install grid components using longest practical lengths. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.

1. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
2. Do not eccentrically load system or produce rotation of runners.
3. Cope exposed flanges of intersecting suspension system members so that flange faces will be flush (cope flange of member supported by other member).

4. Perimeter Seismic Installation: At ceilings greater than or equal to 144 square feet in area, install main runners and cross runners at perimeter in accordance with the applicable ICC-ES Report, manufacturer's installation instructions ASTM E580, and ASCE/SEI 7.

    a. Nonattached Walls: Install suspension runners with a 3/8-inch clearance between the ends of the runners and the perimeter molding at two adjacent orthogonal walls.

        1) Provide seismic perimeter clips at all main runners and cross runners and install to allow for free movement of 3/8-inch toward and away from the wall.

    b. Attached Walls: Install suspension runners so ends are tight to perimeter molding at two adjacent orthogonal walls that are opposing the nonattached walls.

        1) Provide seismic perimeter clips at all main runners and cross runners and install so grid is fixed to perimeter molding.

H. Install acoustical panels with undamaged edges and fit accurately into suspension-system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.

1. Install acoustical panels level, in uniform plane, and free from twist, warp, and dents.
2. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension-system runners and moldings.
3. For reveal-edged panels on suspension-system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
4. For reveal-edged panels on suspension-system members with box-shaped flanges, install panels with reveal surfaces in firm contact with suspension-system surfaces and panel faces flush with bottom face of runners.
5. Field rabbet panel edges where required, and paint exposed cut edges to match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.

I. Install hold-down clips to retain panels tight to grid system within 20-feet of an exterior door.

J. Install seismic stabilizer bars at direct concealed systems a maximum of 60 inches on center with stabilizer bars within 24 inches of the perimeter.

3.4. ERECTION TOLERANCES

A. Variation from Flat and Level Surface: 1/8-inch in 12-feet, non-cumulative.

B. Variation from plumb of grid members caused by eccentric loads: 2-degrees maximum.

3.5. CLEANING AND PROTECTION

A. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings and suspension members; comply with manufacturer's instructions for cleaning and touch-up of minor finish damage.

B. Remove and replace work which cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

C. Protect acoustical ceilings and provide proper temperature and humidity and dust control, so that the work will be without damage and deterioration at the time of acceptance.

END 09 5100

1. GENERAL

1.1. WORK INCLUDES

A. Preparation of subfloors.

B. Resilient base.

C. Resilient transition accessories.

D. Installation materials.

E. Maintenance Stock.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 3300 - Submittal Procedures.
2. Section 01 6000 - Product Requirements.
3. Section 01 7700 - Closeout Procedures.
4. Section 03 3000 – Concrete.
5. Section 05 5000 - Metal Fabrications.
6. Section 09 6800 – Carpet.

1.3. REFERENCES

A. Publication Dates: Comply with standards in effect as of the date of the Contract Documents except for those having different revision dates as referenced in the codes indicated on the Drawings, or unless otherwise indicated.

B. American Society for Testing and Materials (ASTM):

1. ASTM D883 – Standard Terminology Relating to Plastics (Type TP and Type TV).
2. ASTM D1566 – Standard Terminology Relating to Rubber (Type TS).
3. ASTM D1755 - Standard Specification for Poly(Vinyl Chloride) Resins.
4. ASTM E648 – Standard Test Method for Critical Radiant Flux of Floorcovering Systems Using a Radiant Heat Energy Source.
5. ASTM E662 - Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.
6. ASTM F710 - Practice for Preparing Concrete Floors to Receive Resilient Flooring.
7. ASTM F1861 – Specification for Resilient Wall Base.
8. ASTM F1869 – Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
9. ASTM F2169 - Specification for Resilient Stair Treads.
10. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.

C. 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.

1.4. DEFINITIONS

A. Resilient Base and Accessories Terminology: Definitions in ASTM D883, ASTM D1566, ASTM D1755, and ASTM F1861 apply to Work of this Section.

B. Type TS: Rubber, Vulcanized Thermoset.

C. Type TP: Rubber, Thermoplastic.

D. Type TV: Vinyl, Thermoplastic.

E. Group 1: Solid products formed by extrusion, coextrusion, molding, and similar processes.

F. Group 2: Layered products formed by laminating a separate wear layer to a substrate after extrusion.

G. Vulcanization: Irreversible process during which a rubber compound, through a change in chemical structure, becomes less plastic and more resistant to swelling by organic liquids while elastic properties are conferred, improved, or extended over a greater temperature range.

1.5. SUBMITTALS

A. Submit in accordance with Section 01 3300:

1. Product Data: For each type of product, submit manufacturer's technical data.

a. Include manufacturer’s installation instructions for each type of product.

2. Samples: For each type of product indicated and for each color, texture, and pattern required, not less than 12-inches long.
3. Samples for Verification: For each type of product indicated and for each color, texture, and pattern required in manufacturer's standard-size Samples, but not less than 12-inches long.
4. Substrate Test Results and Substrate Acceptance: Provide on Installer’s letterhead. Provide comparison of test results to manufacturer’s recommendations. Include a statement indicating acceptance of substrate conditions.
5. Certificates:

a. Adhesives: Certification from resilient product manufacturer that adhesive(s) selected for project is suitable for the specified resilient materials and project substrates.
b. Fire Test Performance: Certified test results from independent testing laboratory acceptable to authorities having jurisdiction, indicating that resilient flooring products comply with fire test performance requirements.

B. Submit in accordance with Section 01 7700:

1. Operations & Maintenance Data: For each type of resilient product submit manufacturer's recommended maintenance practices to include in maintenance manuals.
2. Provide Maintenance Stock materials to Owner as specified in this Section. Provide the Architect/Engineer an itemized letter of transmittal of material delivery signed by the Owner.

1.6. QUALITY ASSURANCE

A. Installer qualifications:

1. Engage an Installer who has a minimum of 3 years' experience in completed flooring applications similar in material and extent to that indicated for this Project with a record of successful in-service performance. Provide a list of successful projects including a contact list if requested.

1.7. DELIVERY, STORAGE, AND HANDLING

A. General: Deliver, store, and handle products under provisions of Section 01 6000 and in accordance with manufacturer's written instructions.

B. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

C. Store resilient products on flat surfaces.

1.8. PROJECT CONDITIONS

A. Store resilient flooring materials in spaces where they will be installed for at least 48 hours before beginning installation.

B. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive resilient products during the following periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

C. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.

D. Install resilient flooring products after other finishing operations, including painting, have been completed.

1.9. MAINTENANCE STOCK

A. Provide an extra stock of 3% of the lineal feet of base materials of each material and color installed under this section. Deliver to Owner in unopened cartons (minimum 3% but not less than one carton). Submit under provisions of Section 01 7700 for Owner's maintenance stock.

2. PRODUCTS

2.1. MANUFACTURERS

A. Source Limitations: Obtain each type of resilient product from single source from single manufacturer, including recommended primers, adhesives, sealants, and leveling compounds. Where primers, adhesives, sealant, or leveling compounds cannot be obtained from a single manufacture, provide certification in writing from resilient product manufacturer that installation materials selected for project are acceptable to the manufacturer for use with resilient materials on project substrates.

2.2. PERFORMANCE REQUIREMENTS

A. VOC Content: All products, including adhesives, shall comply with VOC limits of authorities having jurisdiction.

B. Fire Test Performance: Provide resilient products which comply with the following fire test performance criteria as by testing identical products by an independent testing laboratory acceptable to authorities having jurisdiction:

1. Critical Radiant Flux Classification: Tested according to ASTM E648 or NFPA 253.
2. Surface-Burning Characteristics: Tested according to ASTM E84.
3. Smoke Density Characteristics: Tested according to ASTM E662 or NFPA 258.

2.3. RESILIENT BASE - RWB-1 & RWB-2

A. Thermoplastic-Rubber Base - Type TP-1: ASTM F1861, Type TP (rubber, thermoplastic), Group: I (solid, homogeneous) or II (layered).

1. Products / Manufacturers: Products of the following manufacturers, provided they comply with requirements of the contract documents, will be considered acceptable:

a. Rubber Base / Allstate.
b. Base 2000 / Flexco.
c. 700 Series / Roppe.
d. DuraCove / Tarkett.
e. Rubber Wall Base / VPI Corporation.
f. Substitutions: Under provisions of Section 01 6000.

2. Height:

a. RWB-1: 4"
b. RWB-2: 6"

3. Thickness: 0.125-inch.
4. Length: Coils in manufacturer’s standard length.
5. Outside Corners: Job formed.
6. Inside Corners: Job formed.
7. Styles: Unless indicated otherwise on the Drawings, provide the following base styles:

a. Style A: Straight base without cove. Adjacent to carpeted floors.
b. Style B: Coved base with toe. Adjacent to resilient flooring.

8. Finish: Matte.

9. Colors: Tarkett / 44 Dark Brown
10. Performance Characteristics: Meet or exceed requirements for heat/light, aging, chemicals, dimensional stability as described in ASTM F1861. Meet or exceed requirements for hardness as described in ASTM D2240 (Rubber 85 – Shore A).
11. Fire Test Performance:

    a. Critical Radiant Flux Characteristics: Class I, not less than 0.45 W/sq. cm.
    b. Surface Burning: Class C, minimum.
    c. Smoke Developed: 450, maximum.

2.4. RESILIENT TRANSITION ACCESSORIES

A. Resilient Transition Accessories:

1. Manufacturers: Product of the following manufacturers, provided they comply with requirements of the contract documents, will be considered acceptable:

    a. Flexco.
    b. Roppe.
    c. Tarkett.
    d. VPI Corporation.
    e. Substitutions: Under provisions of Section 01 6000.

2. Location: Provide at all doorways and dissimilar flooring materials.
3. Material: Polyvinyl Chloride (PVC).
4. Width: 1-inch minimum.
5. Colors and Patterns: As selected by Architect from manufacturer's full range of colors.
6. Profile: Unless otherwise indicated, provide profile as required for adjacent flooring materials.

2.5. INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based, or blended hydraulic-cement-based formulation provided or approved by flooring manufacturer for applications indicated.

B. Concrete Slab Primer: Nonstaining type as recommended by flooring manufacturer.

C. Adhesives: Water-resistant type as recommended in writing by resilient product manufacturer for resilient products and substrate conditions.

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.

1. 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, foreign deposits that might interfere with adhesion of resilient products, and other defects impairing performance or appearance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

1. Installation of resilient products indicates acceptance of surfaces and conditions.

3.2. PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates for Resilient Stair Accessories: Prepare horizontal surfaces according to ASTM F710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
4. Moisture Testing: Perform tests so that each test area does not exceed 1000 sq. ft. and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas. In the absence of moisture tests recommended by manufacturer, comply with both of the following:

    a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
    b. Relative Humidity Test: Using in-situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.

5. Submit test reports and statement indicating acceptance of substrate conditions.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound recommended by resilient flooring manufacturer; remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install resilient products until materials are the same temperature as space where they are to be installed.

1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.

E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

F. Apply concrete slab primer, if recommended by flooring manufacturer, prior to application of adhesive. Apply in compliance with manufacturer's directions.

3.3. GENERAL INSTALLATION

A. Install resilient base or stair finishes using method indicated, in strict compliance with manufacturer's printed instructions. Extend resilient base and/or flooring into toe spaces, door reveals, and closets and similar openings.

B. Scribe, cut, and fit resilient base and/or flooring to permanent fixtures; built-in furniture and cabinets; pipes; outlets; and permanent columns, walls, and partitions.

C. Tightly cement resilient base and/or flooring to substrate without open cracks, voids, raising, or puckering at joints; telegraphing of adhesive spreader marks; or other surface imperfections.

3.4. RESILIENT BASE INSTALLATION

A. Comply with manufacturer'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 practical without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.

G. Job-Formed Corners:

1. Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3-inches in length.

    a. Form without producing discoloration (whitening) at bends.

2. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3-inches in length.

    a. Miter or cope corners to minimize open joints.

3.5. RESILIENT ACCESSORY INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient accessories.

B. Resilient Transition Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor covering that would otherwise be exposed.

3.6. CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.

B. Perform the following operations immediately after completing resilient-product installation:

1. Remove adhesive and other blemishes from surfaces.
2. Sweep and vacuum horizontal surfaces thoroughly.
3. Do not wash floor until after period recommended by resilient flooring manufacturer has elapsed, to allow resilient flooring to become well-sealed in adhesive.

C. Damp-mop floor, being careful to remove black marks and excessive soil. Remove excess adhesive or other surface blemishes, using appropriate cleaner recommended by manufacturer of resilient flooring product.

D. Protect flooring against damage during construction period to comply with directions of resilient flooring manufacturer. Protect against damage from rolling loads for initial period following installation by covering with plywood or hardboard. Use dollies to move equipment or furnishings across floors.

1. Cover resilient flooring with undyed, untreated building paper until inspection for Substantial Completion.

END 09 6513

1. GENERAL

1.1. WORK INCLUDES

A. Epoxy Flooring.

B. Urethane Safety Striping

C. Unit Price #2:

1. General Contractor provide all work, including all labor, material, and slab preparation, associated with Slab Vapor Retarder Coating. Refer to Section 00 4100 – Bid Form.

1.2. RELATED REQUIREMENTS

A. Specified elsewhere:

1. Section 01 3300 - Submittal Procedures
2. Section 03 3000 – Concrete
3. Section 09 9100 – Paints and Coatings

1.3. REFERENCES

A. Publication Dates: Comply with standards in effect as of the date of the Contract Documents except for those having different revision dates as referenced in the codes indicated on the Drawings, or unless otherwise indicated.

B. ACI 503R – American Concrete Institute: Use of Epoxy Compounds with Concrete.

C. American Society for Testing and Materials (ASTM):

1. ASTM C307 – Standard Test Method for Tensile Strength of Chemical Resistant Mortar, Grouts, and Monolithic Surfacings.
2. ASTM C579 – Standard Test Methods for Compressive Strength of Chemical Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes.
3. ASTM C580 – Standard Test Method for Flexural Strength and Modulus of Elasticity of Chemical Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes.
4. ASTM C1028 - Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method.
5. ASTM D635 – Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position.
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 D790 – Standard Test Method for Flexural Properties of Unreinforced Plastics and Electrical Insulating Materials.
9. ASTM D4060 – Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser.
10. ASTM D4541 – Standard Test Method for Pull Off Strength of Coatings Using Portable Adhesion Testers.
11. ASTM E648 – Standard Test Method for Critical Radiant Flux of Floor Covering Systems Using Radiant Heat Energy Source.

12. ASTM F1869 – Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
13. ASTM F2170 – Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using In Situ Probes.

D. ICRI 03732 - International Concrete Repair Institute: Guideline for Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays.

E. NFPA 253 – National Fire Protection Association: Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source.

F. SSPC-SP13/NACE 6 – The Society of Protective Coatings: Surface Preparation of Concrete.

1.4. SUBMITTALS

A. Submit in accordance with Section 01 3300:

1. Manufacturer's product literature indicating technical data.
2. Manufacturer's installation and application guide.
3. Slab Vapor Retarder Coating product data indicating compatibility with appropriate flooring.
4. Shop Drawings: Indicate divider strip (and control joint) layout, patterns, and details at joints and adjacent components.
5. Samples for Verification:

    a. Submit three (3) samples of each selected finish on 6" x 6" rigid substrate. Samples shall be actual finished product and exhibit the selected color(s), gloss and texture.

6. Installer Qualifications:

    a. Certification as an authorized installer.

    b. List of Experience: Written description of experience with specified material. Include job size (in square feet) and complexity of projects. List a minimum of five projects including Owner's contact names and phone numbers.

B. Submit in accordance with Section 01 7700:

1. O&M Data: At project closeout, provide in the O&M manuals manufacturer's recommended maintenance instructions for each type of product specified.

1.5. QUALITY ASSURANCE

A. Source Limitations: All system components and accessories shall be obtained from a single manufacturer to ensure total system compatibility and integrity.

B. Installer Qualifications:

1. Installer shall be certified by the system manufacturer as an approved installer for the products in this Section.
2. Installer shall have a minimum of 5 years successful experience with the systems in this Section on projects of similar scale and complexity.

C. Manufacturer Qualifications: The system manufacturer shall have a minimum of 5 years experience in the manufacture of the systems specified in this Section. The manufacturer shall have experienced in-house technical and site representatives qualified to provide expert technical support.

D. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction.

E. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. General:

a. Location: In-place, at location indicated by Architect.
b. Size: 5 feet square.
c. Include cove base on one edge of mockup.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6. PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials to project site with labels legible and intact.

B. Storage: Store materials as recommended by manufacturer. Store materials in their original, undamaged packages and containers, inside a well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

1.7. PROJECT CONDITIONS

A. Environmental requirements:

1. Comply with Manufacturer's recommendations as to environmental conditions under which flooring systems can be applied. Do not apply flooring system at environmental conditions beyond the limits stated without the specific approval of the Manufacturer's technical representative.
2. Do not apply flooring system in areas where dust or other airborne particulate matter is being generated.

1.8. WARRANTY

A. The Manufacturer and Installer shall provide a "Joint and Several" warranty in a single document for the installed system for a period of one year from date of Substantial Completion against failure of workmanship and materials. Failures include, but are not limited to, loss of bond and wear-through to the substrate under normal use.

1. Extent of warranty shall be limited to the repair or replacement of defective surfaces at no cost to the Owner, and for any damage directly resulting from such defects during the warranty period.
2. The warranty shall not include any remedy for defects caused by abuse, improper maintenance or operation, or by normal wear, tear and usage.

1.9. PRE-INSTALLATION CONFERENCE

A. Conduct conference at the project site. Conference shall be attended by all parties directly affecting work of this Section, including the manufacturer's field representative. Conference shall review methods and procedures including, but not limited to, the following:

1. Inspect and discuss condition of substrate and other preparatory work performed by other trades.
2. Review and finalize construction schedule and verify availability of materials.
3. Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review installation and quality control procedures.

2. PRODUCTS

2.1. GENERAL

A. Static Coefficient of Friction: For flooring installed on walkable surfaces, provide aggregates and surface treatments such that the finished flooring will have the following values as determined by testing identical products per ASTM C1028:

1. Level Surfaces: Minimum 0.5
2. Step Treads: Minimum 0.6
3. Ramp Surfaces: Minimum 0.8

B. Color Blending: All blending of multi-colored chips and flakes must be performed by the manufacturer prior to shipping.

C. Fire Test Performance: Provide flooring products which comply with the following fire test performance criteria as determined by an independent testing laboratory acceptable to authorities having jurisdiction:

1. Critical radiant flux (CRF): Not less than the following rating per ASTM E648 or NFPA 253: 0.45 watt per square centimeter, Class I.
2. ASTM D635: Self-extinguishing.

2.2. EPOXY FLOORING – **RF-1**

A. Acceptable Products/Manufacturers: The following products, provided they comply with the requirements of the Contract Documents as determined by the Architect, are considered acceptable:

1. Sherwin Williams / Resuflor Performance HTS
2. Substitutions: Substitutions not permitted.

B. System Description: Epoxy resin flooring with integral solid color; 1/8" minimum, dry-film system thickness. High performance 100% solids floor coating system.

1. Cove Base: Provide at all locations with epoxy flooring.
2. Waterproofing Membrane: Manufacturer's standard waterproofing membrane.

C. Performance Requirements:

1. System shall be in compliance with requirements of USDA, FDA, and IDPH (local public health department).
2. System shall provide the following performance:

Compressive Strength, minimum	ASTM C579: 10,000 psi	or, ASTM D695: 14,000 psi
Flexural Strength, minimum	ASTM C580: 4,000 psi	or, ASTM D790: 5,250 psi
Tensile Strength, minimum	ASTM C307: 1,750 psi	or, ASTM D638: 4,000 psi
Adhesion to Concrete, minimum	ASTM D4541: 400 psi; 100% substrate failure	or, ACI 503R: 300 psi; 100% substrate failure
Abrasion Resistance, maximum	ASTM D4060, 1000 cycles, 1000 g, CS-17 wheel: 90 mg	

D. Finishes:

1. Color: Steel Gray.
2. Texture: To be selected by the Architect from the graduated texture samples provided.
3. Gloss: Satin.

2.3. URETHANE SAFETY STRIPING

E. Acceptable Products/Manufacturers: The following products, provided they comply with the requirements of the Contract Documents as determined by the Architect, are considered acceptable:

1. Sherwin Williams / Resutile HPS 100
2. Substitutions: Substitutions not permitted.

F. System Description: High solids, two-component, aliphatic, moisture-cure urethane applied over an epoxy primer.

1. Locations: Bus bays. See Finish Floor Plans.

G. Finishes:

1. Color: Yellow
2. Finish: Gloss

H. Special Preparation:

1. Prep concrete floor for striping per manufacturer's requirements. Minimum CSP 2 or CSP 3.

2.4. MISCELLANOUS ACCESSORIES

A. Slab Vapor Retarder Coating: Coating applied to concrete slabs to reduce moisture vapor transmission. Product must reduce moisture transmission to an acceptable level for flooring product(s) specified. Materials shall include any skim coating or top coating recommended by coating, adhesive, or flooring manufacturers for proper installation of flooring over the coating.

1. Product/Manufacturer: Product and manufacturer shall be selected by the Contractor and must be acceptable to the flooring and adhesive manufacturers.

3. EXECUTION

3.1. INSPECTION

A. Examine substrates and areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work. Notify the Architect in writing of any unsatisfactory conditions.

B. Perform bond, alkalinity, and moisture tests recommended by flooring manufacturer to determine if surfaces are sufficiently cured and dry, as well as to ascertain presence of curing compounds, or compatibility of curing/sealing compounds.

1. In the absence of moisture tests recommended by manufacturer, comply with both of the following:

a. Perform anhydrous calcium chloride test, ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate as follows:

1) Epoxy Flooring Systems: 3 lb of water/1000 sq. ft. in 24 hours.
2) Urethane Flooring Systems: 10 lb of water/1000 sq. ft. in 24 hours.

b. Perform relative humidity test using in situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum relative humidity level measurement as follows:

1) Epoxy Flooring Systems: 75 percent.
2) Urethane Flooring Systems: 90 percent.

2. Submit test reports and statement indicating acceptance of substrate conditions.

3.2. PREPARATION

A. Prepare substrates in accordance with flooring manufacturer's recommendations and SSPC-SP13/NACE 6 or ICRI 03732.

1. Scarify or shotblast surfaces.
2. Remove coatings from substrates that would inhibit bond, including incompatible curing compounds.
3. Use leveling and patching compounds as recommended by flooring manufacturer for filling small cracks, holes, and depressions in substrates.
4. Cracks and non-moving joints shall be prepared per manufacturer's recommendations to prevent cracks from telegraphing through flooring.
5. Featheredging of flooring is not acceptable. Provide a minimum 1/4 inch depth key cut to properly seat the system, providing a smooth transition between areas, at the following conditions:

a. Drain perimeters.
b. Expansion joint edges.
c. Where the perimeter of the substrate to be coated is not adjacent to a wall or curb and no other flooring transition is indicated.

B. Slab Moisture Control: Where slab moisture vapor transmission is not acceptable for flooring installation, upon direction of the Architect, prepare the slab surface as required by Slab Vapor Retarder Coating manufacturer. Apply coating as directed by manufacturer. Comply with all written instructions of coating manufacturer.

3.3. APPLICATION

A. General: Prepare, install, and cure all system components in accordance with manufacturer's instructions.

1. The system shall follow the contour of the prepared substrate unless slopes or other leveling work has been indicated.

2. Comply with manufacturer's recommendations for drying time between prime and succeeding coats.
3. Remove excess aggregate after film has dried by broom sweeping or industrial grade vacuum.
4. Apply flooring system finish to all floor areas indicated on the Drawings.
5. Unless directed by the Contract Documents do not install flooring on:

    a. Ferrous metals installed in concrete slabs
    b. Non-ferrous metals installed in or adjacent to concrete slabs.
    c. Pipe, conduit, floor drains, insulated conductors, or other electrical, mechanical or process-related equipment.

B. Joints and Cracks:

1. Non-Moving Joints and Cracks: Treat joints and cracks, including transitions from horizontal to vertical surfaces, as recommended by the flooring manufacturer to provide durable, monolithic flooring.
2. Moving Joints: Honor all moving joints. At substrate expansion and isolation joints, provide joint in resinous flooring to comply with resinous flooring manufacturer's written recommendations.

    a. Apply joint sealant specified in Section 07 9200 – Joint Sealants.

3.4. FIELD QUALITY CONTROL

A. Manufacturer's field representative shall be available to advise the Installer throughout the project, perform at least one inspection during the installation, and be present at the Final Inspection.

B. Installer shall inspect all work of this section for procedural, visual and textural acceptability.

C. Final Inspection: Final inspection is to be conducted by the Manufacturer's field representative, Installer, and Architect.

1. Finished product shall be uniform in color, texture, and thickness. It shall match approved samples and be free of skipped areas.
2. Edges shall be straight and boundaries shall be well defined.

D. Refinish areas where portion of finish has been damaged or is not acceptable.

3.5. PROTECTION

A. Contractor shall protect flooring during remainder of construction period to ensure that flooring and finish are without damage or deterioration at time of Substantial Completion.

END 09 6723

1. GENERAL

1.1. WORK INCLUDES

A. Preparation of subfloors.

B. Slab Vapor Retarder Coating.

C. Carpeting - Glue Down method.

D. Carpet adhesive and accessories.

E. Clean up.

F. Maintenance Stock.

G. Unit Price #2.

1. General Contractor provide all work, including all labor, material, and slab preparation, associated with Slab Vapor Retarder Coating. Refer to Section 00 4100 – Bid Form.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 3300 - Submittal Procedures
2. Section 01 6000 - Product Requirements
3. Section 01 7700 - Closeout Procedures
4. Section 09 3000 – Tile
5. Section 09 6513 - Resilient Base, Stair Accessories, & Flooring Accessories

1.3. REFERENCES

A. All references are the current editions unless noted otherwise.

B. American Society for Testing and Materials (ASTM):

1. ASTM D1335: Standard Test Method for Pile Tuft Bind of Pile Yarn Floorcoverings.
2. ASTM D3936: Standard Test Method for Resistance to Delamination of the Secondary Backing of Pile Yarn Floorcovering.
3. ASTM E648: Standard Test Method for Critical Radiant Flux of Floorcovering Systems Using a Radiant Heat Energy Source.
4. ASTM E662: Standard Test Method for Specific Optical Density of Smoke Generated for Solid Materials.
5. NSF/ANSI 140-2007: Sustainable Carpet Assessment Standard.

C. American Association of Textile Chemists and Colorists (AATCC):

1. AATCC 1654 - Lightfastness.
2. AATCC 165 - Crockfastness.
3. AATCC 129/AATCC 23- Atmospheric Fading.
4. AATCC 134: Electrostatic Propensity.

D. CRI Environmental Chamber Test - Indoor Air Quality.

E. 2021 International Building Code

1.4. SUBMITTALS

A. Submit in accordance with Section 01 3300:

1. Submit shop drawings, product data, samples, and installation instructions.

a. Indicate seaming plan, method of joining seams and direction of carpet.
b. Provide physical data on specified products, describing construction and performance characteristics.

2. Submit manufacturer's warranty for materials specified.
3. Substrate Test Results and Substrate Acceptance: Provide on Installer's letterhead. Provide comparison of test results to manufacturer's recommendations. Include a statement indicating acceptance of substrate conditions.
4. Submit two samples 12" x 12" in size illustrating color and pattern for each flooring material specified.
5. Primers, Adhesives, and Seam Sealers Certification: Certification from carpet manufacturer that primer(s), adhesive(s), and seam sealer(s) selected for project are suitable for the specified carpet materials and project substrates
6. Slab Vapor Retarder Coating product data indicating compatibility with appropriate flooring.

