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ARCHITECTURE

Addendum No. 1

Mechanical Upgrades to the
Early Learning Center at Park Hills
McMillan Pazdan Smith Project No. 019080
March 14, 2020

The following clarifications, amendments, additions, deletions, revisions, and/or modifications are hereby made a part of the Contract Documents, and change the original documents only in the manner and to the extent stated below:

Item No. 1: **Pre-Bid Meeting Minutes/Sign-In Sheet:**
See attached Pre-Bid Meeting Minutes, including sign-in sheet. These are hereby made a part of the contract documents.

Item No. 2: **Project Manual:** Bid Form
Delete page 1 of the previously issued Bid Form and insert the attached page 1 into the Bid Form.

Item No. 3: **Project Manual:** General Requirements, Section 01 01 00, PRIME CONTRACTOR (p.1)
Remove 8th sentence (Owner's restroom facilities will not be available).

Item No. 4: **Project Manual**: HVAC Section 23 00 01, DUCTWORK CLEANING/ ENCAPSULATION (p.4), add the following sentence:
Any new openings that are added to existing ductwork for the purpose of aiding the cleaning/encapsulation process shall be covered with a prefabricated insulated access door or an insulated sheet metal patch, fastened with sheet metal screws, sealed with a gasket, and further sealed with high-strength mastic (no tape).

Item No. 5: **Project Manual**: HVAC Section 23 00 01, ALTERNATES (p.5), add the following sentence:

Alternate #2: Quote the cost deduction to delete demolition of the existing chiller, boiler, and associated pumps, piping & accessories from the contract.

Item No. 6: **Project Manual**: HVAC Section 23 00 01, ALLOWANCES (p.5), add the following sentence:

Contingency allowance: Contractor shall include in his base bid the lump sum of $15,000 to be used by the School District. Items charged to the contingency allowance shall not be included in or considered for the prime contractor's overhead and profit.

Item No. 7: **Project Manual:**

Insert the following attached specification sections into the project manual, to be included in the contract documents:

1. 01 73 29 Cutting and Patching
2. 02 41 12 Selective Demolition
3. 04 10 20 Masonry Repairs and Infills
4. 05 12 00 Structural Steel Framing
5. 05 40 00 Cold Formed Metal Framing
6. 05 50 00 Metal Fabrications
7. 06 10 00 Rough Carpentry
8. 07 92 00 Joint Sealants
9. 09 21 16 Gypsum Board Assemblies
10. 09 51 23 Acoustical Tile Ceilings
11. 09 65 00 Resilient Tile Flooring
12. 09 65 18 Resilient Base and Accessories
13. 09 91 00 Painting
14. 31 05 23 Concrete Pavement
15. 32 92 02 Grass Restoration

Item No. 8: **Architectural Drawings – A100 – Demolition Plan:**

Delete the previously issued sheet A100 and insert the attached drawing A100 into the contract documents

Item No. 9: **Architectural Drawings – A101 – Floor Plan, Wall Sections and Details:**

Delete the previously issued sheet A101 and insert the attached drawing A101 into the contract documents

Item No. 10: **Structural Drawing – S-1: Structural General Notes & Details**

Delete the previously issued sheet S-1 and insert the attached drawing S-1 into the contract documents

Item No. 11: **HVAC Drawings – HVAC-1: HVAC Demolition Plan**

Delete the previously issued sheet HVAC-1 and insert the attached drawing HVAC-1 into the contract documents

Item No. 12: **HVAC Drawings – HVAC-2: HVAC Plan - Area "B"**

Delete the previously issued sheet HVAC-2 and insert the attached drawing HVAC-2 into the contract documents

Item No. 13: **HVAC Drawings – HVAC-3: HVAC Plan - Area "C"**

Delete the previously issued sheet HVAC-3 and insert the attached drawing HVAC-3 into the contract documents

End of Addendum No. 1

CROW & BULMAN ENGINEERING, INC.
800 EAST MAIN STREET, SPARTANBURG, SOUTH CAROLINA 29302

HVAC Upgrades for
District 7 Early Learning Center

Crow & Bulman Engineering Project No. 1823

Mandatory Pre-Bid Meeting Minutes
March 9, 2020

The following represents our understanding of matters discussed and actions agreed upon. Please report corrections and/or omissions to the writer within two (2) working days.

Notes:

1. Sign-in sheet was passed around. A copy of the sign in sheet is attached to these meeting minutes. Only contractors listed on the sign-in sheet may bid this project.

2. Prime contractor may be mechanical or general. Contractor must have 5 year company history and 40 mile radius.

3. Contract documents are available from McMillan Pazdan Smith. The correct date is 3/2/20.

4. Bids must include a 5% bid bond.

5. Questions related to the drawings / specifications should be directed to the project engineer, Hamp Crow, at hcrow@cbengr.com.

6. Any request for equipment substitutions must be submitted not later than 3/12/20 for inclusion in the addendum. Only equipment in specifications or addendum will be allowed.

7. The successful contractor will have a licensed electrician to perform all associated work. Electrical contractors must be listed on bid form.

8. Owner's Control contractor (Honeywell) will provide start-stop signal from the existing building control system. The cost of this work shall be included in the contract price.

9. Some existing duct systems will be cleaned and/or encapsulated. The cost of this work is also included in the contract price.

10. Restroom facilities are provided by the contractor (owner's facilities will not available).

11. Contractor to notify owner if any asbestos is suspected

12. 3rd party inspections will be initiated by the owner.

13. Owner will assign a staging / lay-down area for materials access.

14. Owner-approved roofing contractors are Pickens Roofing and Cannon's Roofing.

15. If the contractor anticipates insufficient lead time for equipment, notify Hamp Crow by 3/16/20. It may be possible for the owner to pre-order equipment prior to awarding the contract and after the Letter of Intent to Award is issued.

16. The public bid opening will be held at the Spartanburg School District 7 District Office at 3:00 PM.

17. The successful contractor will be able to start work according to the following schedule of construction:

Schedule of Construction

The project schedule is as follows:
March 2nd: Bid documents available,
March 9th: Mandatory Pre-bid conference (3:00 p.m. at Park Hills)
March 19th: Receive bids (3:00 p.m. at District Administrative Office)
March 20th: Letter of intent to award issued
April 6th: End of protest period, contract awarded
June 1st: Last day of school
June 3rd: : Construction begins
July 31st: Date of substantial completion (8.5 wks. for construction)
Aug. 17th: First day of school

18. Work Area was toured.

PRE-BID SIGN-IN SHEET
Mechanical Upgrades to the
Early Learning Center at Park Hills
Spartanburg School District Seven
McMillan Pazdan Smith Project No. 019080
March 9, 2020

Company	McMillan Pazdan Smith	**Name**	Donald L. Love, Jr., AIA
Address	127 Dunbar Street Spartanburg, SC 29306	**Email Address**	dlove@mcmillanpazdansmith.com
Phone	864-585-5678		
Fax	864-542-9451	**Trade**	Architect

Company	Crow and Bulman Engineering	**Name**	Hamp Crow
Address	800 E Main Street Spartanburg, SC 29302	**Email Address**	hcrow@cbengr.com
Phone	864-585-9903		
Fax		**Trade**	Mechanical Engineer

Company	Clayton Construction Company	**Name**	Alex Buddenberg
Address	121 Venture BLVD. Spartanburg, SC. 29304	**Email Address**	abuddenberg@claytonconstruction.net
Phone	864-576-1901		wmorrow@claytonconstruction.net
Fax		**Trade**	General Contractor

Company	Steele's Mechanical	**Name**	Kaycee Totherow
Address	1110 Charlotte Hwy Lancaster, SC 29721	**Email Address**	ktotherow@steelesmechanical.com
Phone	803.285.8431		
Fax		**Trade**	HVAC Contractor

Pre-Bid Sign-In Sheet
Mechanical Upgrades to the
Early Learning Center at Park Hills
Spartanburg School District Seven
McMillan Pazdan Smith Project No. 019080
March 9, 2020

Company	Rutherford Heating + Air	**Name**	
Address	300 Spindale Plaza Dr Spindale NC 28160	**Email Address**	
Phone	828-289-9278		
Fax	828-287-1352	**Trade**	

~~Company~~ Name	Steve Russell	**~~Name~~ Company**	Spthg. School Dist 7
Address		**Email Address**	smrussell@spart7.org
Phone	864-594-4500		
Fax		**Trade**	

Company	Waldrop Inc	**Name**	Jeff Newsome
Address	331 South Hammett Rd Greer 29651	**Email Address**	jnewsome@waldropinc.com
Phone	864-541-1680		
Fax		**Trade**	Mechanical

Company	Dunbar Construction	**Name**	Heath Bowen
Address	1075 Southport Rd Spartanburg SC	**Email Address**	heath@dunbarconstruction.net
Phone	864-583-2900		
Fax	864-583-8900	**Trade**	GC

Pre-Bid Sign-In Sheet
Mechanical Upgrades to the
Early Learning Center at Park Hills
Spartanburg School District Seven
McMillan Pazdan Smith Project No. 019080
March 9, 2020

Company Cullum Services, Inc **Name** Esteban Uzarraga
Address 121 Webb Street **Email Address** uzarragae@cullumInc.com
Simpsonville SC 29681
Phone 864-283-2967
Fax **Trade** Mechanical

Company McCarter Mechanical Inc **Name** Will Thompson
Address 685 South Dobb Rd **Email Address** will@mccartermechanical.com
Spartanburg SC 29303
Phone
Fax **Trade**

Company Honeywell **Name** Windell Smith
Address 3223 Sunset Blvd **Email Address** Windell.Smith@honeywell.com
West Columbia, SC 29169
Phone
Fax **Trade**

Company **Name**
Address **Email Address**
Phone
Fax **Trade**

BID FORM

TO: Spartanburg School District #7 Board of Trustees

Ladies & Gentlemen:

Having carefully examined the PROJECT MANUAL for HVAC Replacement for District 7 Early Learning Center, and the drawings referenced, and scheduled therein, including Addenda _____ _____, having visited the site and examined all conditions affecting the work, and having attended the pre-bid conference, the Undersigned proposes to do all work required by the said documents for the Stipulated Sum of Base-Bid: $ _____.