B. Submit in accordance with Section 01 7700:

1. Submit operational and maintenance data. Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.
2. Warranty Certificates as specified in this Specification.
3. Provide "Excess Materials" to Owner as specified in this Specification. Provide the Architect/Engineer an itemized letter of transmittal of material delivery signed by the Owner.
4. Provide Maintenance Stock materials to Owner as specified in this Specification. Provide the Architect/Engineer an itemized letter of transmittal of material delivery signed by the Owner.

1.5. QUALITY ASSURANCE

A. Manufacturer: Company specializing in tufted carpet tile with three years minimum experience.

B. Installer: Company with at least 10 projects of similar size and complexity to this project.

1. Superintendent: In accordance with General Conditions.
2. Workers: Experienced, skilled craftsmen.

C. Source Quality Control: Prior to carpet being shipped to project, ensure that manufacturer has tested all carpet and certified that all carpet meets or exceeds each minimum specified requirement and has no surface or color defects.

D. All material used in subfloor preparation and repair shall be recommended by the carpet manufacturer and shall be chemically and physically compatible with the carpet system specified.

E. VOC Content: All products, including adhesives, shall comply with VOC limits of authorities having jurisdiction.

F. Dye Lots: Yarns of each designated color for each site shall be from a single dye lot.

G. Provide carpet materials that meet or exceed the following performance criteria:

1. Flammability: Pass Methenamine Pill Test per DOC-FF-1-70.
2. Flame Spread: Meets NFPA Class 1 when tested under ASTM E-648 glue down.
3. Smoke Density: MBS Smoke Chamber NFPA-258 – less than 450 Flaming Mode.
4. Static Propensity: < 3.5 kV per AATCC-134 for lifetime of carpet.
5. Colorfastness: No change in color due to exposure to light per AATCC 1654. No color change due to atmospheric contaminants, per AATCC 129/AATCC 23. No stain by crocking per AATCC 165.
6. Wear: wear shall not exceed 10 percent of pile face fiber by weight for lifetime of carpet.
7. Warranty for edge ravel, delamination, zippering: lifetime.
8. Stain resistance: A score of no less than 8.0 on the AATCC Red 40 Stain Scale.
9. Indoor Air Quality Certification: Registration per CRI Green Label Program.
10. Anti-microbial: pass standards for inhibiting bacteria and fungus per AATCC 174, parts I, II, and III. Lifetime warranted.

1.6. PROJECT CONDITIONS

A. Verify Dimensions:

1. Verify all dimensions at site.
2. Determine and order sufficient quantities and proper kinds of all products required to complete the work.

B. All materials to be stored in a cool (above 65 degrees F. and below 90 degrees F.), dry location (humidity must be greater than 35% and below 65%), safe from damage and soiling.

C. Maintain minimum 65 degrees F. and maximum 90 degrees F. 72 hours prior to and 72 hours after installation of materials.

D. Sub floor preparation: Shall meet all conditions as specified in the manufacturer’s installation instructions.

1. Perform flooring manufacturer's recommended bond and calcium chloride moisture tests on concrete subfloors to determine if surfaces are sufficiently cured and dry, as well as to ascertain presence of curing compounds, or compatibility of curing/sealing compounds.

a. Do not install flooring products over concrete slabs until testing has determined the substrate conditions are acceptable.

1.7. PRODUCT HANDLING

A. Transport all carpet to site in manufacturer’s original packaging. Packaging to contain manufacturer's name, product name and identification number and other related information. Store in palletized form as supplied by manufacturer. Do not stack pallets.

B. Materials must be available for inspection as required by the Owner, Architect, General Contractor, or manufacturer.

1.8. WARRANTY

A. Manufacturer's Warranty. Provide a standard, printed warranty from the manufacturer agreeing to repair or replace unsatisfactory work caused by defective materials. If the product fails to perform as warranted when properly installed and maintained, the affected area will be repaired or replaced at the expense of the manufacturer. Warranties shall be non-prorated.

B. Contractor's Warranty. Flooring contractor to provide Owner a written warranty that guarantees the completed installation to be free from defects in materials and workmanship for a period of one year after job completion.

1.9. MAINTENANCE STOCK

A. Provide 5% of carpeting of each material and color installed under this section. Submit under provisions of Section 01 7700 for Owner's maintenance stock. Note this is in addition to “Excess Materials” indicated in Part 3 – Execution.

2. PRODUCTS

2.1. CPT-1

A. Manufacturers/Products: The indicated product line of the following manufacturers, provided it complies with the requirements of the contract documents, will be considered acceptable:

1. (Basis of Design) Mannington Commercial / Cryptogram - Output

a. Color: 14378 Crypt

2. Substitutions: Under provisions of Section 01 6000.

B. Type: Tile.
C. Size: 18" x 36"
D. Tile installation: Ashlar.
E. Dye method: Solution-Dyed.
F. Yarn fiber: Nylon
G. Yarn type: 6,6.
H. Backing: Infinity 2

2.2. WOC-1

A. Manufacturers/Products: The indicated product line of the following manufacturers, provided it complies with the requirements of the contract documents, will be considered acceptable:

1. (Basis of Design) Mannington Commercial / Frixtion - Charge

a. Color: 14362 Vector - Chart

2. Mohawk / First Step II GT315

a. Color: Cobalt

3. Milliken / OBEX Tile

a. Color: SKL153-133 Grey

B. Type: Walk-Off Carpet.

C. Size: 24” x 24”.

D. Tile installation (layout) method: Ashlar.

E. Dye method: Solution Dyed.

F. Yarn fiber: Nylon

G. Yarn type: Type 6.

H. Backing:

1. Mannington: Infinity 2
2. Mohawk: EcoFlex NXT
3. Milliken: WellBAC Comfort Cushion

2.3. ACCESSORIES

A. Slab Vapor Retarder Coating: Coating applied to concrete slabs to reduce moisture vapor transmission. Product must reduce moisture transmission to an acceptable level for flooring product(s) specified. Materials shall include any skim coating or top coating recommended by coating, adhesive, or flooring manufacturers for proper installation of flooring over the coating.

1. Product/Manufacturer: Product and manufacturer shall be selected by the Contractor and must be acceptable to the flooring and adhesive manufacturers.

B. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet manufacturer.

C. Primers, Adhesives and Seam Sealers: Recommended in writing by carpet manufacturer to suit materials and substrate conditions.

D. Protection: Nonstaining reinforced building paper such as Seekure, continuous over carpet installation. Provide tape seams as recommended by protection manufacturer.

3. EXECUTION

3.1. EXAMINATION

A. All areas scheduled for carpeting shall be dry, broom-cleaned, and free of grease, oil paint or other foreign substances.

B. Verify that substrate surfaces are smooth and flat with maximum variation of 1/4" in 10' for stretch method installation and 1/8" in 10' for glued type; and are ready to receive work.

C. Perform bond and moisture tests on concrete subfloors as recommended by flooring and adhesive manufacturers to determine if surfaces are sufficiently cured and dry, as well as to ascertain presence of curing compounds, or compatibility of curing/sealing compounds.

1. In the absence of moisture tests recommended by manufacturer, comply with both of the following:

a. Perform anhydrous calcium chloride test, ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
b. Perform relative humidity test using in situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.

2. Submit test reports and statement indicating acceptance of substrate conditions.

D. Notify Architect in writing immediately of all conditions which will prevent producing satisfactory work. Installation of materials constitutes Contractor's acceptance of existing substrate and site conditions and his assumptions of responsibility for all unacceptable finished work caused by previous conditions.

3.2. PREPARATION

A. Ensure that concrete has cured at least 30 days prior to start of work.

B. Slab Moisture Control: Where slab moisture vapor transmission is not acceptable for flooring installation, upon direction of the Architect, prepare the slab surface as required by Slab Vapor Retarder Coating manufacturer. Apply coating as directed by manufacturer. Comply with all written instructions of coating manufacturer.

C. Ensure that floor is smooth, clean and free of all foreign materials before starting installation.

1. Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes and other defects with sub-floor filler.
2. Apply, trowel, and float filler to leave smooth, flat, hard surface.
3. Prohibit traffic unless filler is cured.
4. Vacuum floor surfaces.

D. Maintain a uniform floor temperature of no less than 65 degrees F. in all areas to be carpeted for a period of 72 hours before, during and 72 hours after installation. During the same time period, maintain air movement, mechanically or otherwise.

E. Inspect floor areas to receive carpet.

3.3. CARPET INSTALLATION - DIRECT GLUE METHOD

A. Install carpet, adhesive, and all products in accordance with manufacturer's current printed instructions.

B. Layout carpet and seams in accordance with shop drawings.

C. Verify carpet match to ensure minimal variation between dye lots.

D. Make cuts straight, true and unfrayed.

E. Join seams using manufacturers recommended method. Form seams straight, not overlapped or peaked, and free of gaps. Bond all seams in accord with manufacturer's recommendation. Do not leave seam glue on carpet face.

F. Lay carpet on floors with run of pile in same direction as anticipated traffic.

G. Do not change run of pile in any room where carpet is continuous through a wall opening into another room. Locate change of color or pattern between rooms under door centerline.

H. Cut and fit carpet around interruptions.

I. Lay carpet tight and flat on sub-floor, well fastened, with a uniform appearance. Provide monolithic color, pattern, and texture match within any one area.

J. Install one piece of reducer/transition strip where carpet terminates at other floor coverings. Where splicing can not be avoided, seam ends tight and flush.

K. Unsatisfactory Work: Work installed not in accord with manufacturer's instructions, or in a manner unacceptable to Architect, will be deemed unsatisfactory and may result in Architect requiring removal and relaying at contractor's expense.

3.4. PROTECTION

A. Contractor to provide and maintain proper protection.

B. Prohibit traffic from carpet areas for 24 hours after installation.

C. Place protection continuously with all seams lapped a minimum of 6" and taped. Maintain in good condition until project acceptance, or as otherwise directed.

D. When requested by Architect, completely remove all protection, tape and legally dispose of off site. Removal will be required no later than project acceptance.

3.5. EXCESS MATERIALS

A. Upon completion of work, inventory all usable excess carpet. Show approximate size of each piece and submit for owner's inspection. Clearly mark each selected piece with type, size color, pattern, and room location. Store excess materials in an orderly manner where directed by Owner.

3.6. CLEAN UP

A. Upon completion of work, thoroughly inspect entire installation. Remove all defective work and replace with new materials.

B. Cut off and trim all loose threads. Remove all visible adhesives, seam, cement, and scraps.

C. Clean all carpet with an upright beater bar type vacuum cleaner or as recommended by carpet manufacturer.

D. Do not wet clean any direct glue installation until it has been completed for 60 days.

E. Remove all rubbish, debris, containers, and all excess materials not selected by Owner for its retention and legally dispose of off Owner's premises.

F. Contractor is responsible for all damages to Owner's property resulting from construction operations. Clean, repair, or replace all damages as directed.

G. Leave premises in clean, accepted condition.

END 09 6800

1. GENERAL

1.1. WORK INCLUDES

A. Fabric-Wrapped Acoustical Wall Panels

B. Installation Accessories

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 3300 – Submittal Procedures
2. Section 09 2100 – Gypsum Board Assemblies

1.3. DEFINITIONS

A. NRC: Noise Reduction Coefficient, as measured by ASTM C423.

1.4. REFERENCES

A. Publication Dates: Comply with standards in effect as of the date of the Contract Documents unless otherwise indicated.

B. American Society for Testing and Materials (ASTM):

1. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
2. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
3. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
4. ASTM E795 - Standard Practices for Mounting Test Specimens During Sound Absorption Tests.

1.5. QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacturing fabric-wrapped acoustical wall panels with a minimum of 5 years experience.

B. Field Measurements: Field verify dimensions of all walls to receive fabric-wrapped acoustical wall panels prior to fabrication.

1.6. SUBMITTALS

A. Submit in accordance with Section 01 3300:

1. Product Data: Manufacturer's catalog information edited to indicate specific panel edge, core material, and related accessories to be provided for this project.

2. Shop Drawings: For acoustical wall panels. Include mounting devices and details. Include elevations showing panel sizes and direction of fabric weave and pattern matching. Show intersections with wall base, countertops, doors, electrical outlets and switches, thermostats, air outlets and inlets, access panels, fire sprinklers, and other wall mounted items.
3. Samples:

    a. Samples for Initial Selection: For each type of fabric facing material from acoustical wall panel manufacturer's full range.
    b. Samples for Verification: Prepare samples from same material to be used in the Work. Provide sample panel of indicated core material, edge profile, thickness, and shape, with selected fabric and mounting device. Indicate which edge of panel is top.

B. Submit in accordance with Section 01 7700:

1. Maintenance Instructions: Submit manufacturer's recommended maintenance practices for each type of product. Include fabric manufacturer's instructions for normal cleaning and removal of stains. Include precautions in use of cleaning materials that may be detrimental to surfaces.

1.7. DELIVERY, STORAGE HANDLING

A. Comply with fabric and acoustical wall panel manufacturers' written instructions for minimum and maximum temperature and humidity requirements for shipment, storage, and handling.

B. Protect panel edges from crushing and impact.

1.8. PROJECT CONDITIONS

A. Environmental Limitations: Do not install acoustical wall panels until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Air-Quality Limitations: Protect acoustical wall panels from exposure to airborne odors, such as tobacco smoke, and install panels under conditions free from odor contamination of ambient air.

2. PRODUCTS

2.1. MANUFACTURER

A. Acceptable Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Conwed
   Respond Acoustical Wall and Ceiling Products
   1205 Worden Avenue East
   Ladysmith, WI 54848
   800-932-2383
2. Craxton Acoustical Products, Inc.
   8238 Vicksburg Lane
   Plymouth, MN 55447

612-553-9890

3. Golterman & Sabo, Inc.
   Acousti-Tack
   5901 Elizabeth Avenue
   St. Louis, MO 63110
4. Kinetics Noise Control
   Hardside Acoustical Wall Panels
   6300 Irelan Place
   Dublin, OH 43017
5. Lamvin, Inc.
   7992 Miramar Road
   San Diego, CA 92126-4212
   800-446-6329
6. MPC, Inc.
   Noise Control Products Division
   835 Canterbury Road
   Westlake, OH 44145
   216-835-1405
7. Silent Sound Systems, Inc.
   PO Box 2476
   Grand Rapids, MI 49501
   616-791-1994

2.2. MATERIALS

A. Core Construction:

1. Acoustical Core Material: Compressed, molded glass-fiber board; ASTM C612.
2. Edges: Resin hardened continuous edge.

B. Panels:

1. Sizes: As indicated on Drawings.
2. Edge: Square
3. Mounting:

   a. Individual panels: Mechanical clips or metal Z-clips.
   b. Multiple panels: Concealed spline.

4. Finish: Designtex / Billiard Panel. Color: 4116-405 Navy.
5. Thickness (nominal) and Overall System NRC (minimum):

   a. 2”, NRC 1.10

C. Panel Assemblies:

1. Provide assembled panel units of size and configurations shown on the Drawings.
2. Surface materials shall cover all visible surfaces of panels. The surface materials shall be square and free from puckers, ripples, wrinkles, sags, blisters, seams, adhesive and other foreign matter.
3. Edges of fabric shall be thermally fused to prevent unraveling.
4. Provide Class A fire rating in accordance with ASTM E84.

D. Dimensional Tolerances of Finished Units: Plus or minus 1/16 inch for the following:

1. Thickness.
2. Edge straightness.
3. Overall length and width.
4. Squareness from corner to corner.
5. Chords, radii, and diameters.

3. EXECUTION

3.1. EXAMINATION

A. Examine surfaces scheduled to receive wall panels for unevenness, irregularities, and dampness that would affect quality and execution of work. Do not proceed with work until unsatisfactory conditions have been corrected.

3.2. INSTALLATION

A. Install acoustical wall panels in locations indicated with vertical surfaces and edges plumb, top edges level and in alignment with other panels, faces flush, and scribed to fit adjoining work accurately at borders and at penetrations.

1. Field cut edges shall be covered by means of on-site fabric wrapping.
2. Scribe acoustical wall panels to fit adjacent work. Butt joints tightly.

B. Comply with acoustical wall panel manufacturer's written instructions for installation of panels using type of mounting accessories indicated or, if not indicated, as recommended by manufacturer. Anchor panels securely to supporting substrate.

1. All fastening devices shall be concealed in completed installation.

C. Match and level fabric pattern and grain among adjacent panels.

D. Panels shall be mounted plumb and level and in continuous straight lines.

3.3. CLEANING

A. Clean exposed surfaces of acoustical wall panels to comply with manufacturer’s instructions for cleaning and touch-up of minor finish damage. Clip loose threads; remove pills and extraneous materials.

B. Remove work which cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

3.4. PROTECTION

A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, to ensure that acoustical wall panels are without damage or deterioration at time of Substantial Completion.

B. Replace acoustical wall panels that cannot be cleaned and repaired, in a manner approved by Architect, before time of Substantial Completion.

END 09 8400

1. GENERAL

1.1. WORK INCLUDES

A. Painting work shown on the drawings and schedules, and herein specified, including surface preparation and field painting of the following:

1. Exposed exterior items and surfaces.
2. Exposed interior items and surfaces.
3. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.

B. Paint exposed surfaces whether or not colors are designated in "schedules", except where the natural finish of the material is specifically noted as a surface not to be painted. Where items or surfaces are not specifically mentioned, paint these the same as adjacent similar materials or areas. When color or finish is not designated, the Architect will select these from standard colors available for the materials system specified.

1. Painting includes field painting of exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron work, and primed metal surfaces of mechanical and electrical equipment where the wall surfaces of the area are indicated to be painted.
2. Paint walls behind cabinets, convectors, ventilators, and mechanical and electrical items in finished areas. Surface preparation and priming shall be included.

C. Painting of Mechanical and Electrical Work: Limited to items exposed in equipment rooms and in occupied spaces.

1. Color-code items in accordance with color schedules.
2. Color-band and identify each component with the following:

    a. Flow arrows.
    b. Name.

3. Mechanical items to be painted include, but are not limited to, the following:

    a. Piping, pipe hangers, and supports.
    b. Heat exchangers.
    c. Tanks.
    d. Ductwork.
    e. Insulation.
    f. Motors and mechanical equipment.
    g. Accessory items.
    h. Others as noted on drawings.

4. Electrical items to be painted include, but are not limited to, the following:

    a. Conduit and fittings.
    b. Switchgear.
    c. Panelboards (wall mounted electrical panels).

D. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.

1. Prefinished items include the following factory-finished components:

a. Architectural woodwork and casework.
b. Acoustical wall panels.
c. Lay-in acoustical ceiling tiles.
d. Toilet/shower partitions.
e. Metal lockers.
f. Finished mechanical and electrical equipment.
g. Light fixtures.
h. Distribution cabinets.

2. Concealed surfaces include walls or ceilings in the following generally inaccessible spaces:

a. Foundation spaces.
b. Furred areas.
c. Ceiling plenums.
d. Pipe spaces.
e. Duct shafts.

3. Finished metal surfaces include the following:

a. Anodized aluminum.
b. Stainless steel.

4. Operating parts include moving parts of operating equipment and the following:

a. Valve and damper operators.
b. Linkages.
c. Sensing devices.
d. Motor and fan shafts.

5. Labels: Do not paint over Underwriters Laboratories (UL), Factory Mutual (FM), or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

E. Surface preparation, priming and coats of paint specified are in addition to shop-priming and surface treatment specified under other sections of the work.

F. Maintenance Stock.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 7700 - Closeout Procedures.
2. Section 05 1200 - Structural Steel: Shop priming structural steel.
3. Section 05 5000 - Metal Fabrications: Shop priming ferrous metal.
4. Section 06 4000 – Architectural Woodwork for shop priming exterior and interior architectural woodwork.
5. Section 07 9200 – Joint Sealants: Coordination for “paint-sealant compatibility field mockup”.

6. Section 08 1100 - Metal Doors and Frames for shop priming steel doors and frames.
7. Section 09 2100 - Gypsum Board Assemblies: Surface preparation for gypsum board.
8. Section 09 6723 – Resinous Flooring.
9. Divisions 23 and 26: Painting of mechanical and electrical work is specified in Divisions 23 and 26, respectively.
10. Section 32 1216 - Asphalt Paving for traffic-marking paint.
11. Section 32 1313 - Concrete Paving for traffic-marking paint.

1.3. REFERENCES

A. Publication Dates: Comply with standards in effect as of the date of the Contract Documents except for those having different revision dates as referenced in the codes indicated on the Drawings, or unless otherwise indicated.

B. ASTM International (ASTM):

1. ASTM D523 – Standard Test Method for Specular Gloss.

C. Painting Contractors of Association (PCA):

1. PCA P5 – Benchmark Sample Procedures for Paint and Other Decorative Coating Systems.

D. Steel Structures Painting Council (SSPC) - Surface Preparation Specifications:

1. SSPC - SP1 - Solvent Cleaning.
2. SSPC - SP2 - Hand Tool Cleaning.
3. SSPC - SP3 - Power Tool Cleaning.
4. SSPC - SP6 - Commercial Wet Abrasive Blast Cleaning.
5. SSPC – SP10 – Near-White Metal Wet Abrasive Blast Cleaning.

1.4. DEFINITIONS

A. Drawdown: Color sample produced by a paint shader. This is created by placing roughly a tablespoon of paint on Leneta form WD plain white coated cards. Drawdowns shall be created using a 4 mil. WFT drawdown bar. The bar is pulled across the paint to produce a smooth parabolic-shaped sample of color.

B. Gloss: Conform to ASTM D523 for the following:

1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85 degree meter.
2. Eggshell refers to low-sheen finish with a gloss range between 5 and 20 when measured at a 60 degree meter.
3. Satin refers to low-sheen finish with a gloss range between 15 and 35 when measured at a 60 degree meter.
4. Semigloss refers to medium-sheen finish with a gloss range between 30 and 65 when measured at a 60 degree meter.
5. Full gloss refers to high-sheen finish with a gloss range more than 65 when measured at a 60 degree meter.

C. Paint and Paint Materials: As used herein includes all coating systems materials, including primers, emulsions, enamels, lacquers, stains, sealers and fillers, and other applied materials whether used as prime, intermediate, or finish coats.

1.5. SUBMITTALS

A. Submit in accordance with Section 01 3300:

1. Product Data: For each paint system specified. Include block fillers and primers.

a. Provide manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material proposed for use. Highlight the following:

1) Type of resin.
2) Dry film thickness.
3) Volume solids.
4) Units of sheen.
5) Other performance or descriptive data required by Part 2 of this Specification.
6) If the data listed above is not on the manufacturer's printed data literature, provide the information in a letter of certification from the manufacturer.

b. After color selection, the Architect will furnish color chips for surfaces to be coated.

2. Samples for Verification:

a. Paint: Submit three 3-7/8" x 6" drawdowns of each product and color combination.
b. Concrete/Masonry Coatings (Stains): Provide three 4" x 8" samples of concrete and/or masonry. Samples of concrete and masonry must match that which is to be used in the project. Include mortar joint with masonry samples.
c. Label each card or sample with the following:

1) Project name.
2) Date.
3) Product name.
4) Product number.
5) Color number as stated in the color schedule.
6) Name, address and phone number of the supplying facility.

3. Product Schedule: Provide a schedule detailing each substrate in the same order as the schedule used in Part 3 of this Section. Include the following:

a. The specific products to be used for each coat.

4. Substrate Test Results and Substrate Acceptance, for Masonry, Plaster and Concrete substrates: Provide on Installer's letterhead. Provide comparison of test results to manufacturer's recommendations. Include a statement indicating acceptance of substrate conditions.
5. Qualification Data: At the request of the Architect/Engineer, provide documentation to demonstrate the required level of applicator qualifications as specified in the "Quality Assurance" Article in this Specification 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.
6. Product Certificates: Documentation that the manufacturer has reviewed and approved each painting system.

a. Certification by the manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs).

B. Submit in accordance with Section 01 7700:

1. Provide one drawdown of each paint finish and one wood sample for each stained or natural wood finish utilized on this project. Label each as indicated above.
2. Provide Maintenance Stock materials to Owner as specified in this Specification. Provide the Architect/Engineer an itemized letter of transmittal of material delivery signed by the Owner.

1.6. QUALITY ASSURANCE

A. Applicator Qualifications: Engage an experienced applicator who has completed painting system applications similar in material and extent to that indicated for this Project with a record of successful in-service performance. Provide a list of successful projects including a contact list if requested.

1. Maintain throughout duration of the work a crew of painters who are fully qualified to satisfy requirements of the specifications.

B. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction.

C. Regulatory Requirements:

1. Contractor shall comply with EPA “Renovation, Repair, and Painting (RRP) Rule” governing lead paint.

D. Inspection Agency: The Owner reserves the right to employ an independent testing agency to verify acceptability of substrates and test coating quality, dry mil thickness, and conformance to application requirements.

1.7. DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the Project Site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label, and the following information:

1. Product name or title of material and manufacturer's name.
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.
8. VOC content.
9. Federal Specification number if applicable.

B. Assign a suitable area to the Painting Subcontractor for mixing and storing materials.

1. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than temperature of 45 deg F.

a. Maintain containers in a clean condition, free of foreign materials and residue.
b. Keep storage area neat and orderly.
c. Remove rags and waste from storage areas daily.
d. Protect from materials from freezing. Remove frozen or damaged materials from the job site.

e. Take necessary measures to ensure that work areas are protected from fire and health hazards resulting from handling, mixing, and application.

1.8. PROJECT CONDITIONS

A. Comply with paint manufacturer's written recommendations for temperature, moisture, humidity, and ventilation conditions. These conditions must be maintained and monitored throughout the application and drying process. Where the manufacturer does not have written recommendations, comply with the following:

1. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 deg and 90 deg F.
2. Apply solvent-thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45 deg and 95 deg F.
3. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85%; or at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces. Avoid painting surfaces while they are exposed to full sun.

a. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

4. Provide continuous ventilation and heating to prevent accumulation of hazardous fumes and to maintain surface and ambient temperatures above 45 deg F. for 24 hours before, during, and for 48 hours after application of finishes.

B. Material Safety Data Sheets (MSDS) for the materials utilized shall be kept on site at all times.

1.9. MAINTENANCE STOCK

A. Furnish extra paint materials from the same production run as the materials applied in the quantities described below. Package paint materials in unopened, factory-sealed containers for storage and identify with labels describing contents. Deliver extra materials to the Owner.

1. Quantity: Furnish the Owner with an additional 5%, but not less than 1 gal. or 1 case, as appropriate, of each material, color, and gloss applied.

2. PRODUCTS

2.1. MANUFACTURERS

A. Paint Manufacturers:

1. Materials, paint numbers, and trade names specified are used to indicate type and quality of materials required.
2. Unless otherwise approved in advance in writing by the Architect or as otherwise specified, all painting materials shall be the products of one or more of the following manufacturers:

a. B. Moore Benjamin Moore & Co., Montvale, NJ
b. Chemprobe Chemprobe Corporation, Garland, TX
c. Devoe Devoe Coatings, Strongsville, OH
d. Euclid Euclid Chemical, Cleveland, OH
e. Glidden Glidden Professional Paints, Strongsville, OH

f.	L&M	L&M Construction Chemicals, Inc, Omaha, NE
g.	PPG	PPG Architectural Finishes, Inc., Pittsburgh, PA
h.	Porter	Porter Paints, Louisville, KY
i.	ProSoCo	ProSoCo, Inc., Kansas City, KS
j.	SW	Sherwin-Williams Company, Cleveland, OH
k.	Tnemec	Tnemec Company, Inc.

3. No claim by Contractor concerning unsuitability of any material specified, or his ability to produce first class work with same, will be entertained unless such claim is made in writing to the Architect prior to starting the work.

B. Manufacturer's products which comply with coating qualitative requirements, yet differ in quantitative requirements, may be considered for use when acceptable to Architect. Furnish material data and manufacturer's certificate of performance to Architect for any proposed substitutions.

C. Source Limitations:

1. To the maximum extent practicable, select a single manufacturer to provide all materials required by this section, using additional manufacturers to provide systems not offered by the selected principal manufacturer.
2. For each individual system: Provide primer and other undercoat paint produced by same manufacturer as finish coat. Use only thinners approved by paint manufacturer and use only within recommended limits.

2.2. PAINT MATERIALS, GENERAL

A. Material Compatibility:

1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.

B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified. Paint-material containers not displaying manufacturer's product identification will not be acceptable.

C. Conform to materials specified in "Paint Materials Application Schedule" at end of this Section.

D. Deliver paint to the job site color-mixed except for tinting of undercoats and possible thinning.

E. Conform to paint manufacturer's recommendations for all thinning and tinting.

2.3. COLORS AND FINISHES

A. Color Pigments:

1. Pure, nonfading paints to suit substrates and service indicated.
2. Lead content: Not more than 0.06% lead, based on total nonvolatile (dry-film) weight. This limitation is extended to all surfaces readily accessible to children under seven years of age.

B. Surface treatments and finishes are indicated in the "Finish Schedules" of the Contract Documents.

C. Colors:

1. PT-1: Sherwin Williams / Agreeable Gray SW7029
2. PT-2: Sherwin Williams / Honorable Blue SW6811
3. PT-3: Sherwin Williams / Black Fox SW7020
4. PT-4: Sherwin Williams / Extra White SW7006
5. PT-5: Sherwin Williams / Tin Lizzie SW9163
6. PT-6: Sherwin Williams / Safety Yellow SW 4084 (To be used at exterior bollards)

2.4. PRIMERS

A. Interior/Exterior:

1. Galvanized Metal Primer

a. A single component acrylic vehicle formulated for use on galvanizing in mild industrial and commercial environments.
b. VOC Limit: 250 g/L maximum.
c. Acceptable products/manufacturers:

1) Super Spec HP Acrylic Metal Primer P04 / B. Moore
2) Devflex 4020PF DTM Int/Ext Waterborne Primer / Devoe
3) Pitt Tech Plus 90-912 Int/Ext DTM Industrial Primer / PPG
4) Pro Industrial ProCryl Universal Primer B66_310 / SW

2. Direct-To-Metal Rust Inhibitive Primer:

a. A fast-dry red, gray, or off-white, lead-free, rust inhibitive metal primer for direct application to metal.
b. VOC Limit: 250 g/L maximum.
c. Acceptable products/manufacturers:

1) Super Spec HP Acrylic Metal Primer P04 / B. Moore
2) Devflex 4020PF DTM Int/Ext Waterborne Primer / Devoe
3) Pitt Tech Plus 90-912 Int/Ext DTM Industrial Primer / PPG
4) Pro Industrial ProCryl Universal Primer B66_310 / SW

3. Masonry Block Filler

a. A pure acrylic resin block filler.
b. VOC Limit: 200 g/L maximum.
c. Acceptable products/manufacturers:

1) Ultra Spec K571 / B. Moore
2) Bloxfil 4000 Interior/Exterior Acrylic Latex Block Filler / Devoe
3) Concrete Coatings Block Filler Int/Ext Primer 3010 / Glidden
4) Speedhide 6-15 Int/Ext Masonry Block Filler / PPG
5) PrepRite Block Filler B25W25 / SW

4. High-Performance Masonry Block Filler

a. A pure acrylic resin block filler formulated for use in moderately severe environments and under strong solvent topcoats.
b. VOC Limit: 200 g/L maximum.
c. Acceptable products/manufacturers:

1) Moorcraft Super Craft Latex Block Filler 285 / B. Moore
2) Bloxfil 4000 Interior/Exterior Acrylic Latex Block Filler / Devoe
3) Concrete Coatings Block Filler Int/Ext Primer 3010 / Glidden
4) Pitt Glaze Int/Ext Blockfiller 16-90 / PPG
5) Heavy Duty Block Filler B42W46 / SW

B. Interior:

1. Interior Latex Primer/Sealer

a. A white pigmented interior vinyl acrylic latex primer.
b. VOC Limit: 200 g/L maximum.
c. Acceptable products/manufacturers:

1) Ultra Spec 500 Zero-VOC Interior Latex Primer 534 / B. Moore
2) High Hide Interior Primer Sealer 1000-1200 / Glidden
3) Speedhide 6-2 Interior Latex Primer-Sealer, White / PPG
4) Speedhide Zero 6-4900 Interior Latex Primer-Sealer, White / PPG
5) PRO-MASTER 2000 Interior Latex Primer/Sealer PP867 / Porter
6) ProMar 200 Zero VOC Interior Latex Primer B28W2600 / SW

2.5. FINISHES

A. Exterior:

1. Exterior Alkyd Enamel-Gloss

a. An alkyd enamel formulated for metal surfaces in mild industrial service.
b. Acceptable products/manufacturers:

1) Super Spec HP Urethane Alkyd Gloss Enamel P22 / B. Moore
2) DevGuard 4309 Alkyd Gloss Rust Preventative Enamel / Devoe
3) 6-1610 Series Interior/Exterior WB Alkyd Gloss / PPG
4) Industrial Enamel Urethane Alkyd B54-150 Series / SW

2. Exterior Masonry Coating-Clear

a. An aluminum modified siloxane in a clear, water-repellant solution.
b. Acceptable products/manufacturers:

1) Prime-a-Pel 200 / Chemprobe
2) Chemstop WB Heavy Duty / Euclid
3) Perma-Crete Aqua-Pel Clear Water Repellent 4-6100 / PPG
4) Weather Seal Siloxane PD / ProSoCo
5) Loxon 7% Siloxane Water Repellant A10T7 / SW

B. Interior:

1. Interior Alkyd - Semi-Gloss

   a. A soya-alkyd semi-gloss enamel
   b. VOC Limit: 150 g/L maximum.
   c. Acceptable products/manufacturers:

      1) ADVANCE Waterborne Interior Alkyd Semi-Gloss 793 / B. Moore
      2) Lifemaster Oil Interior/Exterior Semi-Gloss Paint 1506 / Glidden
      3) Speedhide Interior/Exterior WB Alkyd Semi-Gloss 6-1510 Series / PPG
      4) ProMar 200 Interior Waterbased Acrylic-Alkyd Semi-Gloss B34W8251**/** SW

2. Interior Latex-Semi-Gloss

   a. A vinyl-acrylic semi-gloss enamel.
   b. VOC Limit: 150 g/L maximum.
   c. Acceptable products/manufacturers:

      1) Ultra Spec 500 Interior Satin/Pearl Finish T545 / B. Moore
      2) Ultra-Hide No VOC Interior Latex Semi-Gloss 1415 / Glidden
      3) 6-500 Speedhide Interior Latex Semi-Gloss / PPG
      4) 6-4510 Speedhide Zero Interior Latex Semi-Gloss / PPG
      5) Pro-Master Semi-Gloss Interior Latex Paint 6139 Series / Porter
      6) ProMar 200 Zero VOC Interior Latex Semi-Gloss B31W2600 Series / SW

3. Interior Non-Blocking 100% Acrylic Semi-Gloss

   a. Pencil Hardness (ASTM D3363): H or harder.
   b. VOC Limit: 150 g/L maximum.
   c. Acceptable products/manufacturers:

      1) Ultra Spec HP D.T.M. Acrylic Semi-Gloss HP29 / B. Moore
      2) Devflex 4216HP High Performance Waterborne Semi-Gloss Enamel / Devoe
      3) Manor Hall Interior Semi-Gloss 87-6 Series / PPG
      4) Advantage 900 Semi-Gloss Enamel PP919 Series / Porter
      5) ProClassic Waterborne Acrylic Semi-Gloss B31W50 Series / SW

4. Interior Polyamide Epoxy-Semi-Gloss

   a. A two-component semi-gloss polyamide/epoxy resin coating for heavy-duty use.
   b. VOC Limit: 150 g/L maximum.
   c. Acceptable products/manufacturers:

      1) Super Spec HP Acrylic Epoxy Coating P43 / B. Moore
      2) Tru-Glaze WB Waterborne 4408 Epoxy Coating / Devoe
      3) PPG PMC Amerlock 2 VOC Epoxy / PPG
      4) Macropoxy 646-100 Fast Cure Epoxy B58-620 Series / SW

5. Interior Acrylic Epoxy – Semi-Gloss

   a. A semi-gloss water reducible acrylic epoxy finish.
   b. VOC Limit: 150 g/L maximum.
   c. Acceptable products/manufacturers:

1) Tru-Glaze-WB 4426 Epoxy / Devoe
2) Pitt-Glaze WB1 Pre-Catalyzed Acrylic Epoxy 16-510 / PPG
3) Waterbased Catalyzed Epoxy B70/B60V25 / SW

6. Interior Waterborne Acrylic Dryfall – Flat

a. Flash rust-resistant, acrylic or acrylic-blend coating designed to fall dry in 10 feet or less.
b. VOC Limit: 50 g/L maximum.
c. Acceptable products/manufacturers:

1) Latex Dry Fall Flat 395 / B. Moore
2) Waterborne Interior Flat Dry Fall 1280-1200 / Glidden
3) SuperTech DryFog 6-725XI / PPG
4) Low VOC Waterborne Acrylic Dryfall B42W81 / SW

2.6. MISCELLANEOUS MATERIALS

A. Solvents, Thinners, and Cleaners: Shall be approved by paint manufacturer and meet applicable VOC requirements.

3. EXECUTION

3.1. EXAMINATION

A. Examine substrates, areas, and conditions, with the Applicator present, under which painting will be performed for compliance with paint application requirements. Test surfaces as required.

1. Do not begin to apply paint until unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
2. No priming or painting of wood will be permitted on or in building where concrete, masonry, plaster, or other "wet" operations are in process of installation, application, or drying.
3. Do not apply finish coats on interior of building until all interior "wet" and dust producing work is complete and dry, and until heating and ventilating systems are in operation.
4. If a surface cannot be prepared or painted as specified, notify the Architect immediately in writing.

B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates.

1. Examine the specifications for the various other trades and be thoroughly familiar with all of their provisions regarding painting.
2. Furnish information on characteristics of finish materials to other trades to ensure use of compatible primers.
3. Notify the Architect about anticipated problems using the materials specified over substrates primed by others.

C. Testing:

1. Moisture Content: Conduct moisture tests as required and as recommended by paint manufacturers. Do not apply paint if moisture content exceeds paint manufacturer's recommendations.
2. Alkalinity: Test concrete, masonry and plaster surfaces for alkalinity as required and as recommended by paint manufacturers. If problems exist, take corrective action as recommended by paint manufacturers.
3. Compatibility:

    a. All existing painted surfaces that will be repainted shall be tested for compatibility of new coatings to be applied over existing.
    b. All suspect substrates shall be tested for compatibility of coatings.

D. Report and Acceptance: Submit test reports and statement indicating acceptance of substrate conditions.

    1. Application of coatings indicates acceptance of surfaces and conditions.

3.2. COOPERATION WITH OTHER TRADES

A. Schedule and coordinate all work with other trades, and do not proceed until other work and/or job conditions are as required to achieve satisfactory results.

B. Perform painting work in proper sequence with work of other trades to avoid damage to finished work.

3.3. WORKMANSHIP

A. Conform to paint manufacturer's explicit recommendations and requirements in all aspects unless otherwise directed by the Architect.

B. Employ only skilled and experienced painters, working under the supervision of capable foremen. All workmanship must be of highest quality to the Architect's complete satisfaction. Apply all materials in accord with manufacturer's current printed directions. Thin materials only for proper workability and only in compliance with such directions.

3.4. PREPARATION

A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of the size or weight of the item, provide surface-applied protection before surface preparation and painting. Remove, if necessary, for the complete painting of the items and adjacent surfaces. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.

B. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified herein.

    1. Do not paint over scuffed surfaces.
    2. Patch holes, cracks, and other minor defects in surfaces as recommended by paint manufacturer. Bring all areas, including existing surfaces, to true, even surfaces.

C. Cleaning: Before applying paint or other surface treatments, clean the substrates of substances that could impair the bond of the various coatings. Make sure all surfaces are free from dirt, dust, grease, moisture, and all other substances which might interfere with proper application and functioning of paint system.

1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

a. Before painting is started in any area, broom clean and remove excessive dust.
b. After painting begins in a given area, broom cleaning will not be allowed; cleaning shall then be done only with commercial vacuum cleaning equipment.

D. Cementitious Materials: Prepare concrete, concrete masonry block, cement plaster, and mineral-fiber-reinforced cement panel surfaces to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Use abrasive blast-cleaning methods if recommended by paint manufacturer.

1. Patch large openings and holes, and finish flush with adjacent surface. After priming, fill any remaining small holes with prepared patching material.
2. Do not paint until surfaces have cured for 28 days and are thoroughly and completely dry.

E. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, rust, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with the Steel Structures Painting Council's (SSPC) recommendations.

1. Remove dirt and grease with an approved solvent (SSPC-SP1) and wipe dry with clean cloths.
2. Remove rust, mill scale, and defective paint down to sound surfaces or bare metal by approved hand tool cleaning (SSPC-SP2) or power tool cleaning (SSPC-SP3) methods.

a. If on inspection and rust removal, the cross section of a steel member is found to be reduced from rust by more than 1/16 inch, notify Architect before proceeding.

3. Blast steel surfaces clean as recommended by paint system manufacturer and according to requirements of SSPC-SP 6.
4. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
5. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with the same primer as the shop coat.

F. Aluminum: Remove all oil, grease, dirt, oxide, and other foreign materials by wiping, etching, or scrubbing with brushes. If necessary, degrease and steam clean per SSPC-SP1-G3, solvent cleaning.

G. Galvanized Surfaces:

1. Prepare galvanized surfaces for painting by washing with suitable non-petroleum based cleaning solvents (SSPC-SP1) so surface is free of oil and surface contaminants.
2. Do not use gasoline, benzine, and low-flash naphtha.
3. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.

H. Shop-Primed Metallic Surfaces: For shop-primed metallic surfaces such as structural steel, door frames, access panels, fire extinguisher cabinets, etc. prepare for painting as follows:

1. Thoroughly clean shop-primed surfaces as recommended by finish coat manufacturer.
2. Abrade or de-gloss shiny or slick shop-prime coats.
3. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with the same primer as the shop coat.

I. Impervious Surfaces:

1. Remove mildew by scrubbing with solution of trisodium phosphate and bleach.
2. Rinse with clean water and allow surface to dry.

J. Insulated Coverings: Remove dirt, grease, and oil from canvas, cotton, and other insulated coverings to be painted.

K. Previously Coated Surfaces: Prepare and touch up all surfaces to match new work as closely as possible. Thick build up of paint and runs and sags shall be sanded smooth. Prepare existing work to be repainted in an appropriate condition for repainting and provide good adhesion.

L. Materials Preparation: Mix and prepare paint materials according to manufacturer's written instructions.

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. If necessary, remove surface film and strain material before using.
3. Use only thinners approved by paint manufacturer and only within recommended limits.
4. Paint which is badly settled, caked or thickened in the container, or which cannot be readily dispersed with a paddle to a smooth consistency is unacceptable.

3.5. APPLICATION

A. Project Conditions: Comply with paint manufacturer’s written recommendations for temperature, moisture, humidity, and ventilation conditions or as indicated elsewhere in this Section. These conditions must be maintained and monitored throughout the application and drying process.

B. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.

1. Provide application equipment adequate for the work and workmanship required herein.
2. The final coat of wall painting system shall be roller applied.
3. Provide adequate illumination in all areas where painting operations are in progress.
4. Provide and maintain scaffolding, staging, ladders, planks, and drop cloths required for proper execution of the work. Remove when no longer needed. If necessary, temporarily remove such items to avoid interference with work of other trades and relocate at no additional expense to Owner.
5. Store materials not in actual use in tightly covered containers. Maintain containers used in storage, mixing, and application of paint in a clean condition, free of foreign materials and residue.

C. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.

1. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate. Provide the total dry film thickness of the entire system as recommended by the manufacturer.
2. If undercoats, stains or other conditions show through the final coat of paint, apply additional coats until the paint film is of uniform finish, color and appearance. Give special attention to insure that all surfaces, including edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
3. Provide finish coats that are compatible with primers used.
4. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications. Sand lightly between each succeeding enamel or varnish coat.
5. Painting includes all exposed surfaces of every member. Before installation, paint all parts which will be inaccessible after assembly.
6. Verify that all mixed colors match the color selection made by the Architect prior to application of the coating.
7. 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.
8. The number of coats and the film thickness required are the same regardless of application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer.
9. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces 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. Priming, General:

1. Provide barrier coats over incompatible primers, or remove and reprime as required.
2. Priming includes all exposed surfaces of every member including all sides, edges and end cuts.
3. Apply a prime coat to material which is required to be painted or finished, and which has not been prime coated by others.
4. Recoat primed and sealed surfaces where there is evidence of suction spots or unsealed areas in first coat, to assure a finish coat with no burn-through or other defects due to insufficient sealing.
5. Utilize tinted primer if recommended by finish coat manufacturer.
6. Omit the first coat (primer) on metal surfaces which have been shop-primed and touch-up painted, unless touch-up work is not complete.
7. Before glazing, prime all rabbets and glazing stops.
8. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.

E. Exterior Painting: Finish tops, bottoms, and side edges of all exterior doors the same as exterior faces of these doors.

F. Interior and Exterior Painting:

1. Unless otherwise directed, paint items without factory finish, such as conduits, pipes, ducts, grilles, registers, vents, access panels, wire mold, and other items of similar nature to match adjacent wall or ceiling surfaces.

2. 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.
3. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces.
4. Before the final installation of fixed equipment and fixtures, paint surfaces behind them with prime coat.
5. Paint interior surfaces of ducts with a flat, non-specular (non-reflecting) black paint where visible through registers or grilles.
6. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.

G. Interior Painting:

1. Elastomeric Piping Insulation: Where elastomeric piping insulation is indicated to be painted, select appropriate primer and paint products.

H. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary 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.

I. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, runs, cloudiness, color irregularity, brush marks, orange peel, nail holes, or other surface imperfections.

J. Eggshell Enamel Finishes: Roll and redistribute paint to an even and fine texture. Leave no evidence of rolling, such as laps, irregularity in texture, skid marks, or other surface imperfections.

3.6. TOUCHING-UP

A. Touch up, repair, and repaint blemished, damaged, defaced, and otherwise inferior work.

B. Spot repairs must be primed before finish coats are applied.

C. If touch-up spot painting results are not acceptable to the Architect, repaint the defective surface at no additional cost to the Owner.

3.7. FIELD QUALITY CONTROL

A. Contractor will be required to replace all unsatisfactory work caused by improper or defective surfaces as directed, at no additional cost to Owner.

B. Completed Work must match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

C. Painted exterior and interior surfaces shall be considered to lack uniformity and soundness if any of the following defects are apparent. This list includes, but is not limited to, the following:

1. Brush / roller marks, streaks, laps, runs, sags, drips, heavy stippling, hiding or shadowing by inefficient application methods, skipped or missed areas, and foreign materials in paint coatings.

2. Evidence of poor coverage at rivet heads, plate edges, lap joints, crevices, pockets, corners and re-entrant angles.
3. Evidence of blistering, peeling, scaling, streaks, and stains.
4. Colors of all surfaces shall be free from fading.
5. Damage due to touching before paint is sufficiently dry or any other contributory cause.
6. Damage due to application on moist surfaces or caused by inadequate protection from the weather.
7. Damage and/or contamination of paint due to blown contaminants (dust, spray paint, etc.).
8. Inconsistent or uneven lines and edges of color changes, graphics, and striping.

D. Painted surfaces shall be considered unacceptable if any of the following are evident under natural lighting source for exterior surfaces and final lighting source (including daylight) for interior surfaces. This list includes, but is not limited to, the following:

1. Visible defects are evident on vertical or horizontal surfaces when viewed at normal viewing angles from a distance of not less than 39 inches.
2. Visible defects are evident on ceiling, soffit and other overhead surfaces when viewed at normal viewing angles.
3. When the final coat on any surface exhibits a lack of uniformity of color, sheen, texture, and hiding across full surface area.

E. The Owner reserves the right 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. The Owner will engage the services of an independent testing agency to sample the paint material being used. Samples of material delivered to the Project will be taken, identified, sealed, and certified in the presence of the Contractor.
2. The testing agency will perform appropriate tests for the following characteristics as required by the Owner:

    a. Quantitative material analysis.
    b. Abrasion resistance.
    c. Apparent reflectivity.
    d. Flexibility.
    e. Washability.
    f. Absorption.
    g. Accelerated weathering.
    h. Dry opacity.
    i. Accelerated yellowness.
    j. Recoating.
    k. Skinning.
    l. Color retention.
    m. Alkali and mildew resistance.

3. The Owner may direct the Contractor to stop painting if test results show material being used does not comply with specified requirements. The Contractor shall remove noncomplying paint from the site, pay for testing, and repaint surfaces previously coated with the rejected paint. If necessary, the Contractor may be required to remove rejected paint from previously painted surfaces if, on repainting with specified paint, the 2 coatings are incompatible.

3.8. CLEANING

A. Cleanup: At the end of each workday, 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 proper methods of washing and scraping. Be careful not to scratch or damage adjacent finished surfaces.
2. Repair any damage to painter's room.

3.9. PROTECTION

A. Protect work of other trades, whether being painted or not, against damage by painting and finishing work.

B. Protect all surfaces from damage and/or staining due to painting operations. Properly protect all painted and finished surfaces subject to damage or defacement due to other work on building. Contractor will be responsible for restoring, repairing, and/or replacing all work damaged by painting operations, or by his failure to provide and maintain proper protection from damage. Correct damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect.

C. Provide "Wet Paint" signs as required to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.10. PAINT MATERIALS APPLICATION SCHEDULE - EXTERIOR SURFACES

A. Metal

1. Metal primers may be omitted where surfaces are shop primed and if shop primer is compatible with finish coats.
2. Galvanized Metal/Steel

a. Primer: One coat Galvanized Metal Primer.
b. Finish: Two coats Exterior Alkyd Enamel-Gloss.

3. Structural and Miscellaneous Steel (non-galvanized)

a. Primer: One coat Direct-to-Metal Rust Inhibitive Primer.
b. Finish: Two coats Exterior Alkyd Enamel-Gloss.

B. Masonry and Concrete

1. Concrete Masonry Units - Clear Masonry Sealer

a. Primer and Finish: Two Flood coats Exterior Masonry Coating-Clear.

2. Concrete Walls - Clear Sealer

a. Primer and finish: Two Flood coats Exterior Masonry Coating-Clear.

C. Items not specifically mentioned above shall be coated with materials which are designed for the environment to which the items are exposed and the substrate to which the coatings are to be applied. The Architect shall be contacted prior to application.

3.11. PAINT MATERIALS APPLICATION SCHEDULE - INTERIOR SURFACES

A. Drywall (Gypsum Wallboard)

1. Drywall

a. Primer: One coat Interior Latex Primer/Sealer.
b. Finish: Two coats Interior Latex – Semi-Gloss.
c. Provide 2.5 mils dry film thickness, minimum.

2. Drywall – Epoxy

a. Primer: One coat Interior Latex Primer/Sealer.
b. Finish: Two coats Interior Epoxy - Semi-Gloss.
c. Provide 4.0 mils dry film thickness, minimum.

B. Masonry and Concrete

1. Concrete Masonry Units

a. Primer: One coat Masonry Block Filler.
b. Finish: Two coats Interior Latex - Semi-Gloss.

2. Concrete Masonry Units - Epoxy Finish

a. Primer: One coat High-Performance Masonry Block Filler
b. Finish: Two coats Interior Epoxy - Semi-gloss.

C. Metal

1. Metal primers may be omitted where surfaces are shop primed and if shop primer is compatible with finish coats.
2. Galvanized Metal - Alkyd Finish

a. Primer: One coat Galvanized Metal Primer.
b. Finish: Two coats Interior Alkyd - Semi-Gloss.

3. Steel, Miscellaneous, and Ornamental Iron (non-galvanized)

a. Primer: One coat Direct-to-Metal Rust Inhibitive Primer.
b. Finish: Two coats Interior Alkyd Semi-Gloss.

D. Exposed Overhead Work: Dryfall (Painted) Finish

1. Primer: As indicated elsewhere in this Schedule for the particular substrate.
2. Finish: Two coats Waterborne Acrylic Dryfall.

E. Items not specifically mentioned above shall be coated with materials which are designed for the environment to which the items are exposed and the substrate to which the coatings are to be applied. The Architect shall be contacted prior to application.

END 09 9100

1. GENERAL

1.1. WORK INCLUDES

A. Markerboards, and tackboards as shown on drawings, including all required accessories.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 3300 - Submittal Procedures
2. Section 01 7700 - Closeout Procedures
3. Section 04 2000 - Unit Masonry
4. Section 06 1000 - Rough Carpentry
5. Section 09 2100 - Gypsum Board Assemblies

1.3. REFERENCES

A. Publication Dates: Comply with standards in effect as of the date of the Contract Documents unless otherwise indicated.

B. ANSI A208.1 - Mat Formed Wood Particleboard.

C. APA - American Plywood Association.

D. American Society for Testing and Materials (ASTM):

1. ASTM A526 - Steel Sheet, Zinc-coated (galvanized) by the Hot-Dip Process, Commercial Quality.
2. ASTM B209 - Aluminum-Alloy Sheet and Plate.
3. ASTM B221 - Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes.
4. ASTM C36 - Gypsum Wallboard
5. ASTM 424 - Steel Sheets for Porcelain Enameling.
6. ASTM C208 - Insulation Board (cellulose fiber) Structural and Decorative.
7. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials.

E. FS CCC-W-408 - Wall Covering, Vinyl-Coated.

F. FS LLL-B-810 - Building Board, (hardboard) Hard Pressed, Vegetable Fiber.

G. FS L-P-1040 - Plastic Sheets and Strips, Polyvinylfloride.

H. Porcelain Enamel Institute - Performance Specifications for Porcelain Enamel Chalkboards and Markerboards.

1.4. SUBMITTALS

A. Submit in accordance with Section 01 3300:

1. Shop drawings: Indicating wall elevations, dimensions, and anchor details.
2. Product data: Data on markerboards and tackboards, tackboard surface covering, trim, and accessories. Include manufacturer's installation instructions.

3. Samples for verification purposes: Submit actual samples of chalkboard, markerboard, tackboard surfaces and trim in previously selected colors/finishes. Provide 6" square samples of sheet materials and 6" lengths of trim members.

B. Submit in accordance with Section 01 7700:

1. O&M Data: At project closeout, provide maintenance instructions in the O&M manuals for each type of chalkboard, markerboard and tackboard supplied.
2. Materials: Place markerboard pens and erasers on markerboard tray in each room for Substantial Completion inspection.

1.5. QUALITY ASSURANCE

A. Where possible, furnish all markerboards and tackboards by one manufacturer for the entire project.

B. In addition to the requirements of these specifications, comply with manufacturer's instructions and recommendations for all phases of the work, including preparation of substrate, installation of grounds and anchors, and applications of materials.

C. Take field measurements prior to preparation of shop drawings and fabrication where possible to ensure proper fitting of the work.

D. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency. Unless indicated otherwise, all products of this Section shall have the following minimum rating:

1. Class A: Flame spread: 25 or less; Smoke developed: 450 or less.

1.6. WARRANTY

A. Provide a 50 year manufacturer's written warranty agreeing to replace any chalkboards and markerboards that do not retain their original writing and erasing qualities, become slick, or exhibit crazing, cracking or flaking.

2. PRODUCTS

2.1. PORCELAIN ENAMEL MARKERBOARDS

A. Product/Manufacturer: The following products and manufacturers, provided they comply with the requirements of the Contract Documents, are considered acceptable:

1. Markerboard / Claridge Products and Equipment, Inc.
2. Markerboard / Lemco Visual Display Boards.
3. Markerboard / Marsh Industries, Inc.
4. Markerboard / Platinum Visual Solutions

B. Provide the following for each markerboard:

1. Porcelain-on-Metal: Balances, high pressure laminated, 3-ply construction; with facing sheet, core and backing; complying with the following requirements.
2. Facing Sheets: 24 gauge porcelain enamel steel.