_____(dollars.

ALTERNATE #1: State the cost deduct to the contract price to provide lower efficiency wall mount heat pumps as indicated on the schedule.
$ _____
_____ (dollars).

ALTERNATE #2: State the cost deduct to the contract price to delete demolition of the existing chiller, boiler, and associated pumps, piping & accessories from the contract.
$ _____
_____ (dollars).

ALLOWANCE #1: Contractor shall include in the contract price an allowance of $4500 for floor patching.

ALLOWANCE #2: Contractor shall include in the contract price a Contingency Allowance of $15,000.

When changes in the work are ordered involving extra cost over and above the Contract Sum, and when such work is ordered to proceed on the basis of cost-plus-fee, such fee shall be as indicated in the Supplemental Conditions.

If the Undersigned is notified of the acceptance of this Bid within 15 days after date of opening bids, he agrees to execute within four days a contract for the above work in the form of The Standard Agreement between Owner and Contractor of the American Institute of Architects (AIA DOC A101-2007).

The Undersigned agrees, if awarded the Contract, to furnish and deliver to the Engineer within 10 days after the signing of the Contract, a satisfactory Performance Bond and Labor and Material Payment Bond in the form currently issued by the American Institute of Architects, each in an amount equal to one hundred percent (100%) of the Contract Sum.

SECTION 01 73 29 - CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes procedural requirements for cutting and patching.
   1. Providing and paying for all required personnel air monitoring according to OSHA Standard 29 CFR 1926.62, relative to lead-based paints.

B. Related Sections include the following:

   1. Division 02 Section "Selective Demolition" for demolition of selected portions of the building.
   2. Divisions 02 through 33 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.
   3. Division 07 Section "Firestopping" for patching fire-rated construction.

1.3 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other Work.

B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

C. Lead-Based Paint: The most severe of paint that contains more than 6 percent lead by weight (600 mg/kg) as stipulated by the SCDHEC (South Carolina Department of Health and Environmental Control) or requirements as stipulated by other governing authorities having jurisdiction.

1.4 SUBMITTALS

A. Cutting and Patching Proposal: Submit a proposal describing procedures at least 15 days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:

   1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.

2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
3. Products: List products to be used and firms or entities that will perform the Work.
4. Dates: Indicate when cutting and patching will be performed.
5. Utility Services and Mechanical/Electrical Systems: List services/systems that cutting and patching procedures will disturb or affect. List services/systems that will be relocated and those that will be temporarily out of service. Indicate how long services/systems will be disrupted.
6. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure.
7. Architect's Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

B. Certifications: Submit a copy of the following certifications to the Architect:

1. For each applicator, their current lead certification, in conformance with OSHA Standard 29CFR1926.62, showing date, place, and type of certification. Lead paint certifications for each applicator shall be maintained throughout the painting contract.
2. Lead physicals for each applicator in conformance with OSHA Standard 29CFR1926.62. Lead physicals for each applicator shall be maintained throughout the painting contract.

1.5 QUALITY ASSURANCE

A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.

1. Elements that might otherwise be overlooked as structural elements and that require Architect's approval of a cutting and patching proposal.

B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operating elements include the following:

1. Primary operational systems and equipment.
2. Air or smoke barriers.
3. Fire-suppression systems.
4. Mechanical systems piping and ducts.
5. Control systems.
6. Communication systems.
7. Conveying systems.
8. Electrical wiring systems.
9. Operating systems of special construction in Division 13 Sections.

C. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Miscellaneous elements include the following:

1. Water, moisture, or vapor barriers.
2. Membranes and flashings.
3. Exterior curtain-wall construction.
4. Equipment supports.
5. Piping, ductwork, vessels, and equipment.
6. Noise- and vibration-control elements and systems.

D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

1. If possible retain the original Installer or fabricator to cut and patch the exposed Work. If it is impossible to engage the original Installer or fabricator, engage another recognized experienced and specialized firm.
2. Comply with the recommendations and instructions of the manufacturer of the Work to be cut and patched and of the materials being used for cutting and patching.
3. Incorporate materials and procedures of a quality not less than used in the original construction, recommended by the manufacture of the Work being cut and patched, and acceptable to the Architect.
4. Match the finish, profile, and dimensions, and shall not compromise design, function, operation, and performance of the Work that was cut and patched.
5. Where cutting and patching is necessary on work that is under warranty, cutting and patching shall not compromise, void or reduce the conditions and provisions of warranties or insurance that are in effect.
6. Where cutting and patching may compromise the conditions and provisions of a warranty or insurance, notify the Architect prior to starting cutting or patching operations.
7. The Architect reserves the right to accept and approve cutting and patching. Acceptance and approval shall be based on overall aesthetics, performance, function, and operation.

E. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.6 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

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

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.

1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.
2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Temporary Support: Provide temporary support of Work to be cut.

B. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize or prevent interruption to occupied areas.

E. Lead-based paints:
1. Applicators involved in the disturbance of lead-based paint must comply with OSHA 29 CFR 1926.62. OSHA requires that the employees involved in the contact of lead-based paint must be trained, must have medical examinations (if the action level is exceeded during work activities involving the disturbance of lead-based paint), and must have an exposure assessment performed. If the employee is exposed to levels over the Permissible Exposure Limit (PEL), other work engineering and personnel protective equipment requirements of OSHA must be followed in accordance with 29 CFR 1926.62.
2. Perform required personnel air monitoring to establish employee exposure assessments in accordance with OSHA 29 CFR 1926.62 when working with lead-based paints. Send copy of the air monitoring reports to the Architect.
3. Prior to the disturbance of lead-based painted surfaces, place a layer of six mil polyethylene sheeting on the floor beneath the work area. The intent of work-related activities involving the disturbance of lead-based paint is to minimize large accumulations of lead. Clean up floors and other surfaces contaminated with lead-based paint dust/chips by vacuuming and/or wet wipe methods to minimize the likelihood of lead becoming airborne. The vacuum shall be equipped with HEPA filters. Compressed air shall not be used to remove lead from any surface unless the compressed air is used in

conjunction with a ventilation system designed to capture the airborne dust created by the compressed air.

4. All construction debris having painted surfaces exceeding 0.06% lead must be disposed of in a municipal solid waste landfill (lined landfill) according to SCDHEC Division of Solid and Waste Planning and Recycling pertaining to waste disposal requirements. Hazardous waste shipments shall be accompanied by a Uniform Hazardous Waste Manifest that shall be properly completed and copies returned to the Architect before the Contractor receives final payment.
5. Upon completion of all work activities involving the disturbance of lead-based painted surfaces including the exterior of the building, the Environmental Consultant will conduct a final visual inspection of the areas. Provided the areas are visibly clean, clearance testing shall be performed. The clearance test will include the collection of wipe samples from the interior areas of the building. These results will be compared to current regulatory requirements as outlined EPA 40 CFR Part 745. Should the clearance samples fail to meet the regulatory requirements outlined in EPA 40 CFR Part 745, the contractor will be required to perform additional cleaning, and a second clearance test will be performed at the Contractor's expense for all professional and laboratory fees.

3.3 PERFORMANCE

A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay. All cutting and patching shall be by the general contractor.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.

    a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    b. Restore damaged pipe covering to its original condition.
3. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.

D. Replacing Existing Materials, Components, Equipment: Where the Work requires the removal of existing materials, components, and equipment (items) and replacing them with new, the replacement items shall match the finish, appearance, and function of that removed, unless directed otherwise.