3. Provide manufacturer's standard special writing surface with gloss finish intended for use with liquid chalk markers.
4. Wearability Test Method - Comply with requirements of PEI Test CB-1 (+) established by Porcelain Enamel Institute, Inc.
5. Core: Particleboard of 3/8" thickness of ANSI A208.1, Grade 1-M-1.
6. Backing Sheet: Aluminum foil, 0.015" thick.
7. Laminating Adhesive: Manufacturer's standard moisture-resistant thermoplastic type.
8. Color: White.
9. Size: 4’-0” high x width as indicated on drawings.
10. Trim: Snap on anodized aluminum.
11. Chalk trough: Solid extrusion, ribbed section compatible with snap-on trim.
12. Marker Pens: One box of one dozen assorted colors.
13. Erasers: Provide two erasers, appropriate for the specified markerboard.

2.2. VINYL FACED TACKBOARDS

A. Product/Manufacturer: The following products and manufacturers, provided they comply with the requirements of the Contract Documents, are considered acceptable:

1. Fabricork Vinyl / Claridge Products and Equipment, Inc.
2. No. 330 Vinyl Surfaces / Lemco Visual Display Boards.
3. Vinyl fabric covered board / Marsh Industries, Inc.
4. Vinyl Tackboard / Platinum Visual Solutions

B. Provide the following for each tackboard:

1. Vinyl fabric: Comply with FS CCC-W-408, factory laminated to core material.
2. Core: 1/4" thick cork sheet laminated to 1/4" thick fiberboard (no trim edges wrapped).
3. Trim: Snap-on anodized aluminum.
4. Color: Xorel Strie 6423, Color Number 839.
5. Size: 4’-0” high x width as indicated on drawings.

2.3. TRIM AND ACCESSORIES

A. Basic Requirements:

1. Provide straight single-length units wherever possible and keep joints to a minimum.
2. Miter corners to a neat, hairline closure.
3. When structural support accessories are required in addition to normal trim, provide such additional support.

2.4. FABRICATION

A. Shop Assembly:

1. Porcelain Enamel Boards: Fabricate each board from a single panel of material. Panel joints will not be permitted.
2. Trim to be factory applied and feature concealed fasteners.

3. EXECUTION

3.1. INSPECTION

A. Examine the areas and conditions under which units are to be installed. Notify the Architect/Engineer in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

B. Verify that substrate surfaces to receive units are true and plumb. Correct inadequate surfaces before installation of boards.

C. Verify that moisture and temperature levels of substrate and environment have stabilized.

D. Take field measurements prior to shop fabrication when necessary in order to ensure proper fitting of work.

3.2. INSTALLATION

A. Install boards in locations and mounting heights shown on the drawings and in accordance with the manufacturer's instructions. Provide all grounds, clips, backing materials, brackets and anchors, trim, and accessories for a complete installation.

B. Install units with concealed hangers plumb and level, in accordance with the manufacturer's printed instructions.

3.3. PROTECTION AND CLEANING

A. Protection: Cover completed work with building paper or other covering recommended by manufacturer until Substantial Completion.

B. Cleaning: Prior to Substantial Completion, clean all tackboard, markerboard and chalkboard surfaces per manufacturer's cleaning instructions.

END 10 1100

1. GENERAL

1.1. WORK INCLUDES

A. Cutout characters.

B. Fabricated channel dimensional characters.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 3300 - Submittal Procedures
2. Section 06 1000 – Rough Carpentry
3. Section 10 1423 – Panel Signage

1.3. REFERENCES

A. Publication Dates: Comply with standards in effect as of the date of the Contract Documents unless otherwise indicated.

B. American Society of Testing and Materials (ASTM):

1. ASTM A240 – Standard Specification for Chromium and Chromium Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
2. ASTM A666 – Standard Specification for Annealed or Cold Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
3. ASTM B26 – Standard Specification for Aluminum Alloy Sand Castings.
4. ASTM B36 – Standard Specification for Brass Plate, Sheet, Strip, and Rolled Bar.
5. ASMT B69 – Standard Specification for Rolled Zinc.
6. ASTM B152 – Standard Specification for Copper Sheet, Strip, Plate, and Rolled Bar.
7. ASTM B209 – Standard Specification for Aluminum and Aluminum Alloy Sheet and Plate.
8. ASTM B221 – Standard Specification for Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
9. ASTM B584 – Standard Specification for Copper Alloy Sand Castings for General Applications.
10. ASTM D4802 – Standard Specification for Poly(Methyl Methacrylate) Acrylic Plastic Sheet.

1.4. SUBMITTALS

A. Submit in accordance with Section 01 3300:

1. Product Data: Submit manufacturer's technical information, specific product identification and installation instructions for each sign type.
2. Shop Drawings: Submit shop drawings for fabrication and installation of each sign type specified. Include plans, elevations and lettering layout details, including fasteners, anchoring devices, and coordination with other work.

    a. Schedule: Schedule of signage indicating text and location of each sign. Include floor/site plans to show locations. Correlate schedule with designations used in Contract Documents.
    b. Typography copy of each sign, including graphics and symbols.

3. Warranty: Submit unexecuted copy of warranty.
4. Samples for Initial Selection: For each type of sign assembly, exposed component, and exposed finish:

    a. Lettering samples: Submit samples of available typestyles and graphic symbols.
    b. Color samples: Submit full range of color samples for each finish.

B. Submit in accordance with Section 01 7700:

1. Warranty: Executed warranty certificate.
2. Maintenance Instructions: Submit manufacturer's recommended maintenance practices for each type of product specified.

1.5. QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firm regularly engaged in manufacture of products specified in this Section, and whose products have been in satisfactory use under similar service conditions for not less than 5 years.

B. Installer Qualifications: An entity experienced and regularly engaged in installation of work included in this Section. Installers shall be approved by manufacturers when approval is recommended by manufacturers.

1.6. WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
    a. Deterioration of finishes beyond normal weathering.
    b. Separation or delamination of sheet materials and components.

2. Warranty Period: Five years minimum from date of Substantial Completion.

2. PRODUCTS

2.1. GENERAL

A. Graphic Images: Architect will provide computer image files for artwork elements.

2.2. PERFORMANCE REQUIREMENTS

A. Thermal Movements: For exterior dimensional characters, allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.3. CUTOUT CHARACTERS

A. Acceptable Manufacturers: The following manufacturers, provided they comply with the requirements of the Contract Documents as determined by the Architect, are considered acceptable:

1. ACE Sign Systems, Inc.
2. APCO Graphics, Inc.
3. ARK Ramos
4. ASI Sign Systems, Inc.
5. Diskey Sign Company
6. Gemini Incorporated
7. Metal Arts, Division of L & H Mfg. Co.
8. Metallic Arts
9. Steel Art Company

B. General: Characters cutout of sheet materials with uniform faces; square-cut, smooth edges; precisely formed lines and profiles.

1. Character Material: Sheet or plate aluminum.
2. Character Height: As indicated on Drawings.
3. Thickness: Manufacturer's standard for size of character.
4. Finishes:

    a. Integral Aluminum Finish: Anodized color as selected by Architect from full range of industry colors and color densities.

5. Mounting: Projecting studs, using manufacturer’s standard projection dimension unless noted otherwise.
6. Typeface: Futura.

2.4. FABRICATED CHANNEL DIMENSIONAL CHARACTERS – DL-2

A. Acceptable Manufacturers: The following manufacturers, provided they comply with the requirements of the Contract Documents as determined by the Architect, are considered acceptable:

1. ACE Sign Systems, Inc.
2. ARK Ramos
3. ASI Sign Systems, Inc.
4. Diskey Sign Company
5. Gemini Incorporated
6. Steel Art Company

B. General: Fabricated channel characters, formed free from warp and distortion; with uniform faces, sharp corners, and precisely formed lines and profiles; internally braced for stability and for securing fasteners.

1. Configuration: Metal face and side returns.
2. Character Material: Sheet or plate aluminum.

    a. Material Thickness: Manufacturer's standard for size and design of character.

3. Character Height: As indicated on Drawings.
4. Character Depth: 3”.
5. Finishes:
    a. Integral Aluminum Finish: Anodized color as selected by Architect from full range of industry colors and color densities.

6. Mounting: Manufacturer's standard for size and design of character.

a. Mount flush to wall surface.

7. Typeface: Futura.

2.5. MATERIALS

A. Aluminum Castings: ASTM B26, alloy and temper recommended by sign manufacturer for casting process used and for type of use and finish indicated.

B. Aluminum Sheet and Plate: ASTM B209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

C. Aluminum Extrusions: ASTM B221, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

D. Paints and Coatings for Sheet Materials: Inks, dyes, and paints that are recommended by manufacturer for optimum adherence to surface and are UV and water resistant for colors and exposure indicated.

2.6. ACCESSORIES

A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signage, noncorrosive and compatible with each material joined, and complying with the following:

1. Use concealed fasteners and anchors unless indicated to be exposed.
2. Exposed fasteners shall be tamper-resistant.
3. For exterior exposure, furnish nonferrous-metal or stainless-steel devices unless otherwise indicated.

B. Adhesives: As recommended by sign manufacturer.

C. Dissimilar Metal Coating: Cold-applied asphalt mastic, zinc chromate paint, or other nonconductive, nonabsorptive coating.

2.7. FABRICATION

A. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.

B. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.

C. Comply with AWS for recommended practices in welding and brazing. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.

D. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.

E. Internally brace signs for stability and for securing fasteners.

F. Provide rebates, lugs, and brackets necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.

G. Castings: Fabricate castings free of warp, cracks, blowholes, pits, scale, sand holes, and other defects that impair appearance or strength. Grind, wire brush, sandblast, and buff castings to remove seams, gate marks, casting flash, and other casting marks before finishing.

2.8. GENERAL FINISH REQUIREMENTS

A. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Directional Finishes: Run grain with long dimension of each piece and perpendicular to long dimension of finished trim or border surface unless otherwise indicated.

3. EXECUTION

3.1. EXAMINATION

A. Examine the substrates, areas, and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of signage work.

B. Verify that sign-support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.

C. Notify the Architect in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.2. INSTALLATION

A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.

1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
2. Drill holes in substrate using template.
3. Install signs so they do not protrude or obstruct according to the accessibility standard.
4. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of Dissimilar Metal Coating.

3.3. ADJUSTING AND CLEANING

A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.

B. Remove temporary protective coverings and strippable films as signs are installed.

C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END 10 1419

1. GENERAL

1.1. WORK INCLUDES

A. Interior panel signage.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 3300 - Submittal Procedures
2. Section 06 1000 – Rough Carpentry
3. Section 10 1419 – Dimensional Letter Signage

1.3. DEFINITIONS

A. Typography: Image of exact text and appearance of signage, including any graphics and symbols.

1.4. SUBMITTALS

A. Submit in accord with Section 01 3300:

1. Product Data: Submit manufacturer's technical information, specific product identification and installation instructions for each sign type.
2. Shop Drawings: Submit shop drawings for fabrication and installation of each sign type specified. Include plans, elevations and lettering layout details, including fasteners and anchoring devices.

    a. Schedule: Schedule of signage indicating text and location of each sign. Include floor plans to show locations. Correlate schedule with designations used in Contract Documents.
    b. Typography copy, including graphics and symbols.

        1) Provide full typography for each sign.

3. Samples for Initial Selection: Submit manufacturer's standard samples for the following:

    a. Panel color samples: Submit full range of color samples for panels and text.

1.5. QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firm regularly engaged in manufacture of products specified in this Section, and whose products have been in satisfactory use under similar service conditions for not less than 5 years.

B. Regulatory Requirements: Fabricate and install signage in compliance with requirements of the Americans with Disabilities Act (ADA)

1.6. WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Deterioration of finishes beyond normal weathering.
b. Deterioration of embedded graphic image.
c. Separation or delamination of sheet materials and components.

2. Warranty Period: Five years minimum from date of Substantial Completion.

2. PRODUCTS

2.1. ACCEPTABLE MANUFACTURERS

A. Acceptable Manufacturers: The following manufacturers, provided they comply with the requirements of the Contract Documents as determined by the Architect, are considered acceptable:

1. 2/90 Sign Systems, Inc.
2. APCO Graphics, Inc.
3. ASI Sign Systems, Inc.
4. Bunting Graphics
5. InPro Corporation
6. Mohawk Sign Systems
7. Nelson-Harkins
8. Poblocki Sign Company

2.2. SIGNAGE

A. General:

1. Non-Tactile Characters: Letters, Numbers and Symbols to be permanently bonded to smooth background. Letters shall be all uppercase unless indicated otherwise.
2. Tactile Characters: Signage indicated to be “tactile” shall be as follows: Letters, Numbers and Symbols to be permanently bonded and raised a minimum of 1/32 inch from the smooth background. Letters shall be all uppercase.
3. Braille: Furnish Grade 2 Braille characters for tactile signs; same text as letter designations.

a. Characters to have smooth, non-sharp edges.
b. Center justify under room numbers.
c. Left justify under room identification or other text.

B. Materials:

1. Sign panels: Photo-etch nylon-polymer with metal substrate.
2. Backing: Hardboard, complying with AHA A135.4.

C. Typeface: Helvetica Regular.

1. Character Proportions: The width of the uppercase letter “O” is 55 percent minimum and 110 percent maximum of the height of the uppercase letter “I”.
2. Stroke Thickness: Stroke thickness of the uppercase letter “I” shall be 15 percent maximum of the height of the character.

D. Colors/Finishes:

1. Characters/Symbols: As selected by Architect from manufacturer's full range
2. Panel/Background: As selected by Architect from manufacturer's full range

2.3. ACCESSORIES

A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signage, noncorrosive and compatible with each material joined, and complying with the following:

1. Use concealed fasteners and anchors unless indicated to be exposed.

B. Two-Face Tape: Manufacturer's standard high-bond, foam-core tape, 0.045 inch thick, with adhesive on both sides.

2.4. FABRICATION

A. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.

B. Mill joints to a tight, hairline fit.

C. If signage schedule includes text and symbols that exceeds sizes indicated, increase panel size accordingly but field conditions to be verified for sufficient space to accept sign panel prior to fabrication.

2.5. GENERAL FINISH REQUIREMENTS

A. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.6. SIGN TYPES

A. Refer to Panel Signage Drawings at the end of this Section.

B. Type 1 – Room Number, refer to Drawing 10 1423-01.

1. 1b: Fixed Panel.

C. Type 2 – Exit Sign, refer to Drawing 10 1423-02.

D. Type 3 – Number and Room Name, refer to Drawings 10 1423-03.

1. 3a: Fixed square Panel (number) with rectangular Panel (room name).

E. Type 4 – Number and Interchangeable Room Identification, refer to Drawings 10 1423-04.

1. 4a: Fixed square Panel (number) with rectangular Changeable Insert Holder available with single or double slots.

F. Type 6 – Symbol with Message, refer to Drawings 10 1423-06.

1. 6a: Fixed Panel (Men, Women, Stairs, etc.)

G. Type 14 – Maximum Room Occupancy, located inside assembly occupancy rooms, refer to Drawing 10 1423-14.

1. 14a: Single panel with occupant count to be provided by Architect.

H. Type 17 – School Dedication Plaque

1. 17a: Fixed metal panel w/ dedication information. See Drawing 10 1423-17.

2.7. PANEL SIGNAGE SCHEDULE

A. Please see attachments at the end of this specification section.

3. EXECUTION

3.1. EXAMINATION

A. Examine the substrates, areas, and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of signage work.

B. Verify that sign-support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.

C. Notify the Architect in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.2. INSTALLATION

A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.

1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
2. Install signs so they do not protrude or obstruct according to the accessibility standard.
3. Use vandalism resistant anchors installed in accordance with the manufacturer’s specifications; plastic expansion anchors are not acceptable. Installed frames shall not be removable without tools.

B. Unframed Wall/Door Mounted Signs: Install with Two-Face Tape. Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position, and push to engage tape adhesive.

C. Sign Locations: Refer to attached Drawing for additional information.

1. Typical Signs: Install on the latch side of the door, 2 inches from the door jamb and at a height of 60 inches above the finish floor surface to top of sign panel. The bottom of the lowest tactile characters (lettering/numbers, not Braille) shall not be less than 48 inches above the finish floor surface.
2. Directional Signs to be centered within visual area; verify locations with Architect prior to installation.
3. Projecting and Ceiling Mounted Signs will have a minimum clearance of 7’-6” from floor finish surface to the bottom of the sign panel.

3.3. ADJUSTING AND CLEANING

A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.

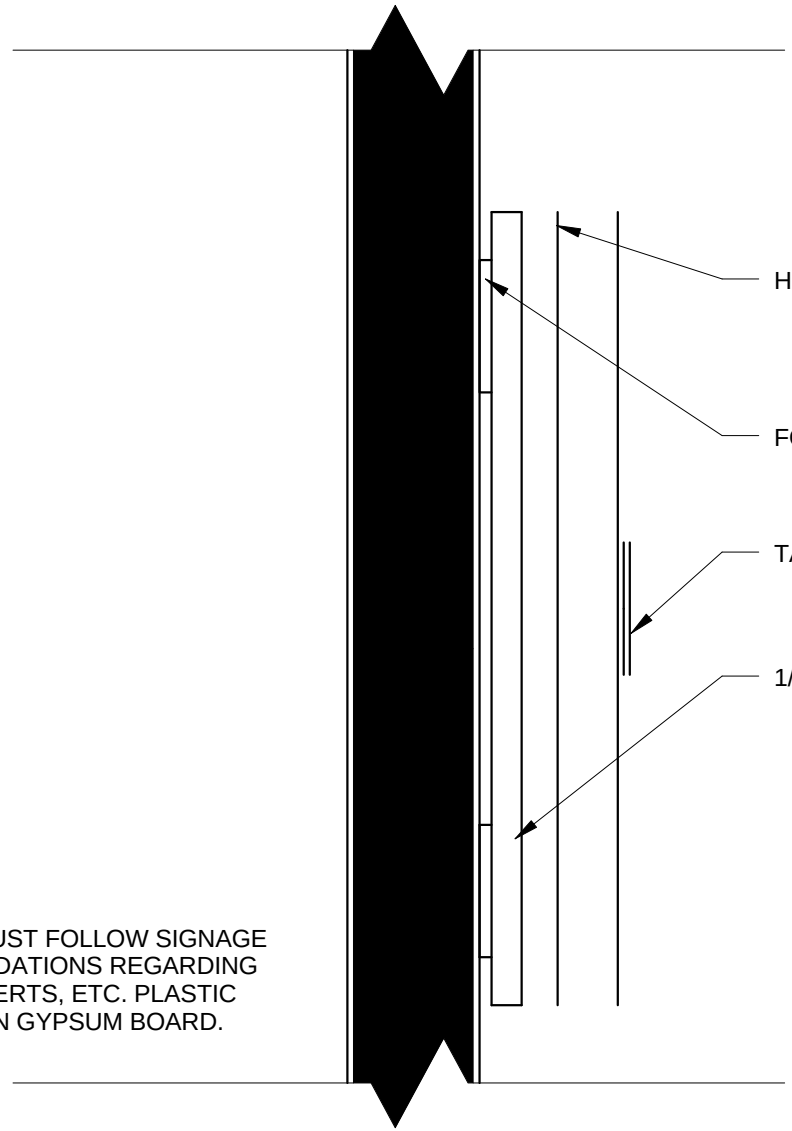
B. Remove temporary protective coverings and strippable films as signs are installed.

C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END 10 1423

MSD Transportation PANEL SIGNAGE SCHEDULE					
ROOM NUMBER	ROOM NAME	QTY.	SIGN TYPE	SIGN TEXT	COMMENTS
100	VESTIBULE	1	02 Exit	EXIT	Mount Sign on Glass
		1	17a Dedication Plaque	Confirm Text w/ Owner	
104a	WORK/BREAK AREA	1	14a Maximum Occupancy	For Your Safety Maximum Occupancy is limited to _____ persons.	Confirm max. occupancy information
105	CONFERENCE ROOM	1	03a Room Number & Name	105 CONFERENCE ROOM	
		1	14a Maximum Occupancy	For Your Safety Maximum Occupancy is limited to _____ persons.	Confirm max. occupancy information
106	DIR. OF TRANSPORT.	1	04a Room Number w/ Changeable Insert	106 (insert)	
107	PAYROLL	1	04a Room Number w/ Changeable Insert	107 (insert)	
108	TRIP COORDINATOR	1	04a Room Number w/ Changeable Insert	108 (insert)	
109	TRANSPORT MANAGER	1	04a Room Number w/ Changeable Insert	109 (insert)	
110	CLOSET	1	01b Room Number	110	
111	STORAGE	1	01b Room Number	111 STORAGE	
112	DISPATCH OFFICE	1	03a Room Number & Name	112 DISPATCH OFFICE	
114	MEN'S RESTROOM	1	06a Symbol w/ Message	(MEN/ADA SYMBOL) MEN	
115	WOMEN'S RESTROOM	1	06a Symbol w/ Message	(WOMEN/ADA SYMBOL) WOMEN	
116	CUSTODIAL	1	01b Room Number	116	
117	STORAGE	1	01b Room Number	117 STORAGE	
118	DATA	1	01b Room Number	118	
119	DRIVER'S ROOM	2	03a Room Number & Name	119 DRIVER'S ROOM	
		1	02 Exit	EXIT	Mount Sign on Glass
		1	14a Maximum Occupancy	For Your Safety Maximum Occupancy is limited to _____ persons.	Confirm max. occupancy information
121	WOMEN'S RESTROOM	1	06a Symbol w/ Message	(WOMEN/ADA SYMBOL) WOMEN	
122	MEN'S RESTROOM	1	06a Symbol w/ Message	(MEN/ADA SYMBOL) MEN	
124	MECH/ELEC	1	01b Room Number	124 ELECTRICAL/MECHANICAL	

125	TRAINING	1	03a Room Number & Name	125 TRAINING ROOM	
		1	14a Maximum Occupancy	For Your Safety Maximum Occupancy is limited to _____ persons.	Confirm max. occupancy information
126	TRAINING OFFICE	1	04a Room Number w/ Changeable Insert	126 (insert)	
127	TRAINING OFFICE	1	04a Room Number w/ Changeable Insert	127 (insert)	
128	VESTIBULE	1	02 Exit	EXIT	Mount Sign on Glass
129	DRIVE THROUGH BAYS	1	03a Room Number & Name	129 DRIVE THROUGH BAYS	
		2	02 Exit	EXIT	
130	MANAGER'S OFFICE	1	04a Room Number w/ Changeable Insert	130 (insert)	
131	LAUNDRY	1	01b Room Number	131 LAUNDRY	
132	WOMEN'S LOCKER	1	06a Symbol w/ Message	(WOMEN/ADA SYMBOL) WOMEN'S LOCKER ROOM	
133	MEN'S LOCKER	1	06a Symbol w/ Message	(MEN/ADA SYMBOL) MEN'S LOCKER ROOM	
134	PART'S STORAGE	1	01b Room Number	134	
135	BREAK ROOM	1	01b Room Number	135 BREAK ROOM	
		1	14a Maximum Occupancy	For Your Safety Maximum Occupancy is limited to _____ persons.	Confirm max. occupancy information
136	TRUCK BAY	1	01b Room Number	136 TRUCK BAY	
		1	02 Exit	EXIT	
137	STORAGE	1	01b Room Number	137 STORAGE	
138	STAIR	1	06a Symbol w/ Message	STAIR (STAIR SYMBOL)	
139	WORK BAY	1	01b Room Number	139 WORK BAY	
		1	02 Exit	EXIT	
140	TIRE STORAGE	1	01b Room Number	140 TIRE STORAGE	
141	DUMPSTER ENCLOSURE	1	01b Room Number	141 DUMPSTER ENCLOSURE	
201	MEZZANINE	1	01b Room Number	201 MEZZANINE	



NOTE: ANCHORAGE SYSTEM MUST FOLLOW SIGNAGE MANUFACTURER'S RECOMMENDATIONS REGARDING SIZES OF HOLES, SCREWS, INSERTS, ETC. PLASTIC INSERTS SHALL NOT BE USED IN GYPSUM BOARD.