1. If there is a conflict with these requirements or there is an uncertainty with these requirements, notify the Architect for interpretation and clarification. Do not order or install replacement materials, components, or equipment without this understanding. There will be no additional compensation in time or money for installed replacement items that do not meet this requirement.
2. Where a replacement item does not match the existing item, or when installed, the replacement item will leave mounting holes or unfinished surfaces, notify the Architect for interpretation.
3. When it is necessary to install new items as a replacement for existing items, and the mounting holes and exposed surfaces from the previous items will be exposed, fill the vacant holes and dress smooth, even, and flush with the adjacent surfaces. Finish filled areas and exposed surfaces to match the color and gloss of the existing adjacent surfaces.
4. Contact the Architect for the disposition of items that are to be removed and replaced with new items.
5. Where the Work requires the replacement of electrical or electronic items, comply with the requirements of applicable governing authorities. Wire and coax shall be concealed, unless otherwise approved. If exposed wire/coax is approved, run it in metallic conduit/wire molding finished to match adjacent surfaces. Exterior installations shall be in approved weatherproof conduit.

E. Replacing Roofing Materials: In addition to other provisions of this section,

1. Coordinate cutting and patching with the roof system manufacturer and ensure that it records the work being done. Describe in detail the work that is proposed.
2. Coordinate cutting and patching with the applicable discipline (mechanical, electrical, architectural, structural).
3. Perform cutting and patching with skilled professionals experienced in their respective trades and specializing in the type of roof system being penetrated or disturbed.
4. Use the same materials produced by the roof system manufacturer.
5. Do not use materials that will void or diminish the Owner’s existing roof warranty.
6. Frame openings 12 inches and longer in either direction with galvanized steel angle and channel. Refer to Division 05 Section “Metal Fabrications”.
7. Ensure that the roof system is in a watertight condition at the close of each day, when wet conditions are imminent, and if areas where cutting and patching occur will be unattended for longer than one hour.

8. Arrange for a representative of the existing roof system to examine completed cutting and patching. This representative shall issue a report of the findings, that the cutting and patching comply with the manufacturer's requirements, and that the existing roof warranty shall include the cutting and patching and disturbed areas.

3.4 CLEANING

A. Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials. Thoroughly clean piping, conduit, and similar features before applying paint or other finishing materials. Restore damaged pipe covering to its original condition.

END OF SECTION 01 73 29

SECTION 02 41 12 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:
1. Demolition and removal of selected portions of a building.
2. Demolition and removal of selected site elements.
3. Patching and repairs.
4. Coordinate all demolition through the Architect.
5. Salvage of existing items to be reused or recycled
6. Handling and properly disposing of hazard materials such as asbestos and paint that contains lead.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1 Division 01 Section "Summary of Work" for use of the premises and phasing requirements.
2 Division 01 Section "Project Management and Coordination" for preconstruction photographs taken before building demolition.
3 Division 01 Section "Temporary Facilities" for temporary construction, protection facilities, and environmental-protection measures for building demolition operations.
4 Division 01 Section "Cutting and Patching" for repairs.
5 Division 01 Section "Construction Waste" for recycling and disposal of nonhazardous demolition wastes and for removal and storage of refrigerant.
6 Divisions 22 through 33 Sections for demolishing or relocating site plumbing, electrical and utility items.

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 Salvage: Items indicated to be removed and salvaged remain the Owner's property. Remove, clean, and pack or crate items to protect against damage. Identify contents of containers and deliver to storage areas designated by the Architect .

C. Remove and Reinstall: Remove items indicated; clean, service, and otherwise prepare them for reuse; store and protect against damage. Reinstall items in the same locations or in locations indicated.

E. Existing to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by the Architect , items may be removed to a suitable, protected storage location during selective demolition and then cleaned and reinstalled in their original locations.

E. Asbestos-Containing Materials: Materials that contain more than 1 percent Asbestos as stipulated by the federal AHERA (Asbestos Hazard Emergency Response Act).

F. Lead-Based Paint: The most severe of paint that contains more than 6 percent lead by weight (600 mg/kg) as stipulated by the SCDHEC (South Carolina Department of Health and Environmental Control) or requirements as stipulated by other governing authorities having jurisdiction.

1.4 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

B. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain the Owner's property, including trees and other vegetation, demolished materials shall become the Contractor's property and shall be removed from the site with further disposition at the Contractor's option.

1.5 SUBMITTALS

A. General: Prior to beginning demolition, submit each item in this Article for information only, unless otherwise indicated.

B. Proposed dust-control measures.

C. Proposed noise-control measures.

D. Schedule of selective demolition activities indicating the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
2. Interruption of utility services. Indicate how long utility services will be interrupted.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Detailed sequence of selective demolition and removal work to ensure uninterrupted progress of Owner's on-site operations.
5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
6. Locations of proposed dust- and noise-control temporary partitions and means of egress**, including for other tenants affected by selective demolition operations**, methods to protect personnel.
7. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
8. Means of protection for items to remain and items in path of waste removal from building.
9. Procedures and methods for shoring, bridging, bracing, and reinforcing.
10. Methods to protect personnel.
11. Use of elevator and stairs.

E. Inventory: Inventory of items to be removed and salvaged. After selective demolition is complete, submit a list of items that have been removed and salvaged.

F. Inventory of items to be removed by Owner.

G. Photographs or videotape as specified by the architect, sufficiently detailed, of existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by selective demolition operations.

H. Record drawings at Project closeout according to Division 1 Section "Contract Closeout."

1. Identify and accurately locate capped utilities and other subsurface structural, electrical, or mechanical conditions.

I. Immediately after deposits at landfills, submit landfill records indicating receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

J. Insurance: Submit copy of policy showing name of Carrier, effective dates of insurance, and coverage. Submittal shall include all claim exclusions.

K. Submit detailed procedures that will be used to handle and dispose of hazard materials, including asbestos-containing materials and lead-based paint, found on the project site.

L. Certifications: Submit a copy of the current and valid license for all operators that will be handling an disposing of lead-base paint.
1. For each operator, their current lead certification, in conformance with OSHA Standard 29CFR1926.62, showing date, place, and type of certification. Lead paint certifications for each operator shall be maintained throughout the demolition contract.
2. Lead physicals for each operator in conformance with OSHA Standard 29CFR1926.62. Lead physicals for each operator shall be maintained throughout the demolition contract.

1.6 QUALITY ASSURANCE

A. Demolition Firm Qualifications: Engage an experienced firm that has successfully completed selective demolition Work similar to that indicated for this Project.

B. Regulatory Requirements: Comply with governing EPA notification regulations before starting selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

C. Predemolition Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to selective demolition including, but not limited to, the following:

1. Inspect and discuss condition of construction to be selectively demolished.
2. Review structural load limitations of existing structure.
3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
5. Review areas where existing construction will remain and requires protection.
6. Review procedures for noise and dust control.
7. Review procedures for protection of adjacent buildings.
8. Review items to be salvaged and returned to Owner.

C. Contractor shall be experienced in handling hazard materials of the type found on the project and licensed by all applicable governing authorities to handle and dispose of all hazard materials found on the site.

E. The Contractor shall fully comply with all provisions of the Contract Documents including, but not limited to, providing and installing such entities as the products, materials, equipment, components, or systems that were proposed at the time bids were received. Except for extenuating circumstances as determined by the Architect, notification of not being able to meet any of the provisions of the Contract Documents or communicating conflicts in the Contract Documents to the Architect will not be considered after receipt of bids; and the Contractor shall fully comply with the Contract Documents at no increase in Contract Sum or Contract Time.

1.7 PROJECT CONDITIONS

A. Owner will occupy portions of the building immediately adjacent to selective demolition area. Conduct selective demolition so that Owner's operations will not be disrupted. Provide not less than 72 hours' notice to ARCHITECT of activities that will affect Owner's operations.

B. Owner or Architect assume no responsibility for actual condition of buildings to be selectively demolished.

1. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
    a. The Owner will maintain, as far as practical, conditions existing at time of inspection for bidding purpose. Neither Owner nor Architect assumes responsibility for actual condition of buildings to be selectively demolished.
    b. Before selective demolition, Owner will remove the following items:
    c. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition. Except for extenuating circumstances, as determined by the Architect, the Architect will not consider notification of not being able to meet provisions of the Contract Documents or communicating conflicts in the Contract Documents after receipt of bids; comply with the Contract Documents at no increase in Contract Sum or Contract Time.
    d. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work. Hazardous materials were present in buildings and structures to be demolished. Reports on the presence of hazardous materials and abatement are included in Division 00. Examine reports to become aware of locations where hazardous materials were present..
2. Hazardous materials have been removed by Owner before start of the Work, under a separate contract.
3. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately stop work in the suspected area, and notify Architect and Owner. Owner will have hazardous materials removed.
4. Use construction/engineering controls and good work precautions to minimize exposure to workers and personnel on site. Follow proper procedures in accordance with the Toxic Substance Control Act (TSCA).
5. Do not touch, disturb or approach the suspected area or materials.
6. Erect a barrier around the suspected area or materials, not less than 10 feet from the suspected area or materials. If the area is in a room or space that can be sealed or closed to traffic, seal or close off the space. If there are HVAC vents to the space, seal the vents.
7. Erect a sign that is clearly legible from at least 10 feet. If the sign will be exposed to weather, the sign and lettering shall be weatherproof. Post the sign at each access to the

area and around the barrier. Space the signs around the barrier a maximum of 8 feet apart. The sign shall contain the following wording:

a. Immediately, stop work in the suspected area.
b. Immediately, notify the Architect.
c. Do not touch, disturb or approach the suspected area or materials.
d. Erect a barrier around the suspected area or materials. The barrier shall not be less than 10 feet from the suspected area or materials. If the area is in a room or space that can be sealed or closed to traffic, seal or close off the space. If there are HVAC vents to the space, seal the vents.
e. Erect a sign that is clearly legible from at least 10 feet. If the sign will be exposed to weather, the sign and lettering shall be weatherproof. Post the sign at each access to the area and around the barrier. Space the signs around the barrier a maximum of 8 feet apart. The sign shall contain the following wording:

DANGER
ASBESTOS-CONTAINING MATERIALS ARE PRESENT. DO NOT ENTER OR CROSS THE BARRIER WITHOUT WRITTEN PERMISSION AND APPROVED PROTECTIVE CLOTHING.

8. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
   a. Maintain fire-protection facilities in service during selective demolition operations.

9. Storage or sale of removed items or materials on-site will not be permitted.

1.8 SCHEDULING

A. Arrange selective demolition schedule so as not to interfere with Owner's on-site operations.

1.9 WARRANTY

A. Existing Special Warranty: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

1.10 REGULATORY REQUIREMENTS

A. In addition to the requirements of the “Contract Clauses,” comply with the following:

1. Federal, state, and local hauling and disposal regulations.

2. Safety requirements shall conform with ANSI A10.6, “Demolition Operations - Safety Requirements”.

3. International Building Code, Chapter 33, “Safeguards During Construction”, Section 3303, “Demolition”.

PART 2 - PRODUCTS

2.1 REPAIR MATERIALS

A. Use repair materials identical to existing materials.

1. Where identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.

2. Use materials whose installed performance equals or surpasses that of existing materials.

3. Comply with Division 2 Section - Cutting and Patching.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify and record (photographs and videos are recommended) conditions of both the interior and exterior of existing building prior to beginning the Work. Verification shall include current damage to building and finishes, cleanliness, and the presence moisture, mold, and mildew. Inspections by mold and IAQ specialists are recommended.
1. During execution of Contract, maintain the existing structure in clean, watertight, weather-tight, and structurally sound conditions at all times. Contractor shall be responsible for all repairs to restore existing structure and finishes to their previous conditions that are satisfactory to the Architect .

B. Verify that utilities have been disconnected and capped.

1. Engage a professional engineer to survey condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective demolition operations. correlate with requirements indicated to determine extent of selective demolition required.

a. During demolition, perform surveys to detect hazards that may result from building demolition activities.

b. Survey of Existing Conditions: Record existing conditions by use of measured drawings and preconstruction photographs. Comply with Division 01 Section "Project Management and Coordination." Include current damage to building and finishes, cleanliness, and the presence moisture, mold, and mildew. Inspections by mold and IAQ specialists are recommended.

c. Survey of Existing Conditions: Record existing conditions by use of measured drawings and preconstruction photographs. Comply with Division 01 Section "Project Management and Coordination." Include current damage to building and finishes, cleanliness, and the presence moisture, mold, and mildew. Inspections by mold and IAQ specialists are recommended.

d. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

e. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.

C. When unanticipated mechanical, electrical, or structural elements that conflict with the intended function or design are encountered, investigate and measure the nature and extent of the conflict. Promptly submit a written report to the Architect .

D. Survey the condition of the building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of the structure or adjacent structures during selective demolition.

E. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.2 UTILITY SERVICES

A. Maintain existing utilities in service and protect them against damage during selective demolition operations.

1. Do not interrupt existing utilities serving occupied or operating facilities, except when authorized in writing by ARCHITECT and authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to ARCHITECT and to governing authorities.

a. Provide not less than 72 hours' notice to ARCHITECT if shutdown of service is required during changeover.

B. Utility Requirements: Locate, identify, disconnect, and seal or cap off utility services serving building to be interrupted or selectively demolished.
1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
2. Arrange to shut off indicated utilities with utility companies.
3. If services/systems are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
4. Do not start selective demolition work until utility disconnecting and sealing have been completed and verified in writing.
5. Provide by-pass connections necessary to maintain continuous service to occupied areas. Provide minimum of 72 hours advance notice to Owner if shutdown of service is necessary during changeover.
6. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.

1. Where entire wall will be removed, existing services/systems may be removed with removal of the wall.

C. Utility Requirements: Refer to Division 15 and 16 Sections for shutting off, disconnecting, removing, and sealing or capping utility services. Do not start selective demolition work until utility disconnecting and sealing have been completed and verified in writing.

3.3 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
   1. Comply with requirements for access and protection specified in Division 01 Section "Temporary Facilities and Controls."

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings, facilities, site improvements, appurtenances, and landscaping to remain.
   1. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Division 01 Section "Temporary Facilities and Controls".
   2. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building and covered passageways, where required by authorities having jurisdiction.
   3. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
   4. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
   5. Cover and protect furniture, furnishings, and equipment that have not been removed.

C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

   i. Strengthen or add new supports when required during progress of selective demolition.

D. Employ a certified, licensed exterminator to treat building and to control rodents and vermin before and during demolition operations.

   ii. Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with selective demolition operations.

E. Vegetation: Take and execute all precautions to protect vegetation, such as trees and shrubs that are to remain. The Contractor shall be responsible for all unauthorized or accidental cutting or damaging of trees and shrubs, including damage due to careless operation of equipment and stockpiling materials or tracking on grass by equipment.
   1. Trees, bushes, and other vegetation that are scheduled to remain and whose branches and stems are in the way of or that will otherwise interfere with demolition, shall be properly and professionally pruned to protect the trees, bushes, and other vegetation. Pruning shall be performed to the satisfaction of the ARCHITECT by a professional and licensed arborist. Pruning shall be only to the extent necessary to prevent interference with the demolition and to protect the trees, bushes and vegetation being pruned.
   2. Trees, bushes, and other vegetation that are scheduled to remain and are damaged during demolition shall be repaired by a professional and licensed arborist. Trees, bushes, and other vegetation that that cannot be repaired to the Architect ’s satisfaction, shall be replaced with like kind, species, color, and size, at no additional cost to the Owner.

B. Employ a certified, licensed exterminator to treat building and to control rodents and vermin before and during demolition operations.

C. Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with selective demolition operations.

D. Employ a certified, licensed exterminator to treat building and to control rodents and vermin before and during selective demolition operations.

E. Conduct demolition operations and remove debris to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from ARCHITECT and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

F. Conduct demolition operations to prevent injury to people and damage to adjacent buildings and facilities to remain. Ensure safe passage of people around selective demolition area.

1. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.

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 weather protection, during interval between demolition and removal of existing construction, on exterior surfaces and new construction to ensure that no water leakage or damage occurs to structure or interior areas.

5. Protect walls, ceilings, floors, and other existing finish work that are to remain and are exposed during selective demolition operations.

6. Cover and protect furniture, furnishings, and equipment that have not been removed.

7. Do not allow any area, section, or component of floors, roofs, walls, columns, pilasters, or other structure element to be left standing without sufficient bracing, shoring, or lateral support to prevent collapse or failure while workmen remove debris or perform other work in the immediate area.

G. Erect and maintain dustproof partitions and temporary enclosures to limit dust and dirt migration and to separate areas from fumes and noise.

1. Construct dustproof partitions of not less than nominal 4-inch studs, 5/8-inch gypsum wallboard with joints taped on occupied side, and 1/2-inch fire-retardant plywood on the demolition side.

2. Insulate partition to provide noise protection to occupied areas.

3. Seal joints and perimeter. Equip partitions with dustproof doors and security locks.

4. Protect air-handling equipment.

5. Weather-strip openings.

H. Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent movement, settlement, or collapse of building to be selectively demolished.

1. Strengthen or add new supports when required during progress of selective demolition.

I. Set up, install, and maintain necessary security, enclosures, and barriers for the facility during demolition and construction to protect the structure, the interior, and the contents and to ensure that unauthorized personnel are denied access to the facility. Coordinate requirements with the Architect .

3.4 PROTECTION

A. Existing Facilities: Protect adjacent walkways, loading docks, building entries, and other building facilities during demolition operations. Maintain exits from existing buildings.

B. 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 Division 01 Sections “Tree Protection” and “Temporary Facilities and Controls.”

i. Protect adjacent walls, windows, roofs, and other exterior construction, existing site improvements, appurtenances, and landscaping to remain from damage due to demolition operations.
ii. Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
iii. Provide protection to ensure safe passage of people around building demolition area and to and from occupied portions of adjacent buildings and structures.

C. Existing Utilities: Maintain utility services to remain and protect from damage during demolition operations.

iv. Do not interrupt existing utilities serving adjacent occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction.
v. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and authorities having jurisdiction.