DWG. NO.
10 1423 - A
FRAMELESS

PANEL SIGNAGE SECTION

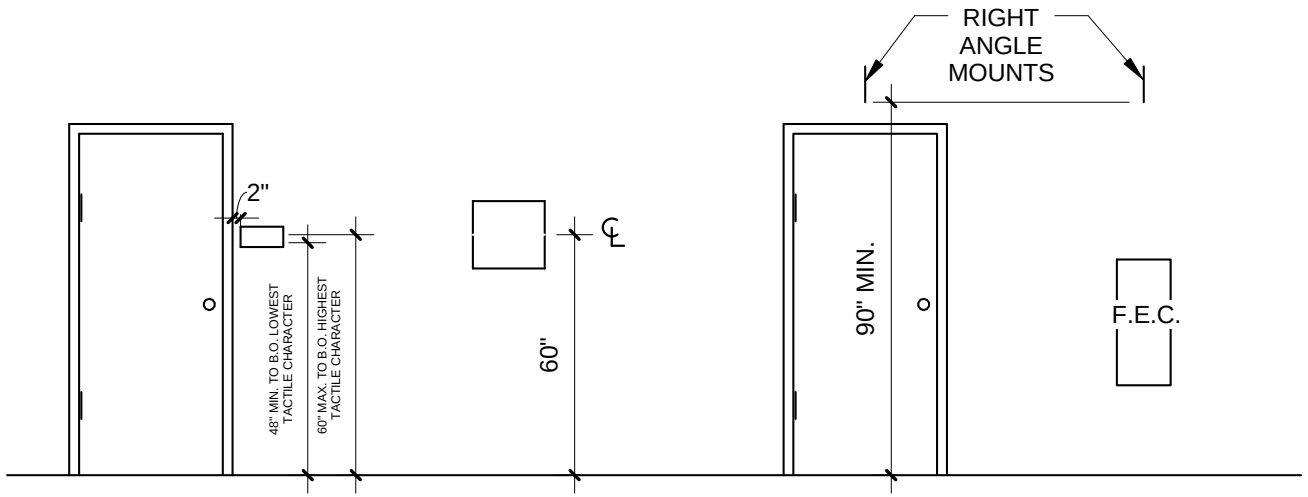
INTERIOR IDENTIFICATION SYSTEM

SPECIFICATION SECTION 10 1423 PANEL SIGNAGE

Design Firm
Registration
#184-000723

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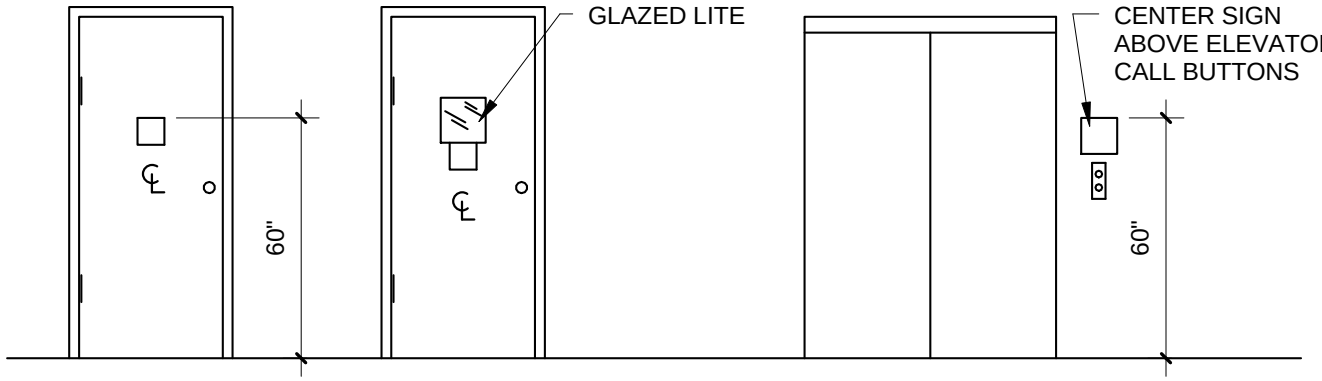


TYPICAL WALL MOUNT

DIRECTIONAL WALL MOUNT

SPECIAL CONDITION RIGHT ANGLE MOUNT

FIRE EXTINGUISHER RIGHT ANGLE MOUNT



DOOR MOUNT
SIGNAGE ON DOOR WHERE WALL MOUNTING NOT POSSIBLE
(VERIFY W/ ARCHITECT PRIOR TO MOUNTING)

ELEVATOR WARNING

DWG. NO.
10 1423 - B

SIGN LOCATION & ELEVATION

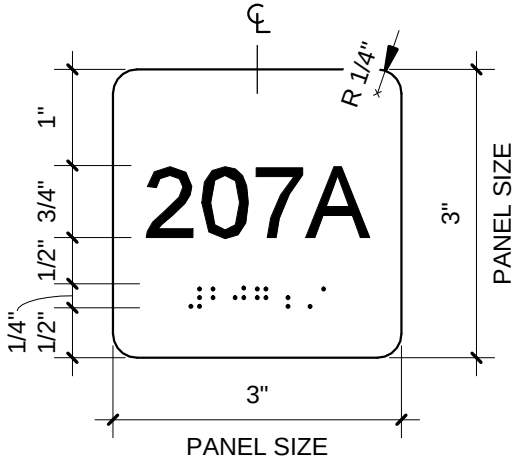
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SPECIFICATION SECTION 10 1423 PANEL SIGNAGE

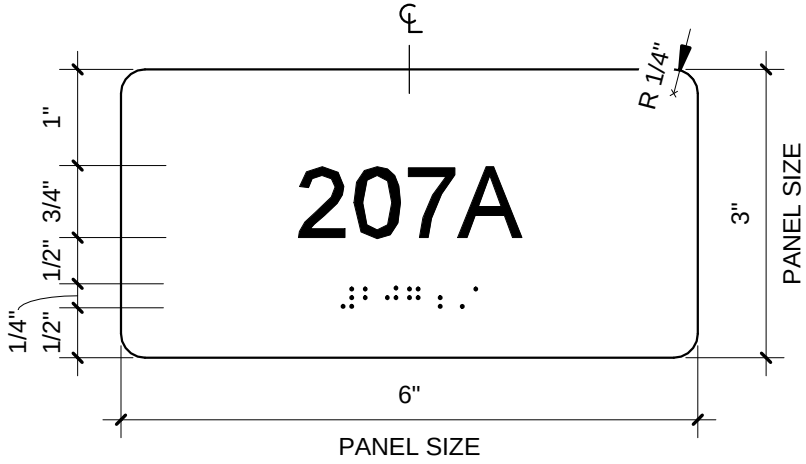
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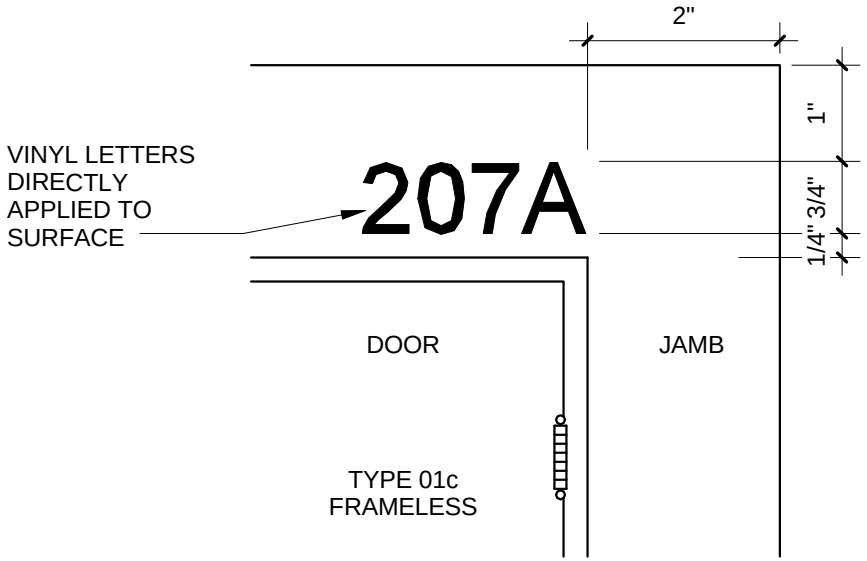
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TYPE 01a
TACTILE SIGNAGE



TYPE 01b
TACTILE SIGNAGE



TYPE 01c
FRAMELESS

NOTE: FONTS AND BRAILLE AS SHOWN ARE FOR GRAPHIC REPRESENTATION ONLY. FABRICATED TYPEFACE SHALL BE AS SPECIFIED.

DWG. NO.
10 1423-01
FRAMELESS

ROOM NUMBER

INTERIOR IDENTIFICATION SYSTEM

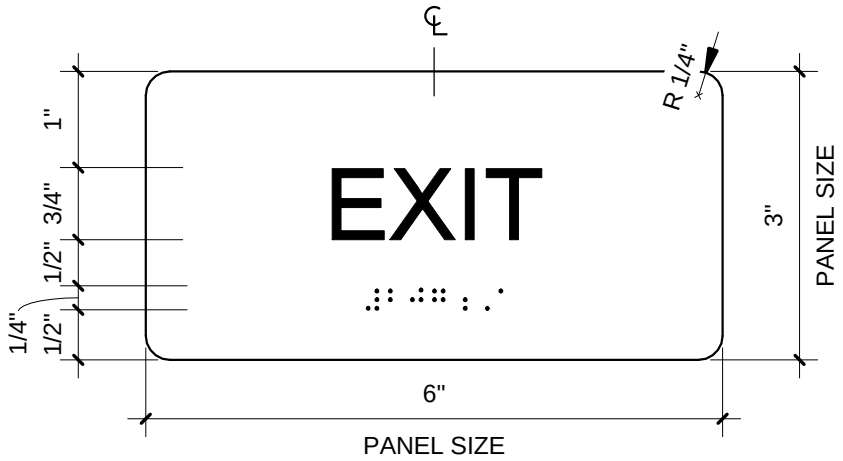
SPECIFICATION SECTION 10 1423 PANEL SIGNAGE

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TYPE:
01a
01b
01c

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TYPE 02
TACTILE SIGNAGE

NOTE: FONTS AND BRAILLE AS SHOWN ARE FOR GRAPHIC REPRESENTATION ONLY. FABRICATED TYPEFACE SHALL BE AS SPECIFIED.

DWG. NO.
10 1423-02
FRAMELESS

EXIT IDENTIFICATION

INTERIOR IDENTIFICATION SYSTEM

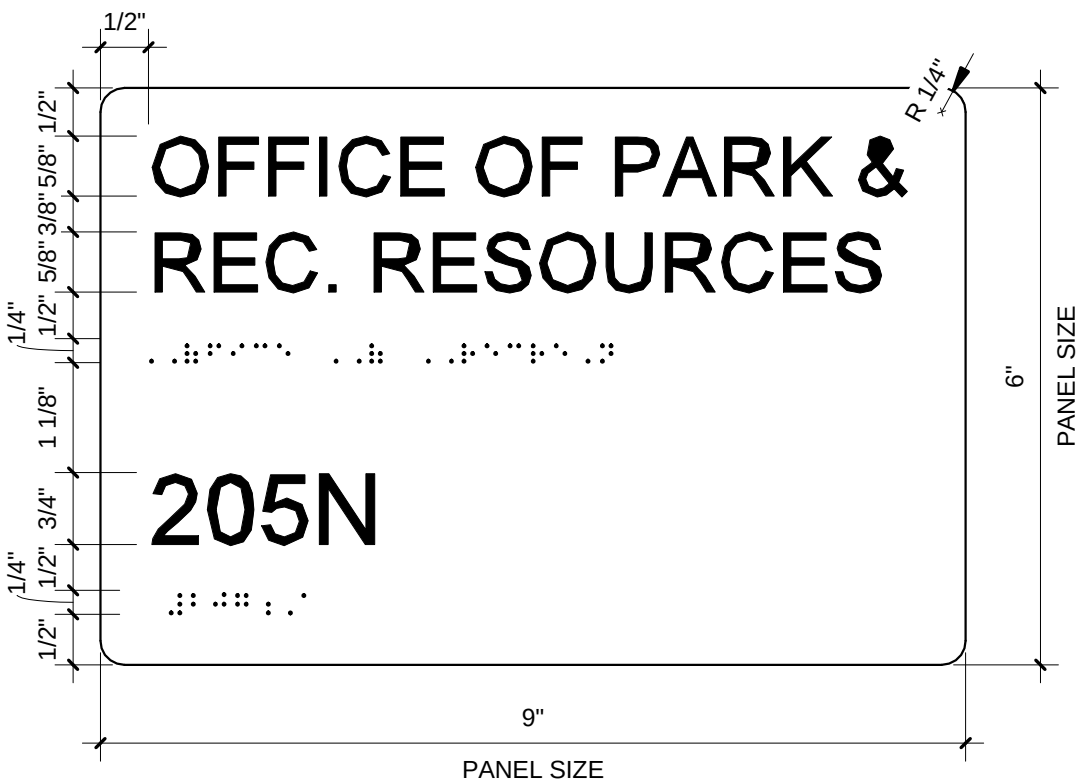
SPECIFICATION SECTION 10 1423 PANEL SIGNAGE

Design Firm
Registration
#184-000723

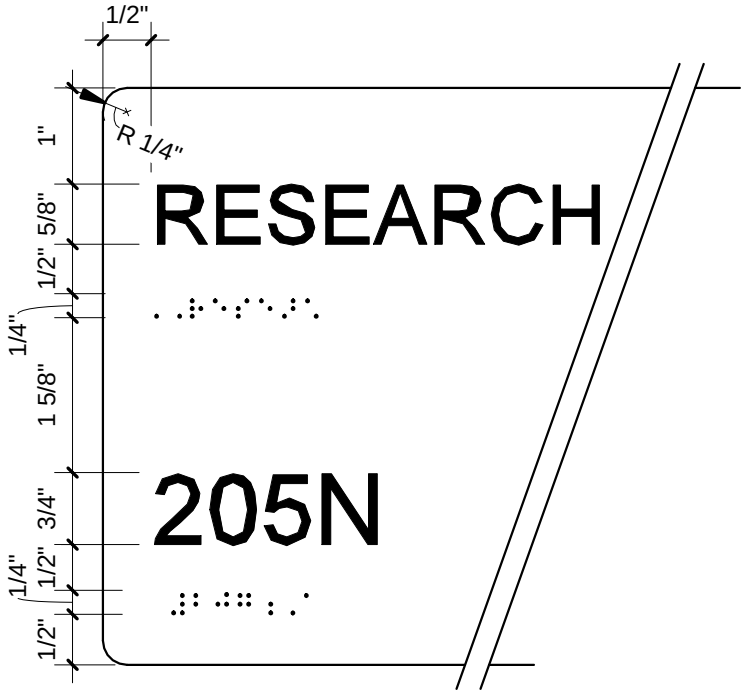
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TYPE:
02

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DOUBLE LINE
LAYOUT



SINGLE LINE
LAYOUT

TACTILE SIGNAGE

NOTE: FONTS AND BRAILLE AS SHOWN ARE FOR GRAPHIC REPRESENTATION ONLY. FABRICATED TYPEFACE SHALL BE AS SPECIFIED.

DWG. NO.
10 1423-03a
FRAMELESS

ROOM NUMBER & NAME

INTERIOR IDENTIFICATION SYSTEM

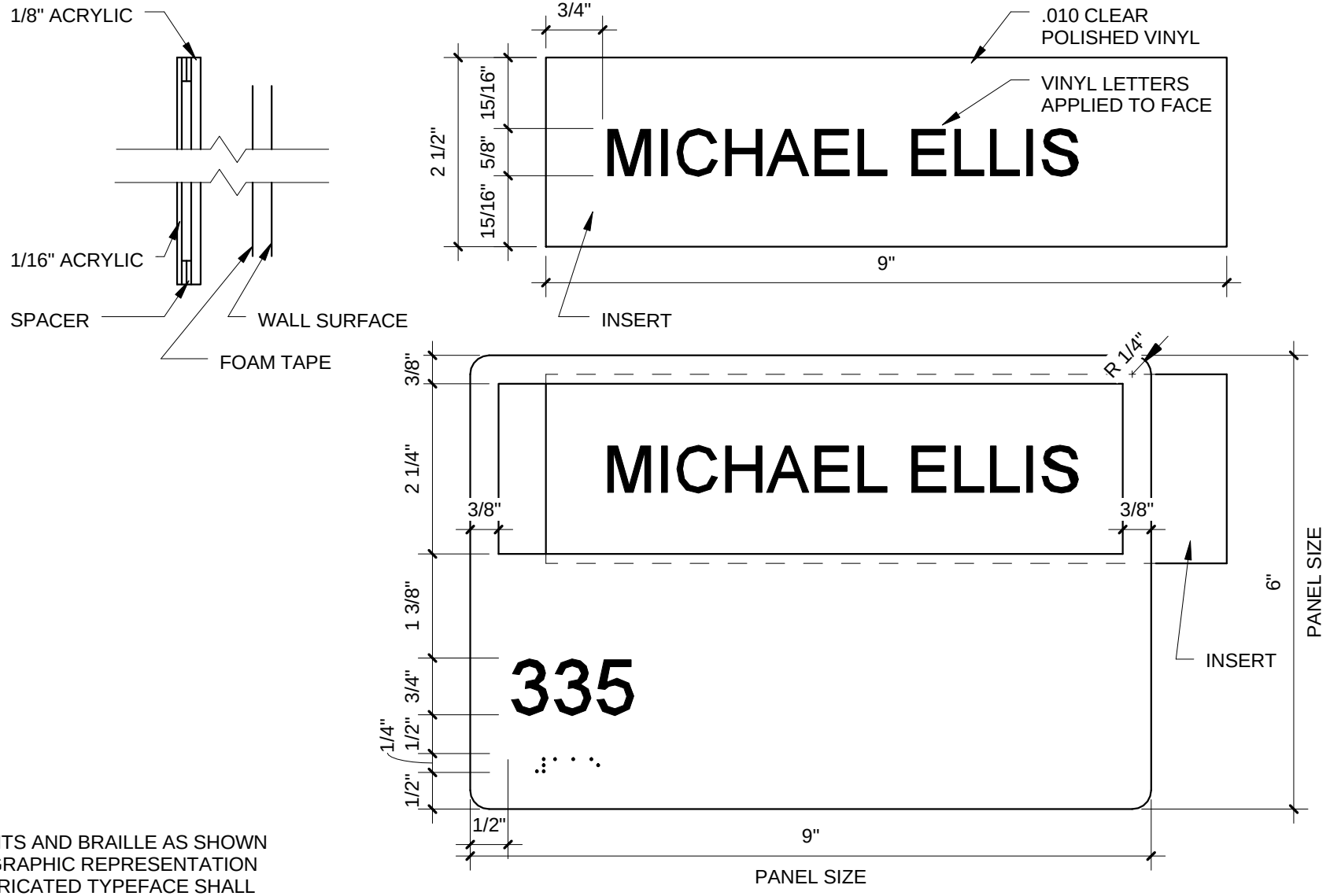
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TYPE:
03a

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TACTILE SIGNAGE: ROOM # ONLY

DWG. NO.
10 1423-04a
FRAMELESS

ROOM NUMBER W/ CHANGEABLE INSERT

INTERIOR IDENTIFICATION SYSTEM

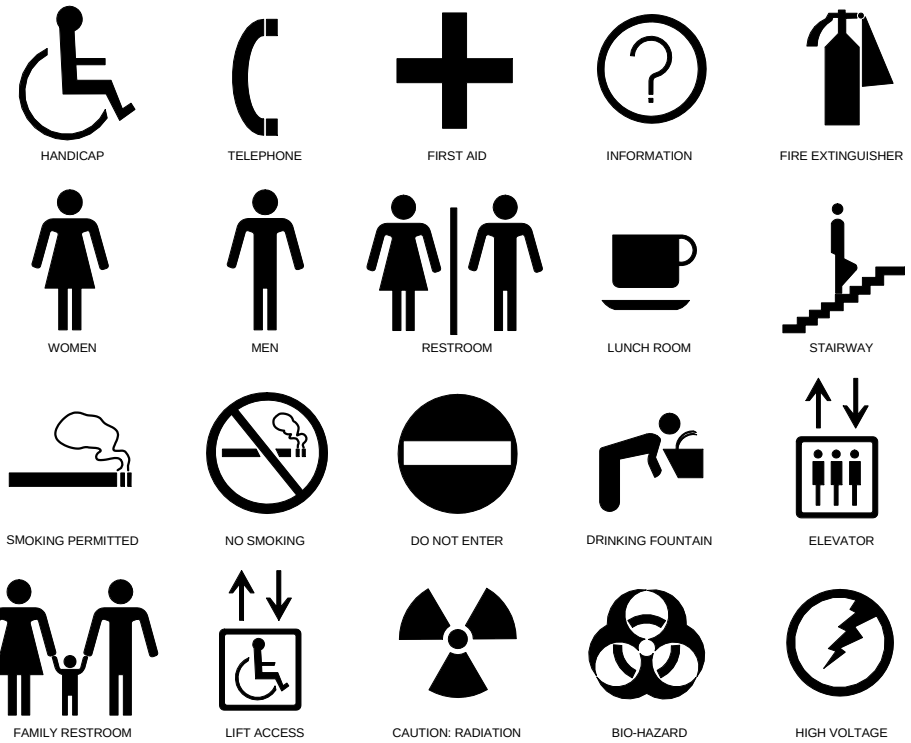
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Registration
#184-000723

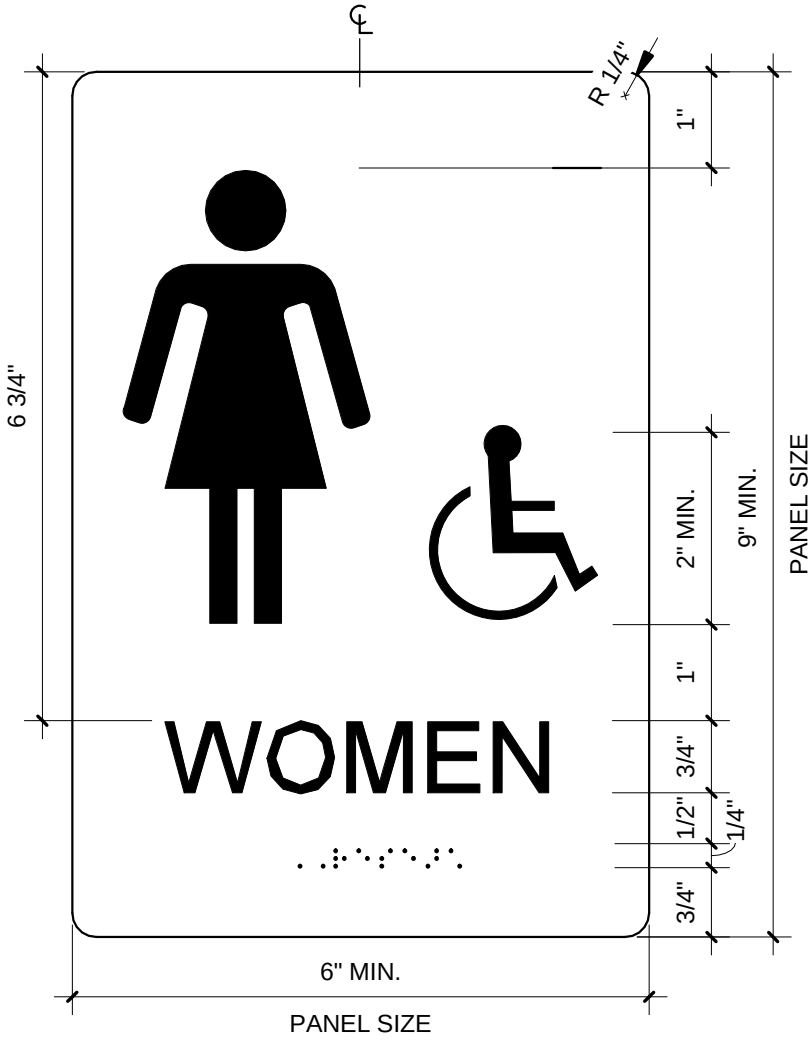
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TYPE:
04a

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TACTILE SIGNAGE



NOTE: FONTS AND BRAILLE AS SHOWN ARE FOR GRAPHIC REPRESENTATION ONLY. FABRICATED TYPEFACE SHALL BE AS SPECIFIED.

DWG. NO.
10 1423-06a
FRAMELESS

SYMBOL W/ MESSAGE, WALL OR DOOR MOUNT

INTERIOR IDENTIFICATION SYSTEM

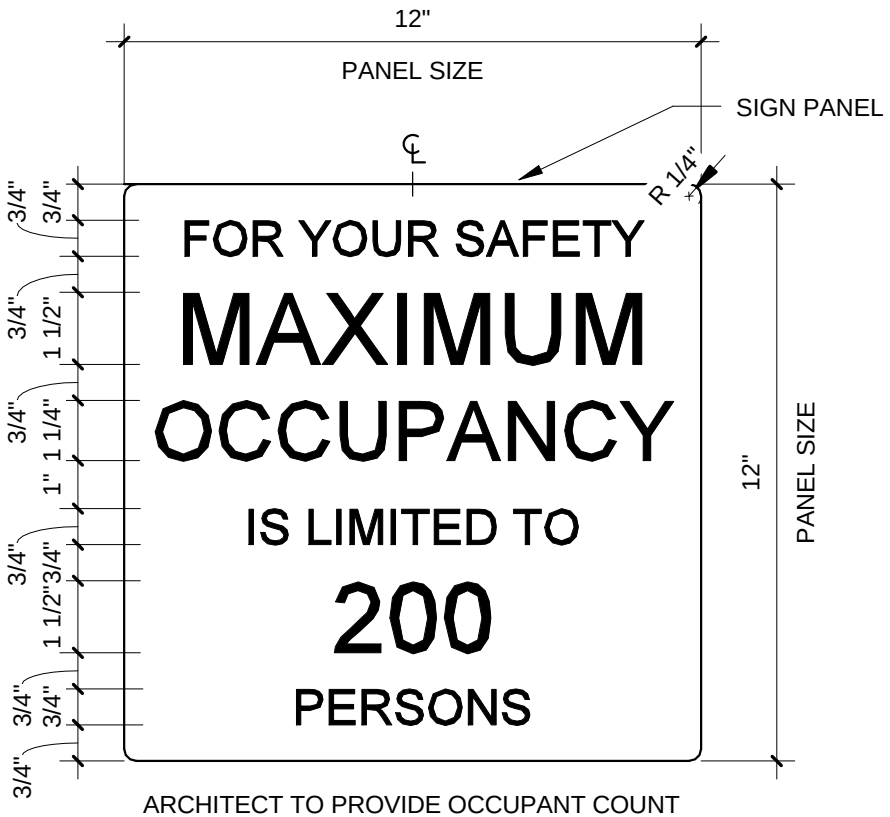
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TYPE:
06a

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ARCHITECT TO PROVIDE OCCUPANT COUNT
FOR EACH APPLICABLE ROOM

NOTE: FONTS AND BRAILLE AS SHOWN ARE FOR GRAPHIC REPRESENTATION ONLY. FABRICATED TYPEFACE SHALL BE AS SPECIFIED.

DWG. NO.
10 1423-14a
FRAMELESS

MAXIUM OCCUPANCY

INTERIOR IDENTIFICATION SYSTEM

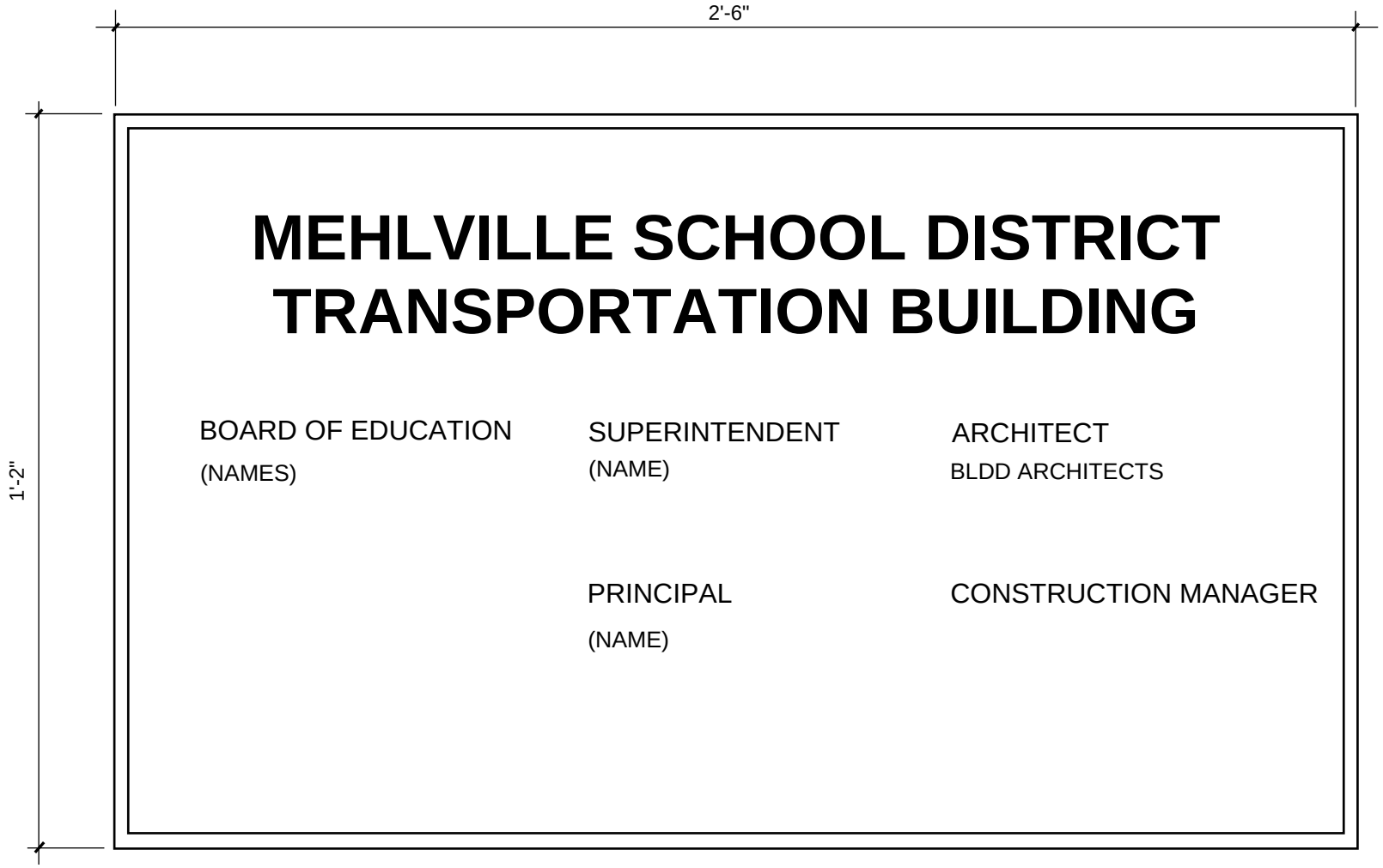
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BLDD ARCHITECTS

TYPE:
14a

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MEHLVILLE SCHOOL DISTRICT
TRANSPORTATION BUILDING

BOARD OF EDUCATION
(NAMES)

SUPERINTENDENT
(NAME)

ARCHITECT
BLDD ARCHITECTS

PRINCIPAL
(NAME)

CONSTRUCTION MANAGER

*CONFIRM SIGN INFORMATION WITH OWNER

Drawing No. 10 1423-17

SIGN TYPE: 17A

1. GENERAL

1.1. WORK INCLUDES

A. Solid plastic toilet compartments and screens.

B. Mounting hardware and related accessories.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 3300 - Submittal Procedures
2. Section 01 7700 - Closeout Procedures
3. Section 10 2800 – Toilet and Bath Accessories

1.3. REFERENCES

A. Publication Dates: Comply with standards in effect as of the date of the Contract Documents except for those having different revision dates as referenced in the codes indicated on the Drawings, or unless otherwise indicated.