1. Provide at least 72 hours’ notice to occupants of affected buildings if shutdown of service is required during changeover.

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.

3.5 POLLUTION CONTROLS

A. Use water mist, temporary enclosures, and other suitable methods to limit the spread of dust and dirt. Comply with governing environmental protection regulations.

1. Do not use water when it may damage existing construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.

B. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

1. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level.

C. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before start of selective demolition.

D. Noise Control:
1. Use equipment with operable, effective, and undamaged mufflers to reduce noise to levels acceptable to the Architect .
2. If noise levels are above acceptable levels to the Architect erect sound barriers to control noise or conduct demolition during times that are less disturbing to the Owner or a combination of both.

3.6 SELECTIVE DEMOLITION

A. Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete Work within limitations of governing regulations and as follows:

1. Performed all demolition in accordance with OSHA regulations and provisions stipulated in IBC 2012.

2. Explosives are prohibited

3. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition work above each floor or tier before disturbing supporting members on lower levels.

4. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. To minimize disturbance of adjacent surfaces, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.

5. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.

6. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.

7. Maintain adequate ventilation when using cutting torches.

6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.

8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.

9. Locate selective demolition equipment throughout the structure and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.

10. Dispose of demolished items and materials promptly. On-site storage or sale of removed items is prohibited.

11. Return elements of construction and surfaces to remain to condition existing before start of selective demolition operations.

B. Demolish concrete and masonry in small sections. Cut concrete and masonry at junctures with construction to remain, using power-driven masonry saw or hand tools; do not use power-driven impact tools.

C. Break up and remove concrete slabs on grade, unless otherwise shown to remain.

D. Below-Grade Construction: Demolish foundation walls and other below-grade construction, as follows:

1. Completely remove below-grade construction, including foundation walls and footings.
2. Break up and remove below-grade concrete slabs, unless indicated to remain.

E. Filling Below-Grade Areas: Completely fill below-grade areas and voids resulting from demolition of buildings and pavements with soil materials according to requirements specified in Division 2 Section "Earthwork."

F. Damages: Promptly repair damages to adjacent facilities caused by demolition operations.

G. Remove resilient floor coverings and adhesive according to recommendations of the Resilient Floor Covering Institute's (RFCI) "Recommended Work Practices for the Removal of Resilient Floor Coverings" and Addendum.

1. Remove residual adhesive and prepare substrate for new floor coverings by one of the methods recommended by RFCI.

H. Remove no more existing roofing than can be covered in one day by new roofing. See applicable Division 7 Section for new roofing requirements.

I. Remove air-conditioning equipment without releasing refrigerants.

J. Remove and transport debris and rubbish in a manner that shall prevent spillage on pavements, streets or adjacent areas. Clean up spillage from pavements, streets and adjacent areas

K. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition, cleaned and reinstalled in their original locations after selective demolition operations are complete.

l. Unknown Elements

1. If unanticipated mechanical, electrical or structural elements are encountered, investigate and measure both nature and extent of the conflict. Submit report to ARCHITECT in written, accurate detail. Pending receipt of directive from Architect . rearrange selective demolition schedule as necessary to continue overall job progress without delay.
2. Should any hidden and/or inaccessible hazardous material be encountered during the demolition activity, the Contractor performing the demolition shall stop work immediately. Use construction/engineering controls and good work precautions to minimize exposure to workers and personnel on site. Follow proper procedures in accordance with the Toxic Substance Control Act (TSCA).

M. 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.

N. Do not use water mist to limit spread of dust and dirt when it may damage adjacent construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.

O. Removed and Reinstalled Items:
1. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4 Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

3.7 EARTHWORK

A. Fill
1. Backfill and Fill Materials shall be suitable soil materials, free of clay, rock or gravel larger than 2’ in any dimension, debris, waste, frozen materials, vegetable and other deleterious matter. Suitable materials for earth fill shall generally be composed of sands, clay-sand and silt-sand mixtures and shall be approved by the soils technician or the Architect prior to being incorporated in fills.
2. Borrow shall consists of sand or sand clay soils capable of being readily shaped and compacted to the required densities, and shall be free of roots, trash and other deleterious material.
3. Shall be reasonably free from roots, organic material, trash and stones having maximum dimensions of 6 inches.
4. Shall be placed in successive horizontal layers of 8 inches (4 inches for hand tamped compaction) in loose depth for the full width of the cross-section and compacted as required with heavy compaction equipment.

B. FINISH GRADING
1. All areas covered by the project including excavated and filled sections and adjacent transition areas shall be smooth graded and free from irregular surface changes.
2. Degree of finish shall be that ordinarily obtainable from either blade-grader or scraper operations, supplemented with hand raking and finishing, except as otherwise specified.

3. The finished surface of unpaved areas shall be not more than 1.2 inches feet above or below the established grade or designed cross-section. Grading shall be done in order that no ponding will occur.
4. Ditches shall be finished smooth to reduce erosion and permit adequate drainage.

3.7 PATCHING AND REPAIRS

A. Promptly patch and repair holes and damaged surfaces caused to adjacent construction by selective demolition operations.

B. Patching is specified in Division 1 Section "Cutting and Patching."

C. Where repairs to existing surfaces are required, patch to produce surfaces suitable for new materials.

1. Completely fill holes and depressions in existing masonry walls to remain with an approved masonry patching material, applied according to manufacturer's printed recommendations.

D. Restore exposed finishes of patched areas and extend finish restoration into adjoining construction to remain in a manner that eliminates evidence of patching and refinishing.

E. Patch and repair floor and wall surfaces in the new space where demolished walls or partitions extend one finished area into another. Provide a flush and even surface of uniform color and appearance.

1. Closely match texture and finish of existing adjacent surface.

2. Patch with durable seams that are as invisible as possible. Comply with specified tolerances.

3. Where patching smooth painted surfaces, extend final paint coat over entire unbroken surface containing the patch after the surface has received primer and second coat.

4. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

5. Inspect and test patched areas to demonstrate integrity of the installation, where feasible.

F. Patch, repair, or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance.

3.8 DAILY CLEANUP AND DISPOSAL OF DEMOLISHED MATERIALS

A. Daily Cleanup: The Contractor shall comply with the following daily cleanup requirements:
1. Do not allow demolished materials, trash, debris, waste, defective materials, and unused materials, equipment and tools to collect in the work areas, areas objectionable to the Owner, or in areas that will be unsightly to passersby. Remove these items on a regular schedule, and dispose of in approved manner and container.
2. Store materials that cannot be removed daily in areas specified by the Contract Manager.
3. Keep work area clean and free of clutter.

4. Secure all materials, equipment, and tools to prevent movement during windy conditions. Do not allow material or debris to become airborne.
5. Cover all materials, equipment, and tools completely at the end of each day to prevent water entry and so that covers will not loosen or separate during windy conditions.
6. Promptly remove all unused or unneeded sharp or pointed objects, including sheet metal, that may puncture cause injury or damage to the Work.
7. Keep all fasteners, anchors, etc, including screws and nails, in rigid storage containers until ready for use. Put all used or defective mechanical fasteners in a designated rigid container that is clearly marked**, SCRAP**. Do not allow used or defective fasteners to mix with new fasteners.
8. Correct all defects not corrected during normal operations by end of each work day.

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.9 CARE OF CUTS AND ABRASIONS

A. Where cuts and minor abrasions occur to living tissue of trees and shrubs, trace back injured cambium according to arboriculture practice and have wounded area treated by a professional and licensed arborist.

3.10 CLEANING

A. Sweep the building broom clean on completion of selective demolition operation.

B. Change filters on air-handling equipment on completion of selective demolition operations.

END OF SECTION 02 41 12

SECTION 04 10 20 – MASONRY REPAIRS AND INFILLS

PART 1 - PART 1. GENERAL

1.1 DESCRIPTION OF WORK

A. This Section includes all materials, labor, and administration to perform masonry infilling as shown on the Drawings.

1.2 RELATED WORK

A. All associated work shall be coordinated with the masonry repairs.

1.3 QUALITY ASSURANCE

A. Certification of Materials: The Contractor shall provide certification that the masonry mortar meets the requirements of ASTM C 270. See ACI 530.1, Article 2.2.2. The cost of testing required to document submittals and certify the compliance of materials prior to use in construction shall be paid for by the Contractor as stated in ACI 530.1, Article 1.5.1.1.