B. American Society for Testing and Materials (ASTM):

1. ASTM A240 – Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
2. ASTM A666 - Standard Specification for Annealed or Cold Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
3. ASTM A743 - Standard Specification for Castings, Iron-Chromium, Iron-Chromium-Nickel, Corrosion Resistant, for General Application.
4. ASTM B26 - Standard Specification for Aluminum-Alloy Sand Castings.
5. ASTM B86 - Standard Specification for Zinc and Zinc-Aluminum (ZA) Alloy Foundry and Die Castings.
6. ASTM B221 – Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
7. ASTM B455 - Standard Specification for Copper-Zinc-Lead Alloy (Leaded-Brass) Extruded Shapes.
8. ASTM B584 - Standard Specification for Copper Alloy Sand Castings for General Applications.

C. National Fire Protection Association (NFPA):

1. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth.

1.4. SUBMITTALS

A. Submit in accord with Section 01 3300:

1. Product Data: Submit manufacturer's detailed technical data for panel systems.

a. Include construction details, material descriptions, dimensions of individual components and profiles, finishes, information on hardware, accessories, leveling and anchorage devices, and fasteners for compartments.
b. Include manufacturer's instructions for examination, preparation, installation, cleaning, and protection.

2. Shop Drawings: Submit shop drawings detailing fabrication and erection of compartments.

a. Include plans, elevations, sections, details, and attachments to other work.
b. Show layout of panels and associated hardware and accessories, door swings, and sizes.
c. Show locations of cutouts for compartment-mounted toilet accessories.
d. [Show locations of centerlines of plumbing fixtures.
e. Show locations of floor drains.
f. Include details showing panel connections, anchorage, and support systems.

3. Samples for Verification: Actual sample of finished products for each panel type, color, texture, and finish used in Work.

a. Size: 6-inch square, of same thickness indicated for Work.
b. Include each type of hardware and accessory.

4. Certificates:

a. Product Certificates: For each type of toilet compartment by manufacturer.

B. Submit in accord with Section 01 7700:

1. O&M Data: At project closeout, provide cleaning and preventative maintenance instructions in the O&M manuals for each product specified in this Section.

1.5. QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firm regularly engaged in manufacture of products specified in this section, and whose products have been in satisfactory use under similar service conditions for not less than 5 years.

B. Installer's Qualifications: Installer shall have a minimum of five years of successful experience with installation of products specified in this Section.

C. Regulatory Requirements: Products and finished installations to be used by handicapped persons must comply with requirements of the U.S. Department of Justice "2010 ADA Standards for Accessible Design".

1.6. PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements prior to fabrication where possible, to ensure proper fitting of work. Allow for adjustments wherever field measurements have not been taken prior to fabrication.

1.7. COORDINATION

A. Use manufacturer's instructions and data to determine anchorage requirements for panel systems. In a timely manner, distribute to affected installers of related work those system components and anchorage devices provided by panel manufacturer for incorporation into other work.

1.8. WARRANTY

A. Provide manufacturer's written warranty covering all plastic components against breakage, corrosion, and delamination for a period of 15 years.

2. PRODUCTS

2.1. MANUFACTURERS

A. Acceptable Manufacturers: The following manufacturers, provided they comply with the requirements of the Contract Documents as determined by the Architect, are considered acceptable:

1. Scranton Products (Hiney Hiders) / Scranton, PA
2. Substitutions: Substitutions not permitted.

2.2. PERFORMANCE REQUIREMENTS

A. Fire Performance: Tested in accordance with, and pass the acceptance criteria of, NFPA 286.

2.3. PANEL SYSTEMS

A. Typical Panels:

1. Panel Mounting Style: Floor anchored and overhead braced.
2. Panel Height: Maximum Privacy, 72 inches.
3. Floor Clearance: 12 inches above finish floor
4. Gap Option: Gap-free doors and stiles.

B. Urinal Screens:

1. Urinal Screen Panel Mounting Style: Wall hung.
2. Urinal Screen Panel Mounting Height: not more than 12 inches above the finish floor.
3. Urinal Screen Panel Height: 48 inches.
4. Urinal Screen Panel Depth: 24 inches.

2.4. PANEL MATERIALS

A. General: Provide manufacturer's standard panels fabricated for installations indicated. Provide panels complete with cutouts, drilled holes, and internal reinforcement to receive indicated hardware and accessories.

B. Materials shall be fabricated from solid, high-density polyethylene (HDPE) forming units that are waterproof, non-absorbent, and has a self-lubricating surface that resists marking with pens, pencils or other writing utensils. Colors and patterns shall be homogenous throughout the thickness of material.

1. Colors/Finishes: Blueberry / Orange Peel Finish.

2.5. HARDWARE

A. Door hardware shall be as follows:

1. Hinges: Integral hinges

a. In-swinging doors shall remain open at a 30 degree angle when left free; out-swinging doors shall remain fully closed.

2. Door Hook/Bumper: Each door shall be furnished with one combination coat hook and bumper of heavy chrome plated Zamac with rubber bumper.
3. Door Pull: Manufacturer's standard chrome plated Zamac unit at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible.
4. Door Latch and Keeper: Fabricated from heavy aluminum extrusion (6463-T5 Alloy) with clear anodized finish with wrap around flange surface mounted and thru-bolted to pilaster with one-way sex bolts.

B. Pilaster Shoes and Caps: Manufacturer’s standard design, polymer; color to match compartment panels.

C. Brackets: Brackets shall be used for all panel to pilaster, pilaster to wall and panel to wall connections. Brackets shall be pre-drilled by manufacturer with holes spaced every 12" along full length of brackets. Wall brackets shall be thru-bolted to panels and pilasters with one-way sex bolts.

1. Full-Height (Continuous) Type: Manufacturer's standard design; stainless steel complying with ASTM A666, Type 304.

a. Provide continuous extruded aluminum where splicing is required to accommodate wall offsets.

D. Headrail shall be heavy aluminum extrusion (6463-T5 Alloy) with clear anodized finish in anti-grip configuration. Headrail shall be fastened to tops of pilasters and headrail brackets by thru-bolting with one-way stainless steel sex bolts.

1. Headrail brackets shall be 16 gauge stainless steel.
2. Extended end panel shall extend up and fasten into headrail.

E. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel or chrome-plated steel, finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless steel, hot-dip galvanized steel, or other rust-resistant, protective-coated steel.

F. Heat Sink: Extruded aluminum strips shall be fastened to the bottom edge of all doors and panels to prevent burning.

2.6. FABRICATION

A. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.

B. Panel Fabrication:

1. Doors, panels and pilasters shall be 1" thick, and all edges machined to a radius of 0.25" and all exposed surfaces to be free of saw marks.
2. Pilasters shall be 82" high unless indicated otherwise.
3. Panels shall arrive at job site with special protective covering.

C. Door Size and Swings: Unless otherwise indicated, provide 24-inch wide, in-swinging doors for standard toilet compartments and 36-inch wide, out-swinging doors with a minimum 32-inch wide, clear opening for compartments designated as accessible.

3. EXECUTION

3.1. EXAMINATION

A. Examine the areas and conditions under which toilet partitions and related items are to be installed. Notify the Architect in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

1. Verify that conditions conform to requirements of Contract Documents.
2. Verify all dimensions by field measurements.
3. Verify locations of plumbing fixtures to determine exact placement of panel assemblies.

3.2. INSTALLATION

A. General: Comply with manufacturer's recommended procedures and installation sequence.

B. Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.

C. Install partitions rigid, straight, plumb and level, with the panels laid out as shown on the Drawings. Doors and panels shall be mounted at 14 inches clear above finished floor unless indicated otherwise.

1. Clearance at vertical edges of doors shall be uniform top to bottom, and shall not exceed 3/16" in width.
2. Clearances exceeding 1" between panels and walls are not acceptable.
3. Clearances exceeding 1/2" between panels and pilasters are not acceptable.

D. Wall Brackets: Where possible, locate wall brackets so holes for wall anchors occur in masonry or tile joints.

1. Wall-mounted brackets shall be spliced as needed to accommodate offsets in wall surfaces, such as at tile wainscot.

E. Do not cut, drill or patch any surface that shall be visible in the finished work.

F. Hardware and Accessories: Mount items in accordance with manufacturer's instructions.

3.3. ADJUSTING AND CLEANING

A. Perform final adjustments to pilaster leveling devices, door hardware, and other operating parts of the partition assembly just prior to final inspection. Clean exposed surfaces of partitions, hardware, fittings, and accessories, and touch up minor scratches and other finish imperfections using materials and methods recommended by the partition manufacturer.

1. No evidence of cutting, drilling, and patching shall be visible on the finished work.

B. Adjustment of Operating Hardware: Adjust and lubricate hardware for proper operation.

3.4. PROTECTION

A. Provide protection as necessary to prevent damage to installed work during remainder of construction period.

B. Protect units so that there will be no indication of use or damage at the time of acceptance.

C. Replace damaged units which cannot be satisfactorily field repaired, as determined by Architect.

END 10 2113.19

1. GENERAL

1.1. WORK INCLUDES

A. Impact-resistant corner guards

1.2. RELATED WORK

A. Specified elsewhere:

1. Section 06 1000 - Rough Carpentry
2. Section 08 7100 - Hardware
3. Section 09 2100 - Gypsum Board Assemblies

1.3. SUBMITTALS

A. Submit in accordance with Section 01 3300:

1. Submit product data for each type of wall protection specified.
2. Submit detail drawings indicating mounting details with the appropriate fasteners for each substrate.
3. Submit verification samples in full-size profiles for each type and color indicated.

1.4. QUALITY ASSURANCE

A. Manufacturer's qualifications: Not less than five years experience in the production of specified products.

B. Single source responsibility: Provide all components of the wall protection system manufactured by the same company to ensure compatibility of color, texture and physical properties.

1.5. DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in unopened factory packaging to the jobsite and store in original packaging in a climate controlled location away from direct sunlight.

B. Material must be stored flat.

1.6. PROJECT CONDITIONS

A. Installation areas must be enclosed and weatherproofed before installation commences.

1.7. WARRANTY

A. Manufacturer's standard limited warranty against material and manufacturing defects.

2. PRODUCTS

2.1. IMPACT-RESISTANT CORNER GUARDS

A. Product/Manufacturer: The following products, provided they comply with the requirements of the contract documents, will be considered acceptable:

1. Type CG1 (90° corner)

    a. Basis of Design: WX12 Series Paintable Textured Vinyl Corner Guards / Wallprotex
    b. Substitutions: Under provisions of Section 01 6000.

2. Type CG2 (end wall condition: two 90° corners with high-impact filler sheet):

    a. 160D / InPro Corporation
    b. Korogard G110 / Koroseal
    c. Acrovyn SSM-25 / C-S Group

B. Profile:

1. CG1: Surface-Mounted; 1-1/8" x 1-1/8" with 90 degree corners; full height of wall above wall base.

    a. EXCEPTIONS: Where ceiling heights exceed 11'-0", corner guard to be 10' in height.

2. CG2: Surface-Mounted; 2" x 2" with 90 degree corners; full height of wall above wall base.

C. Materials:

1. CG1: Corner guard shall be extruded from chemical and stain resistant polyvinyl chloride. No plasticizers shall be added. Surface treated for the highest ASTM rating for paint adhesion.
2. Vinyl: Snap-on covers of .078” minimum thickness, extruded from chemical and stain resistant polyvinyl chloride.
3. End wall protectors (where indicated) shall be made from .060” sheet material.
4. Aluminum: Continuous aluminum retainer of .060” minimum thickness, fabricated from 6063-T5 aluminum with a mill finish.

D. Components:

1. Top caps and bottom caps shall be made of injection molded thermoplastics.
2. Fasteners: All mounting system accessories appropriate for substrates indicated on the drawings shall be provided.

E. Finishes:

1. CG1: Corner guard shall be primed for field painting. Paint to match paint color on adjacent wall in locations as shown on Drawings.
2. CG2: Corner guard colors to be selected by the Architect from the manufacturer’s standard range of colors. Surface shall have a pebble grain texture.
3. Molded components: Top caps and bottom caps shall match the finish of the corner guards.

3. EXECUTION

3.1. EXAMINATION

A. Examine areas and conditions in which the wall protection systems will be installed.

B. Do not proceed until unsatisfactory conditions have been corrected.

3.2. PREPARATION

A. Complete finishing operations, including painting, before installing impact-resistant protection system components.

B. Surface preparation: Prior to installation, clean substrates to remove dirt, debris and loose particles. Perform additional preparation procedures as required by manufacturer's instructions.

C. Protection: Take all necessary steps to prevent damage to material during installation as required in manufacturer's installation instructions.

3.3. INSTALLATION

A. Install wall protection units level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains or other defects that might be visible in the finished work.

B. Install impact-resistant wall protection units in locations and at mounting heights indicated on the drawings or, if not indicated, at heights listed below:

3.4. CLEANING

A. Clean surfaces in accordance with manufacturer's maintenance instructions.

END 10 2623

1. GENERAL

1.1. WORK INCLUDES

A. Each type of toilet room accessory shown on the Drawings and schedules including:

1. Grab bars
2. Metal framed mirrors
3. Sanitary disposal units
4. Paper towel dispenser
5. Coat hooks
6. Robe hooks
7. Shower curtain rods
8. Shower curtain hooks
9. Shower curtains
10. Folding shower seat

B. The Owner will provide the following items to be installed by the General Contractor:

1. Liquid Soap Dispensers
2. Toilet Paper Dispensers

1.2. RELATED WORK

A. Specified elsewhere:

1. Section 01 3300 - Submittal Procedures
2. Section 01 7700 - Closeout Procedures
3. Section 06 1000 – Rough Carpentry: Blocking.
4. Section 09 2100 – Gypsum Board Assemblies: Blocking.
5. Section 10 2113.19 – Plastic Toilet Compartments

1.3. REFERENCES

A. Publication Dates: Comply with standards in effect as of the date of the Contract Documents except for those having different revision dates as referenced in the codes indicated on the Drawings, or unless otherwise indicated.

B. 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 A666 - Standard Specification for Stainless Steel Bars and Shapes.
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 B16 - Standard Specification for Free Cutting Brass Rod, Bar and Shapes for Use in Screw Machines
6. ASTM B19 - Standard Specification for Cartridge Brass Sheet, Strip, Plate, Bar, and Disks.
7. ASTM B30 - Standard Specification for Copper Alloys in Ingot Form.

8. ASTM B456 - Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.
9. ASTM C1503 - Standard Specification for Silvered Flat Glass Mirror.
10. ASTM F446 – Standard Consumer Safety Specification for Grab Bars and Accessories Installed in the Bathing Area.
11. ASTM F2285 - Standard Consumer Safety Performance Specification for Diaper Changing Tables for Commercial Use.

1.4. SUBMITTALS

A. Submit in accordance with Section 01 3300:

1. Product Data: Manufacturer's technical data and installation instructions for each toilet room accessory.
2. Setting Drawings: Provide setting drawings, templates, instructions and directions for installation of anchorage devices in other work.
3. Warranty Certificate: Manufacturer's warranty against silver spoilage of mirrors.

B. Submit in accordance with Section 01 7700:

1. O&M Data: At project closeout, provide operations and maintenance instructions in the O&M manuals for each type of accessory.
2. Operations Equipment: Turn over to the Owner any special tools, keys and materials required for the operation of the accessories.

1.5. QUALITY ASSURANCE

A. Source Limitations: Provide products of the same manufacturer for each type of accessory unit and for units exposed in the same areas, whenever possible.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Regulatory Requirements: Products and finished installations to be used by handicapped persons must comply with requirements of the Americans with Disabilities Act (ADA)

1.6. COORDINATION

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.

B. Inserts and Anchorages: Furnish inserts and anchoring devices which will be surface mounted to walls, toilet partitions, and other surfaces, or built into masonry for the installation of toilet accessories. Coordinate delivery with other work to avoid delay.

1.7. WARRANTY

A. Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 15 years from date of Substantial Completion.

2. PRODUCTS

2.1. GENERAL

A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.

B. Manufacturer Labels: Stamped names or labels on exposed faces of units will not be permitted.

C. Locks: Provide locks where indicated, with the universal keying for each type of accessory units, in the project, wherever possible. Provide minimum of six keys.

D. Acceptable products: The product models listed in this Section are acceptable provided they comply with the requirements of the Contract Documents as determined by the Architect.

2.2. MATERIALS

A. Stainless Steel: ASTM A666, Type 304, with satin finish, unless otherwise indicated in the specifications.

B. Brass: ASTM B19, flat products; ASTM B16, rods, shapes, forgings, and flat products with finished edges; or ASTM B30, castings.

C. Steel Sheet: ASTM A1008, Designation CS (cold rolled, commercial steel).

D. Galvanized-Steel Sheet: ASTM A653, with G60 (Z180) hot-dip zinc coating.

E. Galvanized-Steel Mounting Devices: ASTM A153, hot-dip galvanized after fabrication.

F. Chrome Plating: ASTM B456, Service Condition Number SC 2 (moderate service).

G. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.

H. ABS Plastic: Acrylonitrile-butadiene-styrene resin formulation.

2.3. GRAB BARS

A. General:

1. Material: Stainless steel with wall thickness not less than 0.050 inch (18 gauge).
2. Mounting: Concealed mounting plate with snap over escutcheon.
3. Gripping Surfaces: Non-slip, peened, knurled or striated; manufacturer's standard.
4. Outside Diameter: 1-1/2 inch.
5. Configuration and Length: As indicated on Drawings.
6. Mounting Height: Refer to “Accessibility Information” drawing sheet.

B. Acceptable Product/Manufacturer:

1. 3800P Series / ASI
2. B-6806.99 Series / Bobrick
3. 812-2 Series / Bradley

2.4. MIRRORS

A. General:

1. Mirror Glass: ASTM C1503, Mirror Glazing Quality, clear-glass mirrors, nominal 1/4 inch (6.0 mm) thick.

a. Glass Type: Tempered.

2. Backing:

a. Resilient, non-absorbent filler material, with not less than 0.0375 inch (20 gauge) galvanized steel backing plates, one-piece construction, full height and width of mirror frame. Corrugated cardboard or other moisture-absorbent filler material is not acceptable.
b. Construct metal backing plate with hanger slots for concealed "tamper-proof" mounting. Provide manufacturer's standard hanger to engage with backing for concealed installation.

3. Frame: Stainless steel angle with satin finish, 0.0375 inch (20 gauge) minimum, with square corners welded and ground smooth.
4. Location: As indicated on Drawings.
5. Mounting Height: Refer to “Accessibility Information” drawing sheet.

B. Acceptable Product/Manufacturer:

1. 18”x36”

a. 0600 / ASI
b. B-290 Series / Bobrick
c. 780 / Bradley

2.5. SANITARY DISPOSAL UNITS

A. General:

1. Stainless steel, with welded construction and satin finish, 0.0312 inch (22 gauge) minimum. Disposal door shall be secured to cabinet with full-length piano hinge.
2. Location: Locate in Women's Toilet rooms and all single-user Toilet rooms as indicated on Drawings.
3. Mounting Height: Refer to “Accessibility Information” drawing sheet.

B. Acceptable Product/Manufacturer:

1. Surface Mounted:

a. 0852 / ASI
b. B-270 / Bobrick
c. 4781-11 / Bradley

2.6. PAPER TOWEL DISPENSER

A. General:

1. Stainless steel, with welded construction and satin finish. Door shall have tumbler lock and piano hinge.
2. Location: As indicated on Drawings.
3. Mounting Height: Refer to “Accessibility Information” drawing sheet.

B. Acceptable Product/Manufacturer:

1. Paper Towel Dispenser Surface Mounted (400 Single-Fold)

a. B-263 / Bobrick

2. Paper Towel Dispenser Surface Mounted (400 C-Fold)

a. B-262 / Bobrick

2.7. COAT HOOKS

A. General:

1. Solid aluminum casting or chrome-plated brass coat hook with rubber door bumper.
2. Location: Provide at each toilet stall.
3. Mounting Location: Refer to “Accessibility Information” drawing sheet.

B. Acceptable Product/Manufacturer:

1. 0714 / ASI
2. B-212 / Bobrick
3. 915 / Bradley

2.8. ROBE HOOKS

A. General:

1. Stainless steel, satin finish, concealed mounting.
2. Location: Provide at each shower stall.
3. Mounting Location: Refer to “Accessibility Information” drawing sheet.

B. Acceptable Product/Manufacturer:

1. 7340 / ASI
2. B-6717 / Bobrick
3. 9114 / Bradley

2.9. FOLDING SHOWER SEAT

A. General:

1. Wall-mounted, L-shaped, right-hand and left-hand seat, of 1/2” minimum thickness, solid phenolic. See Drawings for handing.

2. Frame, folding mechanism, and mounting brackets to be of stainless steel, with self-locking mechanism.
3. Capacity: 250 pounds, minimum.
4. Location: As indicated on Drawings.
5. Mounting Height: Refer to “Accessibility Information” drawing sheet.

B. Acceptable Product/Manufacturer:

1. 8206-R and 8206-L / ASI
2. B-5181 / Bobrick
3. 9569 / Bradley

2.10. SHOWER CURTAIN ROD

A. General:

1. Stainless steel, satin finish, 20 gage, 1" diameter rod, with concealed mounting flanges. Rod length shall be between 36” and 72” to accommodate shower width.
2. Location: At each shower location and changing location.
3. Mounting Height: Refer to “Accessibility Information” drawing sheet.

B. Acceptable Product/Manufacturer:

1. 1224 / ASI
2. B-207 / Bobrick
3. S-106 rod, S-SH-2 flanges / Tubular Specialties Mfg. (TSM)

2.11. SHOWER CURTAIN HOOKS

A. General:

1. Stainless steel snap hooks for 1” diameter rod.
2. Quantity: Provide 1 hook for every 6” of shower curtain rod length, plus 1 additional hook per rod.
3. Product/manufacturer:

a. 1200-SHU / ASI
b. 204-1 / Bobrick
c. 9536 / Bradley

2.12. SHOWER CURTAIN

A. General:

1. Opaque, white vinyl shower curtain, flame resistant, anti-bacterial, with grommets on 6” center for hooks.
2. Size: Curtain shall be 72” tall and 6” minimum wider than opening.
3. Location: Provide one curtain at each shower rod and changing area rod.
4. Product/manufacturer:

a. 1200-V / ASI
b. 204-2 / Bobrick
c. 9533 / Bradley

3. EXECUTION

3.1. EXAMINATION

A. Examine the areas and conditions under which the work of this Section is to be installed. Notify the Architect in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until satisfactory conditions have been corrected.

3.2. INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and securely anchored at locations and heights indicated.

1. Use concealed fastenings wherever possible. Furnish concealed mounting devices and fasteners fabricated of the same materials as the accessories, or of galvanized steel, as recommended by manufacturer.
2. Furnish exposed mounting devices and fasteners finished to match the accessories.
3. Furnish theft-resistant fasteners for all exposed accessory mountings.

B. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to ASTM F446.

3.3. ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.

B. Remove temporary labels and protective coatings.

C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END 10 2800

1. GENERAL

1.1. WORK INCLUDES

A. High security commercial key box.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 3300 – Submittal Procedures
2. Section 04 2000 – Unit Masonry
3. Section 06 1000 – Rough Carpentry

1.3. SUBMITTALS

A. Submit in accordance with Section 01 3300:

1. Manufacturer's Data: Submit manufacturer's data and installation instructions for each type of unit.
2. Shop Drawings: Submit shop and layout drawings indicating size, mounting details, anchorage and special reinforcing.

1.4. QUALITY ASSURANCE

A. Box and lock shall be UL listed.

2. PRODUCTS

2.1. SECURITY KEY BOX

A. Hinged Door Unit:

1. Acceptable Manufacturer/Product: Knox Company (800-552-5669) / Knox-Box 3200 Series.
2. Size: 4" W x 5"H x 3-7/8"D.
3. Color: Dark bronze.
4. Mounting: Recessed, include mounting flange.
5. Location: See Drawings; field verify exact location with Architect.
6. Provide UL listed alarm tamper switches to be connected to building’s security system.

3. EXECUTION

3.1. INSPECTION

A. Examine the areas and conditions under which units are to be installed. Notify the Architect in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been completed.

3.2. INSTALLATION

A. Install units at location shown and in accordance with the manufacturer's instructions.

B. Provide grounds, backing materials, brackets, anchors, trim and accessories for complete installation.

C. Provide adequate protection of units until final completion.

END 10 4116

1. GENERAL

1.1. WORK INCLUDES

A. Provide fire extinguishers, cabinets, and accessories where shown on the drawings.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 3300 - Submittal Procedures
2. Section 04 2000 - Unit Masonry
3. Section 06 1000 - Rough Carpentry
4. Section 09 2100 - Gypsum Board Assemblies
5. Section 09 9100 - Paints and Coatings

1.3. SUBMITTALS

A. Submit in accordance with Section 01 3300:

1. Submit Manufacturer's technical data and installation instructions for all fire extinguishers and accessories. Include physical dimensions, operational features, color and finish, wall mounting brackets with mounted measurements, anchorage details, rough-in measurements, location, and details.
2. Submit certification that fire extinguishers comply with classifications and requirements.

1.4. QUALITY ASSURANCE

A. Furnish all fire extinguishers and brackets by one manufacturer. Furnish all specified fire extinguisher cabinets by one manufacturer.

B. Regulatory Requirements:

1. Applicable Codes:

a. 2021 INTERNATIONAL FIRE CODE.
b. NFPA No. 10, 2013.

C. Tests by independent agencies whose classifications and requirements have general acceptance as regulatory and are acceptable to authorities having jurisdiction.

2. PRODUCTS

2.1. FIRE EXTINGUISHERS

A. Provide new fire extinguishers for each location shown on drawings, labeled and approved by acceptable testing agency.

B. Fill extinguishers in accordance with requirements for A, B, C classifications.

C. Provide multi-purpose dry chemical, minimum 4A: 60B: C classification; 10 lb. capacity; in steel container with pressure indicating gauge, for Classes A, B, C fires. Fire extinguisher finish shall be red enamel.

1. Sentry 10 / Ansul
2. B441 / Amerex
3. MP 10 / Larsen
4. Cosmic 10E / J. L. Industries
5. 3010 / Potter-Roemer, Inc.

D. Materials: Heavy duty steel cylinders. Metal valve and siphon tube. Replaceable molded valve stem seals. Corrosion and impact resistant finish. Pull pin squeeze grip operation.

2.2. FIRE EXTINGUISHER CABINETS

A. Provide cabinets, each suitable for housing one (1) 10 lb. size dry chemical fire extinguisher as listed above.

1. Provide fire-rated cabinets where cabinets are recessed into fire-rated construction.

B. Cabinet, door and trim to be fabricated of the following minimum steel gauges.

1. Box and Flange - 20 gauge.
2. Door panel - 20 gauge.

C. Construction:

1. One piece cold rolled steel box with flange extending around the box outside the wall, mitered, welded & buffed smooth.
2. Continuous hinges of material matching the door & trim.
3. Glazed with 1/8” thick acrylic.
4. Satin finish or zinc plated pull handle with self-adjusting roller catch.

D. Size: Approximately 10-1/2" W x 24" H x 6" deep.

E. Identification: Lettering on cabinet complying with authorities having jurisdiction for letter style, size, spacing, and location.

1. Identify fire extinguisher in fire protection cabinet with the words "FIRE EXTINGUISHER”.
2. Location: Applied to cabinet door.

a. Lettering applied to cabinet door shall be applied in the field after painting if cabinets will be field-painted.

3. Application Process: Decals or Pressure-sensitive vinyl letters.
4. Lettering Color: Red.
5. Orientation: Vertical.

F. Finish: Baked white enamel interior and exterior.

G. Multi-purpose (Type A:B:C) fire extinguisher cabinets:

1. Semi-recessed product/manufacturer:

a. 2409-6R-Vertical Duo (acrylic)/Larsen
b. Ambassador 1017V10 (acrylic)/J. L. Industries
c. 7023-DV-6 (acrylic)/Potter-Roemer, Inc.

2.3. BRACKETS

A. Brackets shall be designed and sized to securely hold the fire extinguishers specified.

B. Brackets shall support the fire extinguisher from the bottom and have a strap or other means to securely hold the extinguisher. Hook-type brackets will not be acceptable.

C. Brackets shall be steel; finish shall be red enamel.

D. Multi-purpose (Type A:B:C) fire extinguisher brackets:

1. 30865 / Ansul
2. 862 / Amerex
3. B-2 or 846/ Larsen
4. MB-846 / J. L. Industries
5. 3903 / Potter-Roemer

3. EXECUTION

3.1. INSPECTION

A. Examine construction and conditions under which the fire-fighting devices are to be installed, and notify the Architect/Engineer in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Architect/Engineer.

3.2. INSTALLATION

A. Install in locations indicated on drawings. Prepare recess in wall as required. Securely fasten to structure, square and plumb, in accordance with manufacturer's instructions.

B. Install cabinets with the bottom of the cabinet interior at 26". Install wall mounted fire extinguishers at 44" to the top of the extinguisher, unless otherwise directed by the Architect/Engineer.

END 10 4400

1. GENERAL

1.1. WORK INCLUDES

A. Open-front athletic metal lockers.

B. Locker benches.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 3300 - Submittal Procedures
2. Section 03 3000 - Concrete
3. Section 06 1000 - Rough Carpentry

1.3. SUBMITTALS

A. Submit in accordance with Section 01 3300:

1. Product Data: For each type of metal locker.

a. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of metal and bench.

2. Shop Drawings: For metal lockers.

a. Include plans, elevations, sections, details, and attachments to other work.
b. Show filler locations, locker trim and accessories.

3. Samples:

a. Color Samples: Manufacturer's color charts showing the full range of colors available.

4. Qualification Data: For Installer.
5. Sample Warranty: For special warranty.

B. Submit in accordance with Section 01 7700:

1. Maintenance Data: For adjusting, repairing, and replacing locker doors and latching mechanisms to include in maintenance manuals.

1.4. QUALITY ASSURANCE

A. Field Measurements: Verify actual dimensions of recessed openings by field measurements before fabrication.

B. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

C. Source Limitations: Obtain all metal lockers, locker benches, and accessories from single source from single manufacturer.

D. Regulatory Requirements: Metal lockers and benches are to comply with accessibility requirements of the Americans with Disabilities Act (ADA) and ICC/ANSI A117.1.

E. Preinstallation Conference: Conduct conference at Project site.

1.5. DELIVERY, STORAGE, AND HANDLING

A. Do not deliver metal lockers until spaces to receive them are clean, dry, and ready for their installation.

B. Deliver master and control keys to Owner by registered mail or overnight package service.

1.6. COORDINATION

A. Coordinate sizes and locations of concrete bases for metal lockers.

B. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of work specified in other Sections to ensure that metal lockers can be supported and installed as indicated.

1.7. WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of metal lockers that fail in materials or workmanship, excluding finish, within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures.
b. Faulty operation of latches and other door hardware.

2. Damage from deliberate destruction and vandalism is excluded.
3. Warranty Period for All-Welded Metal Lockers: 10 years from date of Substantial Completion.

1.8. EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Full-size units of the following metal locker hardware items equal to 10 percent of amount installed for each type and finish installed, but no fewer than 5 units:

a. Locks.
b. Identification plates.
c. Hooks.

2. PRODUCTS

2.1. ACCEPTABLE MANUFACTURERS

A. The following manufacturers, provided they comply with the requirements of the Contract Documents as determined by the Architect, are considered acceptable:

1. ASI Storage Solutions

2. DeBourgh Manufacturing Co.
3. List Industries, Inc.
4. Lyon Workspace Products
5. Penco Products, Inc.
6. Republic Storage Systems LLC

2.2. OPEN-FRONT ATHLETIC METAL LOCKERS

A. Locker Arrangement: Open front, with configuration as indicated on Drawings.

B. Body: Assembled by welding body components together. Fabricate from unperforated steel sheet with thicknesses as follows:

1. Tops and Bottoms: 0.060 nominal thickness, with single bend at edges.
2. Backs: 0.048 nominal thickness.
3. Shelves: 0.060 nominal thickness, with double bend at front and single bend at sides and back.

C. Perforated Sides: Fabricated from 0.060-inch nominal-thickness steel sheet with manufacturer's standard diamond perforations. Perforations shall not occur above upper shelf, at security compartment or at seat/footlocker.

D. Frames: Channel formed; fabricated from 0.060-inch nominal-thickness steel sheet or 0.105-inch nominal-thickness steel angles; lapped and factory welded at corners; with top and bottom main frames factory welded into vertical main frames.

E. Reinforced Bottoms: Structural channels formed from 0.075-inch nominal-thickness steel sheet; welded to front and rear of side-panel frames.

F. Seats/Shelves: Full width of metal locker; channel formed; fabricated from 0.075 nominal-thickness steel sheet; with stiffeners for reinforcement.

G. Seats/Footlockers: Enclosure full width of bottom of metal locker; fabricated from cold-rolled steel sheet.

1. Seat/Lid: 0.075-inch nominal-thickness steel sheet; channel formed and reinforced with stiffeners; with manufacturer's standard, steel continuous hinge that is completely concealed and tamper resistant when seat/lid is closed; with padlock hasp.
2. Front Panel: 0.075-inch nominal-thickness steel sheet; channel formed at top edge; with mini-louvers for ventilation; recessed for padlock loop.
3. Sides: Unperforated bottom portions of perforated sides.

H. Security Boxes: Consisting of partition extending from upper shelf to top of metal locker, fabricated from 0.060-inch nominal-thickness steel sheet; with channel-formed, 0.060-inch nominal-thickness, steel sheet door frame, and door fabricated from 0.075-inch nominal-thickness steel sheet with right-angle single bend at edges; with manufacturer's standard, steel continuous hinge that is completely concealed and tamper resistant when door is closed; fabricated to swing 180 degrees.

1. Single-Point Latching: Stainless-steel strike plate with integral pull; with steel, nonmoving latch hook with steel padlock loop that projects through door and is finished to match metal locker body.

I. Security Compartments: Full width of metal locker, with door fabricated from 0.075-inch nominal-thickness steel sheet.

J. Accessories:

1. Identification Plates: Manufacturer's standard, etched, embossed, or stamped aluminum plates, with numbers and letters at least 3/8 inch high.
2. Hooks: Manufacturer's standard ball-pointed type hooks, aluminum or steel; zinc plated.
3. Coat Rods: 1-inch diameter steel tube or rod, chrome finished.
4. Continuous Sloping Tops: Fabricated from 0.048-inch nominal-thickness steel sheet, with a pitch of approximately 20 degrees.

    a. Closures: Vertical-end type.

5. Filler Panels: Fabricated from 0.048-inch nominal-thickness steel sheet.
6. Boxed End Panels: Fabricated from 0.060-inch nominal-thickness steel sheet.

L. Materials:

1. Cold-Rolled Steel Sheet: ASTM A1008, Commercial Steel (CS), Type B, suitable for exposed applications.
2. Metallic-Coated Steel Sheet: ASTM A653, Commercial Steel (CS), Type B; with A60 (ZF180) zinc-iron, alloy (galvannealed) coating designation.

M. Finish: Baked enamel or powder coat.

1. Color: As selected by Architect from manufacturer's full range.

2.3. LOCKS

A. Combination Padlocks: Provided by Owner.

2.4. LOCKER BENCHES

A. Provide bench units with overall assembly height of 17-1/2 inches.

B. Bench Tops: Manufacturer’s standard one-piece units, with rounded corners and edges.

1. Size: Minimum 9-1/2 inches wide by 1-1/4 inches thick except provide minimum 20-inch wide tops where accessible benches are indicated.
2. Bench Material:

    a. Wood: Laminated clear hardwood with one coat of clear sealer on all surfaces and one coat of clear lacquer on top and sides.

C. Pedestal Type:

1. Freestanding Pedestals: Manufacturer’s standard supports, with predrilled fastener holes for attaching bench top, complete with fasteners, and as follows:

    a. Aluminum: 1/8-inch-thick by 3-inch-wide channel or ¼-inch-thick by 3-inch-wide bar stock, shaped into trapezoidal form; with nonskid pads at bottom.

        1) Finish: Clear anodic finish.

D. Materials:

1. Stainless Steel: ASTM A666, Type 304.
2. Extruded Aluminum: ASTM B221, alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated.
3. Steel Tube: ASTM A500, cold rolled.

2.5. FABRICATION

A. Fabricate metal lockers square, rigid, and without warp and with metal faces flat and free of dents or distortion. Make exposed metal edges safe to touch and free of sharp edges and burrs.

1. Form body panels, doors, shelves, and accessories from one-piece steel sheet unless otherwise indicated.
2. Provide fasteners, filler plates, supports, clips, and closures as required for complete installation.

B. Fabricate each metal locker with an individual door and frame; individual top, bottom, and back; and common intermediate uprights separating compartments. Factory weld frame members of each metal locker together to form a rigid, one-piece assembly.

C. Equipment: Provide each locker with an identification plate and the following equipment:

1. Open-Front Athletic Lockers: Two single-prong wall hooks bolted to locker back and coat rod.

D. Welded Construction: Factory preassemble metal lockers by welding all joints, seams, and connections; with no bolts, nuts, screws, or rivets used in assembly of main locker groups. Factory weld main locker groups into one-piece structures. Grind exposed welds flush.

E. Accessible Lockers: Provide quantities in accordance with the ADA Accessibility Code (coordinate locations with Architect). Fabricate as follows:

1. Provide ADA-compliant door handle and latch.
2. Where locks are required in this Section, provide ADA-compliant locks.
3. Locate bottom shelf no lower than 15 inches above the floor.
4. Where hooks, coat rods, or additional shelves are provided, locate no higher than 48 inches above the floor.

F. Continuous Base: Formed into channel or zee profile for stiffness, and fabricated in lengths as long as practical to enclose base and base ends of metal lockers; finished to match lockers.

G. Continuous Sloping Tops: Fabricated in lengths as long as practical, without visible fasteners at splice locations; finished to match lockers.

1. Sloping-top corner fillers, mitered.

H. Recess Trim: Fabricated with minimum of 2-1/2-inch face width and in lengths as long as practical; finished to match lockers.

I. Filler Panels: Fabricated in an unequal leg angle shape; finished to match lockers. Provide slip-joint filler angle formed to receive filler panel.

J. Boxed End Panels: Fabricated with 1-inch wide edge dimension, and designed for concealing fasteners and holes at exposed ends of nonrecessed metal lockers; finished to match lockers.

1. Provide one-piece panels for double-row (back-to-back) locker ends.

K. Finished End Panels: Designed for concealing unused penetrations and fasteners, except for perimeter fasteners, at exposed ends of nonrecessed metal lockers; finished to match lockers.

1. Provide one-piece panels for double-row (back-to-back) locker ends.

L. Center Dividers: Full-depth, vertical partitions between bottom and shelf; finished to match lockers.

2.6. ACCESSORIES

A. Fasteners: Zinc- or nickel-plated steel, slotless-type, exposed bolt heads; with self-locking nuts or lock washers for nuts on moving parts.

B. Anchors: Material, type, and size required for secure anchorage to each substrate.

1. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls for corrosion resistance.
2. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

3. EXECUTION

3.1. EXAMINATION

A. Examine walls, floors, and support bases, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2. INSTALLATION

A. General: Install level, plumb, and true; shim as required, using concealed shims.

1. Anchor locker runs at ends and at intervals recommended by manufacturer, but not more than 36 inches o.c. Using concealed fasteners, install anchors through backup reinforcing plates, channels, or blocking as required to prevent metal distortion.
2. Anchor single rows of metal lockers to walls near top and bottom of lockers.

B. Welded Metal Lockers: Connect groups together with standard fasteners, with no exposed fasteners on face frames.

C. Equipment:

1. Attach hooks with at least two fasteners.
2. Identification Plates: Identify metal lockers with identification indicated on Drawings.

a. Attach plates to upper shelf of each open-front metal locker, centered, with at least two aluminum rivets.

D. Trim: Fit exposed connections of trim, fillers, and closures accurately together to form tight, hairline joints, with concealed fasteners and splice plates.

1. Attach recess trim to recessed metal lockers with concealed clips.
2. Attach filler panels with concealed fasteners. Locate filler panels where indicated on Drawings.
3. Attach sloping-top units to metal lockers, with closures at exposed ends.
4. Attach boxed end panels using concealed fasteners to conceal exposed ends of nonrecessed metal lockers.
5. Attach finished end panels using fasteners only at perimeter to conceal exposed ends of nonrecessed metal lockers.

E. Freestanding Locker Benches: Place benches in locations indicated on Drawings.

3.3. ADJUSTING

A. Clean, lubricate, and adjust hardware. Adjust doors and latches to operate easily without binding.

3.4. PROTECTION

A. Protect metal lockers from damage, abuse, dust, dirt, stain, or paint. Do no permit use during construction.

B. Touch-up marred finishes, or replace metal lockers that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by locker manufacturer.

END 10 5100

1. GENERAL

1.1. WORK INCLUDES

A. Alternate #2: Freestanding, pre-engineered metal canopies including concrete foundation, steel framing, metal roof, roof drains and leaders, fascia components, and metal ceiling and accessories.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 3300 - Submittal Procedures
2. Section 03 3000 - Cast-In-Place Concrete
3. Section 05 5000 - Metal Fabrications.
4. Section 07 9000 - Joint Sealers.
5. Division 22 - Plumbing: Plumbing services and connections.
6. Division 26 - Electrical: Electrical wiring and connections.
7. Section 32 1216 - Asphalt Paving
8. Section 32 1313 - Concrete Paving

1.3. REFERENCES

A. American Institute of Steel Construction, Inc. (AISC): AISC 360 - Specification for Structural Steel Buildings.

B. American Society of Civil Engineers (ASCE): ASCE 7 - Minimum Design Loads for Buildings and Other Structures.

C. American Welding Society (AWS): AWS D1.1 - Structural Welding Code - Steel.

D. ASTM International (ASTM):

1. ASTM A 36/A 36M - Standard Specification for Structural Steel.

E. National Association of Architectural Metal Manufacturers (NAAMM): NAAMM MFM - Metal Finishes Manual.

F. National Fire Protection Association (NFPA): NFPA 70 - National Electrical Code (NEC).

1.4. PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide pre-engineered canopies capable of withstanding the effects of gravity, wind, seismic, thermal and other project specific load conditions as required by the current building code for the site-specific location where canopy is installed:

1. Uniform pressure as indicated on Sheet S001 – Minimum design loads per ACSE 7

B. Thermal Movements: Provide pre-engineered canopies that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 degrees F (67 degrees C), ambient; 180 degrees F (100 degrees C), material surfaces.

1.5. SUBMITTALS

A. Submit under provisions of Section 01 3300 - Submittal Procedures.

1. Product Data: Submit manufacturer's data sheets on each product to be used, including:

a. Construction details, material descriptions, dimensions of individual components and profiles, and finishes.

2. Shop Drawings: Submit shop drawings. Include plans, elevations, sections, details, and attachments to other work. Canopy supplier shall furnish complete canopy drawings signed and sealed by a professional engineer licensed in the state where the canopy shall be installed.
3. Samples:

a. Submit samples for initial color selection. Submit samples of each specified finish. Submit samples in form of manufacturer's color charts showing full range of colors and finishes available. Where finishes involve normal color variations, include samples showing the full, range of variations expected.

4. Certificates: Submit product certificates signed by the manufacturer certifying material compliance with specified performance characteristics and criteria, and physical requirements.
5. Warranty Data: Submit warranty documents specified herein.

1.6. QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in engineering and manufacturing pre-engineered canopies with a minimum documented experience of twenty years and with an in-house quality inspection program not by AISC or other certification program

B. Welding: Qualify procedures and personnel according to the following:

1. Welding shall be in accordance with AWS D1.1 (with E70XX electrodes).
2. Steel shop connections shall be welded and field connections shall be bolted (unless otherwise noted on the Drawings). Shop welds may be changed to field welds with the approval of the project engineer.
3. Slag shall be cleaned from welds and inspected. Steel shall be painted with red oxide rust-inhibitive primer (unless galvanizing specified).

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NEC, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

D. Source Limitations: Obtain pre-engineered metal canopy through one source from a single manufacturer who shall manufacture and install the canopy.

E. Product Options:

1. The Drawings indicate size, profiles, and dimensional requirements of pre-engineered metal canopies and are based on the specific system indicated. Refer to Refer to Section 01 6000 - Product Requirements. Do not modify intended aesthetic effects, as judged

solely by the Architect, except with the Architect's approval. If modifications are proposed, submit comprehensive explanatory data to the Architect for review.

F. Coordination:

1. The Contractor shalll conduct site meetings to verify project requirements, substrate conditions, utility connections, manufacturer's drawings and installation instructions. Comply with Division 1 section on project meetings.
2. The contractor shall prepare for and pour the concrete footers for the pre-engineered metal canopies. Manufacturer shall furnish recommended footing drawings as per IBC Section 1807.3 and prints and rebar details for concrete footings, as well as provide anchor bolts to be embedded in concrete footer. Such items shall be delivered to project site in time for installation.

1.7. DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Protect components and accessories from corrosion, deformation, damage, and deterioration when stored at job site. Keep materials free from dirt and foreign matter.

1.8. PROJECT CONDITIONS

A. Field Measurements: The Contractor shall verify location and elevation of footings relative to finished grade, columns, and other construction contiguous with pre-engineered metal canopies by field measurements before fabrication and indicate measurements on shop drawings.

1. Established Dimensions: The Contractor shall, where field measurements cannot be made without delaying the work, establish dimensions and proceed with fabricating metal canopies without field measurements. Contractor is responsible to coordinate footer locations and elevations with any interferences with or attachments to abutting structures.

1.9. WARRANTY

A. Manufacturer's Warranty: Provide manufacturer's standard written warranty, to be free of defects in materials, leaks, and workmanship for 1 year from date of Substantial Completion.

2.PRODUCTS

2.1. MANUFACTURERS

A. Acceptable Manufacturer: Austin Mohawk and Company, Inc.

B. Substitutions: Under provisions of Section 01 6000.

2.2. MATERIALS

A. Structural Steel:

1. Material and work shall conform to the latest AISC 360.
2. Structural steel shall be painted with a rust inhibitive (red oxide) primer (std).

B. Sheet Metal:

1. Decking: 3 inch (76 mm) by 16 inch (406 mm) by 20 gage smooth white, ASTM A 653/A 653M GR40, Fy = 40 ksi, galvanized steel with baked enamel finish.
2. Perimeter Gutter: 20 gage hot-dip galvanized steel baked enamel finish.
3. Internal Downspout: 3 inch (76 mm) diameter PVC

2.3. PRE-ENGINEERED METAL CANOPY

A. General: Provide a complete, integrated set of manufacturer's standard design canopy components to form a pre-engineered canopy ready for installation on project site. Canopy steel framing consists of using stacked wide-flange roof beams which transfer loads to columns. Columns are designed as fixed base elements to transfer vertical & lateral loads and moments to concrete foundations. Columns are typically located in an area of site protected from drive lane traffic. Pre-engineered metal canopy shall be designed to meet all site specific design loads per or project specific requirements.

B. Canopy Fascia:

1. Aluminum Composite Panel (ACM): Available with a fluorocarbon paint finish, masked on one side. Shall be warranted for 5 -10 years depending on color and finish selection.

C. Canopy Finishes: Comply with NAAMM MFM for recommendations for applying and designating finishes.

1. 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 are assembled or installed to minimize contrast.

D. Fabrication: Fabricate pre-engineered canopies completely in factory.

3.EXECUTION

3.1. EXAMINATION

A. Verification of Conditions: Examine areas and conditions under which the work is to be installed, and notify the Contractor in writing, with a copy to the Owner and the Architect, of any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

1. Examine supporting foundations for compliance with manufacturer's requirements, including installation tolerances and other conditions affecting performance of supporting members.
2. Verify the rough-in of required mechanical and electrical services prior to placement of the structure.

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. A work area shall be required extending 10 feet (3 m) beyond buildings and canopies in all directions to the extent practical. The work area shall be flat, comprised of hard-packed soil or gravel, asphalt, or concrete, and free of open excavation, debris, construction equipment and construction workers. An additional flat work space a minimum of 25 feet (7.6 m) by 25 feet (7.6 m) or as practical shall be provided adjacent to the canopy and/or building for unloading and storing materials. Site to meet OSHA guidelines to allow lift equipment and scaffolding to maneuver the work area.

B. Set pre-engineered metal canopy plumb and aligned. Level base plates true to plane with full bearing on concrete bases.

C. Fasten pre-engineered metal canopy columns to anchor bolts and/or foundation bolts.

D. Provide anchor bolts as follows:

1. Anchor bolts or foundation bolts will be set in accordance with approved site-specific drawings. They must not vary from the size and dimensions shown on the erection drawings. Use of a plywood template is recommended. Remove template prior to column erection.
2. Anchor bolts shall conform to ASTM F1554 grade 55 and shall have a minimum of 7 inches (178 mm) of exposed thread and 23 inch (584 mm) minimum embedment with 1-1/4 inch (32 mm) nut and washer as embedment end.

E. Provide bolted connections as follows:

1. Structural erection bolts shall conform to ASTM A 325/A 325M.
2. Bolts shall be tightened to snug tight per latest RCSC specifications (unless otherwise specified).

F. Provide screws as follows:

1. Fastening shall be performed per installation prints provided by the manufacturer.
2. Self-drilling and self-tapping screws shall have a sufficient cut point and a 1/2 inch (13 mm) outside diameter dished metal-backed neoprene washer to be used in water sealing applications.

G. Provide pedestrian protection and warnings during construction which comply with local, Federal, and OSHA codes.

H. Prior to steel erection of any kind, the Contractor shall grade, backfill and otherwise prepare the job site to allow for rolling scaffold and ensure safe working conditions including the removal or relocation of overhead power lines.

I. Any grade or elevation situations which deviate from the approved manufacturer's plans shall be conveyed to the manufacturer prior to fabrication.

J. All anchor bolts and/or leveling plates shall be set within 1/4-inch (6 mm) tolerance on layout and grade level.

K. Connect electrical power service to power distribution system according to requirements specified in Division 26 - Electrical.

3.4. ADJUSTING AND CLEANING

A. After completing installation, inspect exposed finishes and repair damaged finishes.

3.5. PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair, or replace damaged products before Substantial Completion.

END 10 5380

1. GENERAL

1.1. WORK INCLUDES

A. Metal storage shelving.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 3300 - Submittal Procedures

1.3. COORDINATION

A. Coordinate sizes and locations of blocking and backing required for installation of metal storage shelving attached to wall and ceiling assemblies.

B. Coordinate locations and installation of metal storage shelving that may interfere with ceiling systems including lighting, HVAC, speakers, sprinklers, access panels, electrical switches or outlets, and floor drains.

1.4. SUBMITTALS

A. Submit in accordance with Section 01 3300:

1. Product Data: For each type of product.

a. Include rated capacities, construction details, material descriptions, dimensions of individual components and profiles, and finishes for metal storage shelving.

2. Shop Drawings: For metal storage shelving.

a. Include plans, elevations, sections, and attachment details.
b. Include installation details of connectors, lateral bracing, and special bracing.

3. Samples: For each type of metal storage shelving and for each color specified, in the following sizes:

a. Vertical Supports: 12 inches (305 mm) tall.
b. Shelves: Full size, but not more than 24 inches wide by 12 inches deep (610 mm wide by 305 mm deep).
c. Connectors: Full size.
d. Shelf-Label Holders: Full size.

4. Samples for Initial Selection: For each type of metal storage shelving with factory-applied color finishes.

a. Include Samples of accessories involving color selection.

5. Samples for Verification: For the following components, of size indicated below:

a. Vertical Supports: 12 inches (305 mm) tall.

b. Shelves: Full size, but not more than 24 inches wide by 12 inches deep (610 mm wide by 305 mm deep).
c. Connectors: Full size.

6. Delegated-Design Submittal: For seismic restraint of metal storage shelving.
7. Qualification Data: For Installer.
8. Seismic Qualification Certificates: For metal storage shelving, accessories, and components, from manufacturer.
9. Product Certificates: For each type of metal storage shelving.

B. Submit in accordance with Section 01 7700:

1. Maintenance Data: For metal storage shelving to include in maintenance manuals.

1.5. QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

1.6. FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install metal storage shelving until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at levels intended for building occupants during the remainder of the construction period.

1.7. MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Shelves: Full-size units equal to 5 percent of amount installed for each type indicated, but no fewer than 5 shelves.
2. Shelf-to-Post Connectors: Full-size units equal to 5 percent of amount installed for each type indicated, but no fewer than 10 connectors.

2. PRODUCTS

2.1. PERFORMANCE REQUIREMENTS

A. Delegated Design: Design metal storage shelving, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Seismic Performance: Metal storage shelving shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. Seismic Component Importance Factor: 1.0.

2.2. METAL STORAGE SHELVING

A. Storage rack with wire decking, welded metal upright posts; field assembled from factory – formed components; maximum load of 900 lbs/shelf.

B. Acceptable Manufacturers:

1. Technibilt
2. Architect approved equivalent.

C. Materials

1. Frame - welded steel
2. Shelves - span between supporting corner posts that allow shelf-height adjustment over full height of shelving unit; top and bottom shelf fixed; intermediate shelf adjustable in 3" maximum increments.

D. Finishes: Powder-coated finish with corrosion, chemical and chip resistance.

E. Sizes: See Drawings.

F. Seismic Performance: Provide shelving capable of withstanding the effect of earthquake motion as required by applicable building codes.

G. Field Measurements: Verify quantities of bulk product shelving units before fabrication. Indicate verified measurements on shop drawings. Coordinate fabrication and deliver to ensure no delay in progress of the work.

2.3. FABRICATION

A. Fabricate metal storage shelving components to provide field-assembled units that are square and rigid, with posts plumb and true and shelves flat and free of dents or distortion. Fabricate connections to form a rigid structure, free of buckling and warping.

1. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Locate joints where least conspicuous.
2. Build in straps, plates, brackets, and other reinforcements as needed to support shelf loading.
3. Cut, reinforce, drill, and tap metal fabrications to receive hardware, fasteners, and similar items.

B. Form metal in maximum lengths to minimize joints. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing the Work. Form backs of shelving units of up to 48 inches (1219 mm) wide from one piece.

C. Form edges and corners free of sharp edges or rough areas. Fold back and crimp exposed edges of unsupported sheet metal to form a hem on the concealed side; ease edges of metal plate to radius of approximately 1/32 inch (0.8 mm). Shear and punch metals cleanly and accurately. Remove burrs.

D. Weld corners and seams continuously to develop strength, minimize distortion, and maintain the corrosion resistance of base metals. At exposed locations, finish welds and surfaces smooth and blended so surface is smooth after finishing and contour of welded surface matches that of adjacent surface. Weld before finishing components to greatest extent possible. Remove weld spatter and welding oxides from exposed surfaces before finishing.