B. The Owner may, with or without cause, choose, employ, and pay for an independent testing agency or engineer to evaluate the masonry installation and masonry accessories. Since this section of the specifications requires special inspections as stipulated by governing codes and authorities, the selected inspector for these special inspections will be employed to make other inspections as stipulated in this section of the specifications or as directed by the Owner. The General Contractor shall coordinate his work with the inspection agency. If suspected work does not meet the specifications, the Contractor shall pay for all testing, retesting, removing defective work and replacing defective work with good work. The following items are part of the General Contractor's contract, and it will be the General Contractor's responsibility to notify all parties involved:
   1. Organize and conduct a pre-masonry conference. The General Contractor's superintendent shall hold the meeting prior to the start of masonry work as described below and in Section 01 20 00 – Project Meetings.
   2. The General Contractor shall notify the inspection agency 24 hours prior to the start of masonry work.
   3. The masonry contractor shall be able to perform all work related to laying masonry, flashing, mortar mixing, grouting, and reinforcing, with his own mechanics who are qualified, experienced, skilled, and trained in their respective trades prior to beginning masonry work on this project. The masonry contractor shall posses or have ready access to all tools and equipment, including scaffolding, mixers, and material handling equipment, etc. required to complete the masonry work at the time of contract execution.
   4. The General Contractor shall furnish a letter from its masonry contractor certifying that the masonry contractor meets and complies with these special requirements. If it is determined the masonry contractor does not meet the specified qualifications, even after contract execution, the General Contractor will be asked to replace the unqualified masonry contractor with one that meets the specified qualifications.

1.4 TESTING

A. During the course of the work the masons shall allow the sampling and testing of all masonry materials and mortars to ensure the compliance of the work with the specifications.

B. Work not conforming to the specifications shall be removed and replaced with no additional cost to the owner.

1.5 TEST PANEL

A. Prior to performing repairs, perform examples of each type of work to ber performed unde this sectionof the specifications. Prepare test panels to verify selections of materials and use of proper methods and to to demonstrate aesthetic effects as well as qualities of materials and execution. Build test panels to comply with the following requirements, using materials indicated for final unit of Work, including same base construction, special features for expansion joints, and contiguous work as indicated.
   1. Locate test panels on portions of the structure as directed by the Architect.
   2. Notify Architect one week in advance of the dates and times when test panels will be prepared.
   3. Demonstrate the proposed range of aesthetic effects and workmanship.
   4. Obtain Architect's acceptance of test panels before start of final unit of Work.
   5. Retain and maintain test panels during construction in an undisturbed condition as a standard for judging the completed Work.
   6. Accepted test panels in an undisturbed condition at the time of Substantial Completion may become part of the completed Work.

B. Test panels shall be used to demonstrate all removal and installation techniques, tooling and mortar finishing. Test panels on the historic building shall not be used to demonstrate the abilities of the workmen. This must be demonstrated by prior projects.

C. For critical or exceptionally fine work it may not be practical to locate panels on the building. Separately constructed test panels may be required.

D. Test panels on the building shall be located in inconspicuous areas and located by the Architect.

1.6 PRODUCT SAMPLES

A. Make available to the Architect all package labels and descriptions for each product or ingredient listed in the work.

B. Submit samples of all special ware prior to their installation in the work.

C. Submit samples of cured mortar in color to be used to compare fromatch with existing mortar.

1.7 MATERIAL STORAGE

A. All materials are to be kept dry and protected from weather and contamination.

B. All labels and seals must remain intact until use.

C. Any material that has deteriorated or been contaminated shall be discarded.

1.8 LOCAL CONDITIONS

A All stored materials must be maintained above 40 degrees F.

B. No mortar shall be placed when the air temperature is 40 degrees F or lower. No antifreeze additives shall be allowed.

C. Placed work which reaches 32 degrees F during the four days (96 hours) after placement shall be replaced.

D. No mortar shall be placed when the wall temperature is above 80 degrees

E. All new work shall be protected from drying out for four days after placement. Refer to moisture curing instructions described in these specifications.

1.9 PREINSTALLATION MEETING

A. Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings." The meeting attendance shall include the General Contractor's area foreman and the masonry contractor's job superintendent and area foreman. The General Contractor shall advise the Owner, Architect, Engineer, and the independent testing agency at least 24 hours prior to this meeting. As a minimum, the meeting shall include the following topics:
Lintels
Tooling
Scheduling
Inspections
Grout pours
Mortar types
Wetting brick
Staging materials
Matching existing
Efflorescence tests
Required photographs
Water repellant additive
Mixing mortar and grout
Moisture absorption tests
Joint work (head and bed)
Cleaning/pressure washing
Horizontal and vertical reinforcing

PART 2 - PRODUCTS

2.1 MORTAR MATERIALS

A. All materials and mixes shall have minimum proportions of alkali, sulfates, and free salts so as to prevent or minimize efflorescence after installation.

B. General: Provide colored mortar and sand to provide a mix to match existing.

C. Cement
1. Portland Cement: White, ASTM C 150, Type II. If not available, then Type I, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

2. Mortar Cement: Mixture of ASTM C 150, Type I or II portland cement and ASTM C 207, Type S hydrated lime to produce a mixture that complies with ASTM C1329. Use for laying masonry units

D. Hydrated Lime: ASTM C 207, Type S.

E. Aggregate for Mortar: ASTM C 144; except for joints less than 1/4 inch, use aggregate graded with 100 percent passing the No. 16 sieve. Ocean sand is not acceptable for fine aggregate.

F. Aggregate for Grout: ASTM C 404. Ocean sand is not acceptable for fine aggregate.

G. Ready-Mixed Mortar: Cementitious materials, water, and aggregate complying with requirements specified in this Article; combined with set-controlling admixtures to produce a ready-mixed mortar complying with ASTM C 1142. Ocean sand is not acceptable for fine aggregate.

H. Cold-Weather Admixture: Non-chloride, non-corrosive, accelerating admixture complying with ASTM C 494, Type C, and recommended by the manufacturer for use in masonry mortar of composition indicated.

I. Water: Potable.

J. Integral Water Repellant: For all mortar to be exposed to weather, use one of the following water repellants integrally blended into the mix: Dry-Block Mortar Admixture by W.R. Grace & Co or RainBloc by ACM Chemistries, or Acme Ultra by Acme-Hardesty.

2.2 BRICK.

A. All face brick shall pass the efflorescence test per ASTM C67 – Standard Method for Sampling and Testing Brick and Structural Clay Tile. Submit test results.

B. New Face Brick: ASTM C 216. New brick shall match existing work in color, texture, and all dimensions. Bricks shall be whole and uncut and as follows:
1. Grade and Unit Compressive Strength: Provide units with grade and minimum average net-area compressive strength indicated below:
a. Grade: SW.
b. Unit Compressive Strength: 6000 psi based on gross area.
2. Type: FBS.

C. Salvage brick matching the existing work in color, texture, and all dimensions may be used if it is hard burned face brick, free of deleterious salts and other materials, and was not previously used in a below water table or chimney stack location. Check for efflorescence.

2.3 ACCESSORIES

A. Sheet Flashing: Non-Asphaltic: Full sheet of 5 oz./sq. ft copper with both sides fully bonded to dense glass fabric that is coated with ductile non-asphalt adhesive. Fully

compatible with joint sealants specified in Section 07901. Copper Sealtite 2000 by Advanced Building Products, Inc. or a reviewed substitute

B. Weep Holes: No. 383 Louvered weep hole, injection molded PVC by Hohmann and Barnard or a reviewed substitute with louver designed to assist in cavity pressure equalization and to prevent reverse passage of water.

C. Cavity Wall: Insulation: Rigid, extruded polystyrene thermal insulation board with closed cells and integral high-density skin, formed by the expansion of polystyrene base resin in an extrusion process to comply with ASTM C 578, Type IV; in manufacturer's standard lengths and widths; and in thicknesses indicated. Dow Styrofoam Cavity Mate or equal
   1. Adhesive: Waterproof and compatible with the insulation and cementitious substrate as recommended by insulation board manufacturer for application indicated.
   2. Insulation Tape: Heavy duty, reinforced, waterproof, and perm rating no greater than that of the insulation as recommended by the insulation manufacturer.

D. Reinforcing and Ties: As recommended by the Brick Institute for type construction to be performed and complying with applicable codes and seismic requirements.

E. Masonry Cleaner:
   1. Based on the type, color, texture, and composition of the masonry to be cleaned and the type foreign material (mortar, grout, mud stains, soot, mold, efflorescence, etc.) to be removed, provide products expressly approved for the intended use by the chemical manufacturer and the manufacturer of the masonry units.
   2. Use manufacturer's standard-strength, general-purpose cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry surfaces of type indicated below without discoloring or damaging masonry surfaces or mortar joints;

PART 3 - . EXECUTION

3.1 MORTAR MIXING

A. All proportions are given in dry volume.

B. All measurements of mortar ingredients shall be made with fixed volume units. Shovel measuring is not acceptable. Mix in mechanical batch mixers.

C. The amount of water added shall be carefully measured during batch mixing. It shall be determined by the plasticity of the mortar. If mortar clinging to the bottom of the mason's trowel is not released by a single slight shake, it is too stiff. If mortar will not cling to bottom of the trowel, too much water has been added.

D. Regular Construction Grade Mortar for Unit Masonry: Mix in proper proportions to comply with ASTM C270, Proportion Specification, for job-mixed mortar; and ASTM C 1142 for ready-mixed mortar for Type S. Cured mortar shall match existing mortar.