3. EXECUTION

3.1. EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine floors for suitable conditions where metal storage shelving will be installed.

C. Examine wall to which metal storage shelving will be attached for properly located blocking, grounds, or other solid backing for attachment of support fasteners.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2. PREPARATION

A. Vacuum and clean finished floor over which metal storage shelving is to be installed.

3.3. INSTALLATION

A. Install metal storage shelving level, plumb, square, rigid, true, and with shelves flat and free of dents or distortion. Make connections to form a rigid structure, free of buckling and warping.

1. Install exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible.
2. Install braces, straps, plates, brackets, and other reinforcements as needed to support shelf loading and as required for stability.
3. Adjust post-base bolt leveler to achieve level and plumb installation.
4. Anchor shelving units to floor with floor anchors through floor plate. Shim floor plate to achieve level and plumb installation.
5. Install seismic restraints.
6. Connect side-to-side shelving units together.
7. Install shelves in each shelving unit at spacing indicated on Drawings.

3.4. ERECTION TOLERANCES

A. Erect case-type metal storage shelving to a maximum tolerance from vertical of 1/2 inch (13 mm) in up to 10 feet (3 m) of height, not exceeding 1 inch (25 mm) for heights taller than 10 feet (3 m).

3.5. ADJUSTING

A. Adjust metal storage shelving so that connectors and other components engage accurately and securely.

B. Adjust and lubricate operable components to operate smoothly and easily, without binding or warping. Check and readjust operating hardware.

C. Touch up marred finishes or replace metal storage shelving that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by metal storage shelving manufacturer.

D. Replace metal storage shelving components that have been damaged beyond successful repair by finish touchup or similar minor repair procedures.

END 10 5613

1. GENERAL

1.1. WORK INCLUDES

A. Alternate #1: Work in this section shall include the design, fabrication, and installation of aluminum open frame shade structure as shown in drawings and as specified.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 3300 - Submittal Procedures
2. Section 01 7700 - Closeout Procedures
3. Section 03 3000 - Cast-in-Place Concrete.

1.3. REFERENCES

A. 2015 International Building Code.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

C. ASCE 7-16 - Minimum Design Loads for Buildings and Other Structures.

D. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High-Performance Organic Coatings on Aluminum Extrusions and Panels.

E. Aluminum Design Manual 2015.

F. ASTM B 209, Specification for Aluminum and Aluminum Alloy Sheet and Plate.

G. ASTM B 221, Specification for Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

H. ANSI/AWS D1.2, Structural Welding Code – Aluminum.

1.4. SUBMITTALS

A. Submit in accordance with Section 01 3300:

1. Product Data: Indicate the basis of design, product sizing, and options selections
2. Shop Drawings: Indicate dimensions, locations of members, connections, general construction details, anchorages, method of anchorage, and installation method.
3. Samples: Submit material and color selection samples.
4. Delegated Design Submittals: Submit engineered shop drawings signed and stamped by a licensed professional engineer employed by the Manufacturer licensed in the project location.

B. Submit in accordance with Section 01 7700:

1. Operation and Maintenance Information
2. Manufacturer's Warranty

3. Provide Extra Materials to Owner as specified in this Section. Provide the Architect/Engineer an itemized letter of transmittal of material delivery signed by the Owner.

1.5. QUALITY ASSURANCE

A. Qualifications

1. Manufacturer: Single source manufacturer for design, engineering, fabrication, and shipping with a minimum of 15 years of experience fabricating aluminum structures.
2. Installers: Familiar with the manufacturer's structures and installation techniques.
3. Licensed Professionals: Professional Engineer to be licensed in the project state.

1.6. DELIVERY, STORAGE, AND HANDLING

A. Delivery and Acceptance Requirements: Upon receipt, all packages and pallets shall be opened and inspected for damage. Any missing or damaged components must be noted on the delivery receipt with the carrier before accepting the shipment.

B. Storage and Handling Requirements: Upon completion of the inspection, all items shall be repackaged and stored where protected from moisture, dirt, and excessive heat. Do not wrap material so that heat or moisture can become trapped. Ensure that items are level and fully supported and have airflow between parts. Handle materials to protect materials, coatings, and finishes during transportation and installation to prevent damage or staining.

1.7. WARRANTY

A. Provide manufacturer's standard warranty.

B. Powder Coat Finish 10-Year Warranty.

1.8. EXTRA MATERIALS

A. Extra Materials: Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Shade Canopy: Provide one replacement unit.

2. PRODUCTS

2.1. MANUFACTURERS / PRODUCTS

A. Structureworks /Harbor

B. Substitutions: Under provisions of Section 01 6000.

2.2. PERFORMANCE DESIGN/CRITERIA

A. Design structure, including comprehensive engineering analysis by a qualified engineer, using structural performance requirements and design criteria indicated.

B. Structure shall withstand the effects of gravity loads and the loads and stresses within limits and under conditions indicated, specific to the project location and code requirements, without permanent deformation of canopy components or permanent damage to fasteners and anchors.

C. Design members to withstand wind loads in accordance with ASCE 7-16 and applicable code.

D. Design foundations in accordance with applicable code for the specific structure and site conditions.

E. Design structure for required allowable ground snow load in accordance with applicable code.

F. Design structure in accordance with applicable fire code and provide data on ASTM E84 testing.

2.3. SHADE STRUCTURE

A. Freestanding extruded aluminum frame

1. Size: 18' x 18'
2. Columns: 6" x 6"
3. Beams: 4" x 12"
4. Ledger: 2" x 12"

B. Shade Canopy Fabric:

1. High-density polyethylene fabric
2. Color: As selected from manufacturer's full range

C. Hardware

1. Stainless steel cable provided in the perimeter hem of the fabric top and attached to tensioners.
2. Tensioners shall be made with stainless steel threaded components
3. Stainless steel cable shall be connected with stainless steel connectors.

2.4. MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated, complying with the requirements of standards indicated below.

1. Extruded shapes: ASTM B221
2. Sheet: ASTM B209

B. Fasteners: 300 or 400 series stainless steel

2.5. FINISHES

A. High Performance Organic Coating Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

1. Fluoropolymer Coating System: Complying with AAMA 2604 and containing not less than 50 percent PVDF resin by weight in color coat.

a. Color and Gloss: As selected by Architect from manufacturers full range of choices for color and gloss.

3. EXECUTION

3.1. EXAMINATION

A. Begin installation once supporting structures have been properly prepared.

B. Verify that all concrete, masonry, and roofing work in the vicinity is complete and cleaned.

3.2. INSTALLATION

A. Install all products true to line, level, and plumb and in accordance with the manufacturer's installation guide.

3.3. CLEANING

A. Clean all surfaces and restore any marred surfaces to their original condition as approved by the Architect.

3.4. PROTECTION

A. Protect installed products until completion of the project.

B. Touchup, repair, or replace damaged products before substantial completion.

END 10 7113

1. GENERAL

1.1. WORK INCLUDES

A. Manually-operated projection screens.

B. Electrically-operated projection screens.

C. Projector ceiling-mount system.

D. Electrical Contractor Provide:

1. Installation of switches and final connection of electrical connections for electrically-operated projection screens.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 3300 - Submittal Procedures
2. Section 01 7700 - Closeout Procedures
3. Section 06 1000 - Rough Carpentry
4. Division 26: Furnishing and installation of electrical wiring, conduit and/or electrical items and final connections.

1.3. DEFINITIONS

A. Gain of Front-Projection Screens: Ratio of light reflected from screen material to that reflected perpendicularly from a magnesium carbonate surface as determined per SMPTE RP 94.

1.4. SUBMITTALS

A. Submit in accordance with Section 01 3300:

1. Product Data: Submit manufacturer's specifications and installation instructions for each type of projection screen unit in accordance with Section 01 3300.
2. Shop Drawings: Show layouts and types of projection screens. Include the following:

a. Location of screen centerline relative to ends of screen case.
b. Location of seams in viewing surfaces.
c. Drop length.
d. Connections to supporting structure.
e. Anchorage details.
f. Details of juncture of exposed surfaces with adjacent finishes.
g. Accessories.

h. For electrically operated units:

1) Location of wiring connections.
2) Wiring diagrams.

3. Samples for Initial Selection: Submit color charts of finishes of surface-mounted screen cases.
4. Samples for Verification Purposes: Submit actual samples of case finishes previously selected on wood or metal as appropriate. Minimum size: 2”x2”.

B. Submit in accordance with Section 01 7700:

1. O&M Data: At project closeout, provide operations and maintenance instructions in the O&M manuals for each type of projection screen, including cleaning instructions and schedule of preventative maintenance.
2. Operations Equipment: Turn over to the Owner any special tools, keys and materials required for the operation of the screens.

1.5. QUALITY ASSURANCE

A. Source Limitations: Obtain projection screens through one source from a single manufacturer. Obtain each screen as a complete unit, including viewing surface, controls, motor, and necessary mounting hardware and accessories.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.6. PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Do not deliver projection screens until building is enclosed and ready for screen installation.

B. Protect screens from damage during delivery, handling, storage and installation.

2. PRODUCTS

2.1. MATERIALS

A. Electrically-Operated Screens:

1. General: Manufacturer's standard units consisting of case, screen, motor, controls, mounting accessories, and other components necessary for a complete installation. Provide units that are listed and labeled as an assembly by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
2. Line Voltage Control: 120V operation. Remotely located 3-position control switch installed in recessed metal device box with flush cover plate matching other electrical device cover plates in room where switch is installed.

    a. Provide single-station control switch.

3. Motor in Roller: Instant-reversing motor of size and capacity recommended by screen manufacturer; with permanently lubricated ball bearings, automatic thermal-overload protection, preset limit switches to automatically stop screen in up and down positions, and positive-stop action to prevent coasting. Mount motor inside roller with vibration isolators to reduce noise transmission.
4. Screen Mounting: Top edge securely anchored to rigid metal roller and bottom edge formed into a pocket holding a 3/8-inch- (9.5-mm-) diameter metal rod with ends of rod protected by plastic caps.

a. Roller for motor in roller supported by vibration- and noise-absorbing supports.

B. Screen Materials and Viewing Surfaces

1. General:

a. Mildew Resistance: Rating of 0 or 1 when tested according to ASTM G21.
b. Flame Resistance: Passes NFPA 701.
c. Flame-Spread Index: Not greater than 75 when tested according to ASTM E84.
d. Seams: Provide screens, in sizes indicated, without seams where possible. If length of screen indicated exceeds maximum length produced without seams in material specified, provide screen with seam a minimum quantity of seams and as inconspicuous as possible.
e. Provide extra drop length where indicated.

2. Matte-White Viewing Surface: Peak gain of 0.9 to 1.0, and gain of not less than 0.8 at an angle of 50 degrees from the axis of the screen surface.

2.2. ELECTRICALLY-OPERATED PROJECTION SCREENS

A. Recessed, Electrically-Operated Screens without Ceiling Closure: Motor in roller units with bottom of case entirely or partially open under screen compartment. Finish of portions of case exposed to view, including interior, to be black primer.

1. Acceptable Model/Manufacturer:

a. Advantage Electrol / Da-Lite Screen Co.
b. Access/Series E / Draper Inc.

2. Mounting Method; Provide screen case with trim flange to receive ceiling finish:

a. Ceiling: Hanger rods.

3. Screen:

a. Size: 8'x8'.
b. Viewing Surface: Matte White.
c. Edge Treatment: Black masking borders.
d. Extra Drop: None.

2.3. PROJECTOR CEILING-MOUNT SYSTEM

A. Acceptable Products/Manufacturers: The following products, provided they comply with the requirements of the Contract Documents as determined by the Architect, are considered acceptable:

1. CMS440 / Chief Manufacturing
2. ELPMB01 / Epson America, Inc.
3. CMJ500R1 / Peerless Industries, Inc.

B. System Description: Adjustable tray attaches to suspended acoustical ceiling tile grid, but the weight of the system is suspended by four tie wires from the structural deck above. The adjustable carriage allows for ideal projector positioning below a 2' x 2' or 2' x 4' standard ceiling tile. The mounting pipe fitting fits through a standard lay-in ceiling tile and the hole is finished with an escutcheon ring.

1. Capacity: 50 pounds, minimum.
2. 1 ½" diameter mounting pipe fitting for attachment of an adjustable extension column that is not included.
3. Chrome escutcheon ring around pipe fitting.
4. Knockouts for two electrical outlet boxes.

3. EXECUTION

3.1. INSPECTION

A. Examine the areas and conditions under which the projection screens are to be installed. Notify the Architect in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

B. Prior to installation, verify type and location of power supply.

3.2. INSTALLATION

A. Install projection screen units and accessories where shown on drawings in accordance with the manufacturer's written instructions.

B. Install level, plumb, secure, and at the proper height.

C. Cooperate with other crafts for securing projection screen units to finished surfaces.

D. Repair or replace damaged units in a manner acceptable to Architect.

E. Coordinate requirements for power supply, conduit, and wiring required for projection screen motors and controls. All conduit and wiring is to be concealed.

3.3. TESTING

A. Test electrically-operated projection screens to verify that screen, controls, limit switches, closure, and other operating components are functional. Ensure that screen is level and viewing surface plumb when extended. Correct deficiencies.

3.4. PROTECTION

A. After installation, protect projection screens from damage during construction. If damage occurs despite such protection, remove and replace damaged components or entire unit as required to provide units in their original, undamaged condition.

END 11 5213

1. GENERAL

1.1. WORK INCLUDES

A. Manually-operated roller shades.

B. Roller Window Shade Schedule.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 3300 - Submittal Procedures
2. Section 01 7700 - Closeout Procedures
3. Section 06 1000 - Rough Carpentry

1.3. REFERENCES

A. Publication Dates: Comply with standards in effect as of the date of the Contract Documents except for those having different revision dates as referenced in the codes indicated on the Drawings, or unless otherwise indicated.

B. National Fire Protection Association (NFPA):

1. NFPA 701 - Standard Methods of Fire Tests for Flame Propagation of Textiles and Films.

C. Window Covering Manufacturers Association (WCMA):

1. ANSI/WCMA A101.1 - American National Standard for Safety of Window Covering Products.

1.4. SUBMITTALS

A. Submit in accordance with Section 01 3300:

1. Product Data: For each type of product.

a. Include styles, material descriptions, fire-test-response characteristics, construction details, dimensions of individual components and profiles, features, finishes, and operating instructions for roller shades.
b. Include manufacturer's installation instructions.

2. Shop Drawings: Show location and extent of roller shades. Include elevations, sections, details, and dimensions not shown in Product Data. Show installation details, mountings, attachments to other Work, operational clearances, and relationship to adjoining work.
3. Samples for Verification, for the following products:

a. Shade Band Material: Not less than 3" square, with specified treatments applied. Mark inside face of material if applicable.
b. Roller Shade: Full-size operating unit, not less than 16" wide for each type of roller shade indicated.

4. Roller Window Shade Schedule: Include roller shades in schedule using same room designations indicated on Drawings and in roller widow shade schedule. Include shade type, size, quantities, and installation information within schedule.
5. Qualification Data: For Installer.

B. Submit in accordance with Section 01 7700:

1. Maintenance Data: For roller shades to include in O&M manuals. Include the following:

a. Methods for maintaining roller shades and finishes.
b. Precautions about cleaning materials and methods that could be detrimental to fabrics, finishes, and performance.
c. Operating hardware.

2. Provide Extra Materials to Owner as specified in this Section. Provide the Architect/Engineer an itemized letter of transmittal of material delivery signed by the Owner.

1.5. QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this Section with three years documented experience.

B. Installer Qualifications: An experienced installer who has completed installation of roller shades 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.

1.6. DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle roller window shade products under provisions of Section 01 6000 and in accordance with manufacturers written instructions.

B. Deliver roller window shades wrapped and crated in factory packages in a manner to prevent damage to components or marring of surfaces, marked with manufacturer, product name, and location of installation using same designations indicated on Drawings and roller window shade schedule.

C. Store in a clean, dry area, laid flat and blocked off ground to prevent sagging, twisting, or warping.

1.7. PROJECT CONDITIONS

A. Environmental Limitations: Do not install roller shades until construction and wet and dirty finish work in spaces, including painting, is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Field Measurements: Contractor shall be responsible for taking field dimensions required for proper fitting of roller window shades before fabrication and indicate measurements on Shop Drawings. Allow clearances for operating hardware of operable glazed units through entire operating range. Notify Architect/Engineer of discrepancies. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.8. EXTRA MATERIALS

A. Extra Materials: Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Roller Shades: Provide three replacement units for typical front and rear roller.

2. PRODUCTS

2.1. MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Draper Shade & Screen Co., Inc.
2. Hunter Douglas Contract
3. MechoShade Systems, Inc.
4. SM Automatic.

B. Source Limitation: Obtain roller window shades from single source from single manufacturer.

2.2. PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: Provide roller shade band materials with the markings for fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by a qualified testing agency:

1. Flame-Resistance Ratings: Passes NFPA 701.

B. Corded Window Covering Product Standard: Provide roller shades complying with ANSI/WCMA A100.1.

2.3. ROLLER SHADES

A. Types:

1. Type 01: Light-filtering shade
2. Type 02: Light-filtering + blackout shade

B. Shade Band Material (Front Roller): Phifer, sheerweave, Style 4400, or equivalent PVC-coated fiberglass.

1. Material width: Field verify window width.
2. Bottom Hem: Straight
3. Material Openness Factor: 3%
4. Material Color: As selected by Architect/Engineer from manufacturer's full range of colors.

C. Blackout Shade Band Material (Rear Roller): Sunbloc-Series SB9000, or equivalent, fiberglass blackout material. Provide manufacturer's recommended side and sill channels/angles to provide perimeter light seals.

1. Material Width: Field verify window width.
2. Bottom Hem: Straight
3. Material Openness Factor: 0%

4. Material Color: As selected by Architect/Engineer from manufacturer's full range of standard colors.

D. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service; with manufacturer's standard method for attaching shade material.

1. Direction of Roll: Regular, from back of roller

E. Mounting Brackets: Fascia end caps, fabricated from steel finished to match fascia or headbox. Mounting shall permit easy removal and replacement without damaging roller shade or adjacent surfaces and finishes.

F. Fascia: L-shaped, aluminum extrusion that conceals front and underside of roller and operating mechanism and attaches to roller endcaps without exposed fasteners.

1. Height: Manufacturer's standard height required to enclose roller and shadeband when shade is fully open.

G. Bottom Bar: Steel or extruded aluminum, with plastic or metal capped ends. Provide concealed, by pocket of shade material, internal-type bottom bar with concealed weight bar as required for smooth, properly balanced shade operation.

2.4. ROLLER OPERATION – MANUAL

A. Chain-and-Clutch Operating Mechanisms: With continuous-loop bead chain and clutch that stops shade movement when bead chain is released; permanently adjusted and lubricated.

1. Bead Chain: Nickel-plated metal.
2. Limit Stops: Provide upper and lower ball stops.

B. Roller-Coupling Assemblies: Coordinated with operating mechanism and designed to join up to three inline rollers into a multiband shade that is operated by one roller drive-end assembly. Provide where indicated in roller window shade schedule.

2.5. ROLLER SHADE FABRICATION

A. Product Safety Standard: Fabricate roller shades to comply with ANSI/WCMA A100.1, including requirements for chain-loop tension/restraining devices; lead content of components; and warning labels.

B. Product Description: Roller shade consisting of a roller, a means of supporting the roller, a flexible sheet or band of material carried by the roller, a means of attaching the material to the roller, a bottom bar, and an operating mechanism that lifts and lowers the shade.

1. Orientation of Shade Band: "Up the bolt" wherever possible. If "up the bolt" is not possible, review seaming and batten options with the Architect.
2. Lifting Mechanism: With permanently lubricated moving parts.

C. Unit Sizes: Obtain units fabricated in sizes to fill window and other openings as follows, measured at 74° F.

1. Between (Inside) Jamb Installation: Edge of shade not more than 1/4" from face of jamb. Length equal to head to sill dimension of opening in which each shade is installed.

D. Installation Brackets: Designed for easy removal and reinstallation of shade, for supporting fascia, roller, and operating hardware and for hardware position and shade mounting method indicated.

E. Installation Fasteners: Not fewer than two fasteners per bracket, fabricated from metal noncorrosive to shade hardware and adjoining construction; type designed for securing to supporting substrate; and supporting shades and accessories under conditions of normal use.

2.6. FACTORY FINISHING

A. Color-Coated Finish: For metal components exposed to view, apply manufacturer's standard baked finish complying with manufacturer's written instructions for surface preparation including pretreatment, application, baking, and minimum dry film thickness.

1. Colors and Finish: As selected by Architect/Engineer from manufacturer's full range of available finishes.

3. EXECUTION

3.1. EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2. ROLLER SHADE INSTALLATION

A. Install roller shades level, plumb, square, and true according to manufacturer's written instructions.

1. Units shall be located so shade band is not closer than 2" to interior face of glass.
2. Allow clearances for window operation hardware.

3.3. ADJUSTING

A. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

3.4. CLEANING AND PROTECTION

A. Clean roller shade surfaces after installation, according to manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that roller shades are without damage or deterioration at time of Substantial Completion.

C. Replace damaged roller shades that cannot be repaired, in a manner approved by Architect/Engineer, before time of Substantial Completion.

3.5. DEMONSTRATION AND TRAINING

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain systems. Use the manufacturer’s O&M Manuals as an instructional guide.

3.6. ROLLER WINDOW SHADE SCHEDULE

A. Roller window shades conforming to the requirements of this section according to the attached schedule.

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MSD TRANSPORTATION WINDOW SHADE SCHEDULE

ROOM #	ROOM NAME	SHADE TYPE	SHADE QTY. (VERIFY IN FIELD)	SIZE (VERIFY IN FIELD)	MOUNTING (VERIFY IN FIELD)
102	WAITING	1	3	3'-10"W X 10'-0"H	COUPLED, INSIDE MOUNT W/ FASCIA
105	CONFERENCE ROOM	02	3	2'-5"W X 8'-0"H, 3'-5"W X 8'-0"H, 4'-0"W X 8'-0"H	COUPLED, INSIDE MOUNT W/ FASCIA
106	DIR. OF TRANSPORT	01	1	4'-0"W X 8'-0"H	INSIDE MOUNT W/ FASCIA
107	PAYROLL	01	1	4'-0"W X 8'-0"H	INSIDE MOUNT W/ FASCIA
108	TRIP COORDINATOR	01	1	4'-0"W X 8'-0"H	INSIDE MOUNT W/ FASCIA
109	TRANSPORT. MANAGER	01	1	4'-0"W X 8'-0"H	INSIDE MOUNT W/ FASCIA
112	DISPATCH OFFICE	01	1	4'-0"W X 8'-0"H	INSIDE MOUNT W/ FASCIA
119	DRIVER'S ROOM	01	11	4'-3"W X 8'-0"H	COUPLED, INSIDE MOUNT W/ FASCIA
123	CORRIDOR	01	2	3'-6"W X 10'-0"H	COUPLED, INSIDE MOUNT W/ FASCIA
125	TRAINING ROOM	02	2	2'-8"W X 8'-0"H, 3'-5"W X 8'-0"H	COUPLED, INSIDE MOUNT W/ FASCIA
126	TRAINING OFFICE	01	1	4'-0"W X 8'-0"H	INSIDE MOUNT W/ FASCIA
127	TRAINING OFFICE	01	1	4'-0"W X 8'-0"H	INSIDE MOUNT W/ FASCIA
130	MANAGER OFFICE	01	2	6'-8"W X 4'-0"H, 5'-0"W X 8'-0"H	INSIDE MOUNT W/ FASCIA
135	BREAK ROOM	01	4	3'-2"W X 8'-0"H	COUPLED, INSIDE MOUNT W/ FASCIA

1. GENERAL

1.1. WORK INCLUDES

A. Two-post symmetric vehicle lift

B. Two-post heavy-duty inground lift

C. Conduit, wiring, switching, and final connection of electrical utilities between equipment and utilities, with all work necessary for complete and operational equipment installation.

D. Piping, compressed air lines and drain lines between equipment and utilities with all work necessary for complete and operational equipment installation.

1.2. RELATED WORK

A. Specified Elsewhere:

1. Section 01 7700 - Closeout Procedures
2. Section 03 3000 Concrete

1.3. SUBMITTALS

A. Submit in accordance with Section 01 3300:

1. Product Data: Manufacturer's data sheets on each product to be used, including:

a. Preparation instructions and recommendations.
b. Storage and handling requirements and recommendations.
c. Installation methods.

2. Shop Drawings: Submit drawings showing full layout of all lifts with dimensions and details shown.

B. Submit in accordance with Section 01 7700:

1. Operation and Maintenance Manual: Submit Owner's manual to include system operation, maintenance and troubleshooting, spare part numbers, drawings and schematics.

1.4. QUALITY ASSURANCE

A. Manufacturer qualifications: The lift company selling the product shall possess ISO-9001 certification.

B. Installer qualifications: For warranty validation, installation shall be performed by qualified factory authorized and trained personnel.

C. Product requirements / design standards and certification: The lift shall be certified by a Nationally Recognized Testing Laboratory (NRTL) to the ANSI/ALI ALCTV (current edition) “Standard for Automotive Lifts: Safety Requirements for Construction, Testing, and Validation”.

1.5. DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.6. COORDINATION:

A. Coordinate the final location in the field with the Owner.

1.7. 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.

1.8. WARRANTY

A. Manufacturer's Warranty: Lift system shall be warranted for a minimum period of 2 years for parts and 1 year for labor.

2. PRODUCTS

2.1. MANUFACTURERS

A. Acceptable manufacturers:

1. Rotary Lift
2. Substitutions: Under provisions of Section 01 6000

2.2. TWO-POST SYMMETRIC VEHICLE LIFT

A. General description: Heavy-duty 12,000 lb. capacity symmetric 2-post vehicle lift.

B. Product: SPO12

C. Lifting Capacity: 12,000 lbs.

D. Rise: 75 3/4" - 78 1/8"

E. Overall Height: 13'-8".

F. Overall Width: 11'-5 5/8"

G. Drive-thru: 102 3/8"

H. Inside Columns: 114 7/8"

I. Arm Reach Front & Rear Reach: 27 1/2" minimum, 59" maximum

J. Minimum Adapter Height: 4 ¾”

K. Motor/voltage: 2 HP, 208-230V

2.3. TWO-POST HEAVY-DUTY INGROUND LIFT

A. General description: Six-foot-deep steel enclosure with two pistons and in-pit power units. Self-storing automatic shutter plates and covers keep the opening covered as required by OSHA.

B. Product: Mod235

C. Lifting Capacity: 70,000 lbs.

D. Rise: 70”

E. Power Unit: 5 HP

F. Oil Displacement: 19.3 gallon

G. Standard Adapter Adjustment: 17 15/16" - 44 1/4"

H. Front Post Saddle : Low profile, 4 1/8" tall, 40 1/2" wide maximum reach

I. Saddle Adapter Kits: Type D School Bus

J. Lift Control: Wall-Mounted Console

3. EXECUTION

3.1. EXAMINATION

A. Examine lift areas for compliance with requirements for installation tolerance and other conditions affecting performance. Verify critical dimensions; examine supporting structure and other conditions under which the lift work is to be installed.

B. Do not begin installation until substrates have been properly prepared.

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. Test for proper operation, and re-test if necessary until satisfactory results are obtained.

3.4. FIELD QUALITY CONTROL

A. Acceptance Testing: On completion of lift installation and before permitting use (either temporary or permanent) of lifts.

3.5. DEMONSTRATION AND TRAINING

A. Instruct Owner's personnel in proper use, operations, and daily maintenance of lifts. Use the manufacturer’s O&M Manuals as an instructional guide. Train Owner's personnel in procedures to follow in identifying sources of operational failures or malfunctions.

B. Make a final check of lift operation with Owner's personnel present and just prior to date of Substantial Completion. Determine that operation systems and devices are functioning properly.

3.6. PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before substantial completion.

END 14 4500