E. Lime Putty
   1. Lime putty shall be made from Type S hydrated lime by adding full bags of lime to water.

2. Thoroughly mix to a thick cream consistency.
3. Allow to stand a minimum of 24 hours before use.
4. Carefully note wet lime equivalence to dry lime.
5. Store in covered containers and protect from contamination or freezing.

F. Mortar Formulas.
1. All proportions are given in dry volume.
2. The equivalent lime putty shall be used for the dry lime volume in the mix.
3. Pointing and bedding mortars for all work shall consist of the following ratio of materials.

Type S Lime		White Portland Cement		Sand Aggregate
2 1/2	:	1	:	8-9

G. Mortar Mixing
1. All measurements of mortar ingredients shall be made with fixed volume units.
2. No shovel measuring shall be accepted.
3. Wood boxes equal in volume to each ingredient of the mix are required to ensure consistent exact mixes.
4. Mechanical batch mixers shall be used.
5. Lime and aggregates shall be mixed for 5 minutes prior to addition of cement.
6. After addition of cement batch shall be mixed for a total of 10 minutes.
7. The amount of water added shall be carefully measured during batch mixing. It shall be determined by the plasticity of the mortar. If mortar clinging to the bottom of the mason's trowel is not released by a single slight shake, it is too stiff. If mortar will not cling to bottom of the trowel, too much water has been added.
8. Mortars containing any portion of cement must be placed in the work within two hours of its introduction into the mortar mix. Retempering of mortar shall be done with potable water in small amounts from a squeeze bottle or a clean bristle brush. After two hours all unused mortar shall be discarded.
9. All mixing boards and mechanical mixers shall be thoroughly cleaned between batches.

3.2 INSTALLATION, GENERAL

A. Cut masonry units with motor-driven abrasive saws to provide clean, sharp, unchipped edges. Cut units as required to provide continuous pattern and to fit adjoining construction. Use full-size units without cutting, where possible.

B. Matching Existing Masonry: Match coursing, joint work, bonding, color, and texture of existing masonry where tie ins are to be made. Tool joint to match existing

C. Reinforcement Placement: Install horizontal and vertical joint reinforcement as recommended by the Brick Institute to comply with applicable International Building Code and Seismic Requirements for Seismic Class of Project location. Comply with requirements in ACI 530.1/ASCE 6/TMS 602.

D. Do not install cracked, broken, damaged, distorted, or discolored units. Remove and replace masonry units, even if mortar has hardened, that are loose, chipped, broken, stained, or otherwise damaged or if units do not match adjoining units. Install new units to match adjoining units; install in fresh mortar or grout, pointed to eliminate evidence of replacement.

E. Adjust units to line and level while mortar is still plastic. Do not disturb units once they are in-place. If a unit must be removed, remove the unit and all the old mortar and install fresh mortar.

F. Lay solid brick-size masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not furrow bed joints or slush head joints.

G. Keep mortar from exposed faces. Remove mortar droppings from exposed faces after mortar has dried sufficiently not to smear.

H. Provide for expansion and movement as recommended by the Brick Institute.

3.3 CURING

A. Provide sufficient moisture in the lime mortar mix to permit continuous hydration of the cementitious materials. The most effective procedure for curing shall be based on climatic and job conditions. The lime mortar must remain moist for 96 hours following installation into the work.

B. The timing between mortar layers will vary with climatic conditions. Temperature and relative humidity extend or reduce the time between consecutive operations. Cold or wet weather lengthens and hot or dry weather shortens the time period. Moderate changes in temperature and relative humidity can be overcome by providing additional heating materials during cold weather and by reducing the absorption of the base by pre-wetting during hot weather.
   1. Some moisture must be retained in or added back to freshly applied mortar. If the relative humidity is relatively high (above 75%) the frequency for re-wetting may be reduced. If it is hot, dry and windy, the frequency of re-wetting must be increased.
   2. The method of curing selected should consider the physical characteristics of the structure as well as the previously mentioned conditions. The methods can be one or a combination of the following.
      a. Moisture curing is accomplished by applying a fine fog spray of water as frequently as required, generally twice daily in the morning and evening. Care must be taken to avoid erosion damage to mortar surfaces.
      b. Plastic film, when taped or weighted down around the perimeter of the repointed area, can provide a vapor barrier to retain the moisture between the membrane and mortar. Care must be exercised when placing the film; if too soon, the film may damage the surface texture; if too late, the moisture may have already escaped.
      c. Canvas, cloth, or sheet material barriers can be erected to deflect sunlight and wind, both of which will reduce the rate of evaporation. If the humidity is very low, this option may not provide adequate protection.

3.4 MASONRY TIE INS

A. Infill brick shall match size, color, shape, texture, compressive strength of existing adjoining brick. Comply with brick specifications previously mentioned in this section.

B. Mortar shall match color, texture, and tooling of existing adjoining mortar. Comply with mortar specifications previously mentioned in this section.

C. Ties and Reinforcing: Comply with specifications previously mentioned in this section.

D. Lay up masonry infills where indicated on the Drawings.

E. Masonry work shall match adjacent masonry brick, coursing, pattern, and joint work.

F. Tie ins shall be neat and toothed into existing coursing.

G. Flush tie ins are not acceptable.

3.5 CLEANING

A. Perform daily and final cleaning as recommended by the Brick Institute and as follows:
   1. Clean daily with bucket and brush.
   2. Test cleaners prior to using.
   3. Power washing is not acceptable

END OF SECTION 04 10 20

SECTION 05 12 00 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes
   1. Structural steel,
   2. Erection
   3. Surface preparation and field touch-up by the erector.
   5. Checking, at delivery, for proper shop priming

B. Related Sections: The following Sections contain requirements that relate to this Section:

   1. Division 01 Section "Quality Requirements" for independent testing agency procedures and administrative requirements.

   2. Division 05 Section "Steel Decking" for field installation of shear connectors.

   3. Division 05 Section "Metal Fabrications" for loose steel bearing plates and miscellaneous steel framing.

   4. Division 09 Section "Painting" for surface preparation and priming requirements.

C. Contractor’s Investigation: Prior to Contract Execution, the Contractor shall have thoroughly investigated the entities such as employees, consultants, subcontractors, manufacturers, suppliers, etc. and other entities that will performing work or supplying materials, products, equipment, or systems for this project to ensure that they meet all of the qualifications and requirements mentioned or implied in the Contract Documents. If it is later determined that any of the previously mentioned entities do not meet the qualifications and requirements specified in the Contract Documents, the Contractor will be required to replace that entity with a qualified entity at no increase in Contract sum or Contract Time.

1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance: Engineer structural steel connections required by the Contract Documents to withstand design loadings indicated.

B. Engineering Responsibility: Engage a fabricator who utilizes a qualified professional engineer to prepare calculations, and other structural data for structural steel connections.

1.4 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product Data for each type of product specified.

C. Submit shop connection standards prior to submitting shop and erection drawings for all structural steel components. Submit two prints, showing complete details and schedules (if required) for fabrication, assembly and erection. Furnish anchor bolts required for installation in other work; furnish templates for bolt installation.

D. Shop and erection drawings include the following:

1. Types of materials, including sizes and weights of members, identifying by piece numbers and locations.

2. Location, types and details of connections.

3. Openings, including reinforcement as shown on the Drawings.

4. Erection drawings, erection sequence including piece numbers and location. Do not use drawings prepared by the Engineer for erection purposes. Shop drawings must be completely checked by the contractor before submitting them for review. Shop drawings will not be reviewed until shop and field welders certificates have been submitted.

5. Cleaning and painting schedules.

6. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld.

7. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify high-strength bolted slip-critical, direct-tension, or tensioned shear/bearing connections.

E. Calculations: Submit calculations of all connections unless specifically shown on Drawings according to the load/force requirements as specified here in or as indicated on the Drawings. Calculations shall bear the seal of a Professional Engineer registered in the state in which the Project occurs, and shall be submitted to the structural engineer of Record (SER) for review.

F. Mill test reports signed by manufacturers certifying that their products, including the following, comply with requirements.

1. Structural steel, including chemical and physical properties.
2. Bolts, nuts, and washers, including mechanical properties and chemical analysis.
3. Direct-tension indicators.
4. Shear stud connectors.
5. Shop primers.
6. Nonshrink grout.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has completed structural steel work similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Fabricator Qualifications: Engage a firm experienced in fabricating structural steel similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to fabricate structural steel without delaying the Work. Steel fabricator shall meet the following minimum requirements:
   1. Minimum of 10 years' continuous experience on projects of similar size and complexity.
   2. Have AISC certification.
   3. Be able to perform the specified surface preparation requirements.
   4. Be able to apply inorganic zinc primers and high build epoxy primers

C. Comply with applicable provisions of the following specifications and documents:

   1. AISC's "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design."

   2. AISC's "Specification for Allowable Stress Design of Single-Angle Members."

   3. AISC's "Seismic Provisions for Structural Steel Buildings."

   4. ASTM A 6 "Specification for General Requirements for Rolled Steel Plates, Shapes, Sheet Piling, and Bars for Structural Use."

   5. Research Council on Structural Connections' (RCSC) "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

   6. Research Council on Structural Connections' (RCSC) "Load and Resistance Factor Design Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

   7. SSPC "Steel Structures Painting Manual, Volume 2, Systems and Specifications."

   8. OSHA 1970 as amended to date of contract.

D. Professional Engineer Qualifications: A professional engineer who is legally authorized to practice in the 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 projects with structural steel framing that are similar to that indicated for this Project in material, design, and extent.

E. Welding Standards: Comply with applicable provisions of AWS D1.1 "Structural Welding Code--Steel."

   1. Present evidence that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

F. Qualifications for Welding Work: Qualify welding processes and welding operators in accordance with AWS "Standard Qualification Procedure" AWS D1.1.

   1. Provide certification that both shop and field welders to be employed in work have satisfactorily passed AWS qualification tests within the previous 48 months.

G. Connections: As shown on final shop drawings. Use high-strength bolts for field connections, except as otherwise indicated. Unless otherwise noted, all beam connections shall be Standard Frames Connections as shown in part 4 of the AISC Manual of Steel Construction. Unless reactions are indicated on the plans, connections shall develop at least one half of the total uniform load capacity tabulated in part 2 of the AISC Manual of Steel Construction. In no case, however, shall the connections be less than the one half the T dimensions.

1. Prior to fabricating any material, shop drawings must be reviewed by the Engineer. Paragraph 4.2.1 of Section 4, Code of Standard Practice for Steel Buildings and Bridges, (AISC) is hereby modified to delete the sentence, “This approval constitutes the Owner’s acceptance of all responsibility for the design adequacy of any connections designed by the fabricator as a part of his preparation to those in AISC’s “Structural Steel Detailing”.

H. Bracing: All bracing connections shall develop the greater of (1) The force indicated on the Drawings, (2) The allowable tension force in the member, or (3) The force required by AISC’s Seismic Provisions, if applicable, unless noted otherwise. A minimum of two bolts shall be used per connection unless otherwise noted. All bracing connections shall be designed and detailed so all force components will be transmitted directly to the centerline of the intersecting members; where this is not possible, connections shall be designed for all resulting eccentricities.

I. Substitute Requests For A Specified Entity

1. Provisions, requirements, and stipulations stated under this paragraph of this specification apply not only to this specification, but they also apply to all other specifications that are included in the project manual, on the drawings or are otherwise a part of the Contract Documents even if not so stated in these documents. Information requested under this paragraph heading is the minimum required information for consideration and evaluation and additional information may be requested. This information is required in addition to information required by any substitute request forms that may be included in the Project Manual or Contract Documents, or otherwise provided.

2. Where the Contract Documents list at least three entities (products, materials, components, systems, manufacturers, installers, methods, etc.), the Architect reserves the option to reject any and all requests for a substitute. Where the Contract Documents list only one entity without “Or equal” or similar language, substitutes will not be considered. Where the Contract Documents list less than 3 entities, substitutes may be reviewed and evaluated on an individual base.

3. Include the following information on the cover page of the request:
   a. Name of Project and project number as shown in the header of the specification
   b. Date request is being made.
   c. Name of person, company, and contact information of person requesting substitute.
   d. Specification title and number and drawing number where the specified product is listed or shown.
   e. Exact name of the specified entity and substitute entity. .

4. When requesting a substitute, include all requested and required supporting data, specifications, and performance criteria. The Architect must receive this substitute request no later than the time stated elsewhere for submitting product substitutions. If no time is stated, then 10 days prior to date of bid opening. When a Request For Substitute Form is included in the Project Manual, properly complete the form and include it with the submittal.

5. Verbal requests for a substitute or requests that do not comply with these provisions are not acceptable, will be rejected, and will not extend the submittal deadline. Submittals that are incomplete have vague or unspecific answers (“Better”. “Cheaper”. “More competitive”, etc.); that lack supporting data to substantiate equal or superior quality/design; that do not include the requested proof, verification, reports, and substantiating documentation; or are received after submittal deadline will be rejected. Provide convincing answers as to why the substitute should be approved. Rejection or disapproval will not extend the submittal deadline.
   a. If the substitute entity differs from specified entity, compare the substitute entity with the specified entity in a tabular format that clearly shows all the differences.

6. Include the following information on all requests for substitutes:
   a. Length of time the manufacturer has been in business.
   b. Whether the manufacturer operated under any other name, and if so, under what name and when?
   c. Length of time the substitute entity has been on the market.
   d. Whether the substitute entity has been marketed under any other name, and if so, under what name and when?
   e. Who will install and service the substitute entity?
   f. Whether the installer is trained and certified by the manufacturer? If so, describe how this training and certification are achieved and if training records are maintained?
   g. All required changes in the project design that will be required to incorporate the substitute entity.
   h. Describe any known problems or failures associated with the substitute entity? If there are any, provide details.

7. The manufacturer’s published literature, description, capabilities, operating and performance parameters, options, accessories, etc. of all submitted substitutes shall meet or exceed those published by the manufacturer of the specified entity even if they are not specifically mentioned in the Contract Documents. Additionally, manufacturers whose standards are less than those of the specified entity but are capable of producing an entity hat meets the specified entity shall not, for the convenience of their normal production methods, vary from the specified entity standards.

8. Where test data and standards are being submitted as supporting data and for comparison with the specified item, comply with the following requirements. Submittals not complying with these provision will be considered incomplete, unacceptable, and will be rejected:
   a. All substitutes shall meet all of the minimum performance criteria of the specified entity.
   b. Submit certified data provided by an independent testing laboratory.
   c. Prepare supporting data in side-by-side tabular form showing the submitted criteria next to each specified performance criteria and denoting the differences between the specified item the substitute item.
   d. Show submitted data using same tests and standards and with the values and results in the same units of measure as those shown for the specified item.
   e. Where a performance criterion is not listed in the specifications, comply with the specified product manufacturer’s published data for performance criteria.
   f. Where the specified entity requires certifications, registrations, approvals, policies, practices, etc., submit proof that the substitute entity is in compliance.

9. Each and all requests for substitutes shall be signed by the person making the submittal. By signing the submittal, the person requesting the substitute certifies and agrees to the following requirements. Requests without the signature of a responsible person will be rejected.
    a. That the specifications have been read and are understood,
    b. That the entity being submitted meets or exceeds all provisions of the specifications,
    c. That all submitted information is true and accurate,
    d. Will remove the substitute entity and replace it with an acceptable product, at his expense, if it is determined that the substitute does not meet the specifications as certified.
    e. Agrees to pay for all necessary design changes and increased construction costs to incorporate the substitute entity.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver structural steel to Project site in such quantities and at such times to ensure continuity of installation.
    1. At delivery and prior to unloading, examine all steel for signs of thin or no shop primer. If steel has numerous signs of improper packing, handling, or preparation, as evidenced by numerous breaks, chips, scratches, and heavily rusted areas in the shop primer, do not accept the steel. Where existing primer appears to be thin as evidenced by shadows or variegated appearance, or rust bloom, check thickness of primer with a magnetic thickness tester such as a Positester.
    2. If unloaded, staged, or erected steel is found to have low shop-primer as described above, the Contractor shall be responsible for bringing the required surface preparation and priming to bring the shop primer thickness to the specified dry film thickness, even if the steel is erected.

B. Store materials to permit easy access for inspection and identification. Keep steel members off ground by using pallets, platforms, or other supports. Handle and protect steel members and packaged materials from damage, corrosion, and deterioration. Do not erect rust steel.

    1. Store fasteners in a protected place. Clean and relubricate bolts and nuts that become dry or rusty before use.

    2. Stack in such a manner that surface water will properly drain. If materials are to be stored for an extended period of time, cover in such a way that rain will not fall on the material, but air will flow freely through the stack.

    3. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.

    4. Store steel so as to be protected from mud and dirt. Remove all traces of mud and dirt prior to erecting. Mud and dirt shall be removed carefully to prevent damage to the primer.

1.7 SEQUENCING

A. Supply anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, templates, instructions, and directions, as required, for installation.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Wide Flange Structural Steel Shapes, Plates, and Bars: Carbon Steel, ASTM A992, Grade 50.

B. Structural Steel Plates, Bars and Angles: Carbon Steel, ASTM A36.

C. Cold-Formed Structural Steel Tubing: ASTM A 500, Grade B.

D. Hot-Formed Structural Steel Tubing: ASTM A 501.

E. Steel Pipe: ASTM A 53, Type E or S, Grade B.
   1. Weight Class: As indicated.
   2. Finish: Black, except where indicated or specified to be galvanized.

F. Carbon-Steel Castings: ASTM A 27, Grade 65-35, medium-strength carbon steel.

G. High-Strength Steel Castings: ASTM A 148, Grade 80-50.

H. Shear Connectors: ASTM A 108, Grade 1015 through 1020, headed-stud type, cold-finished carbon steel, AWS D1.1, Type B.

I. Anchor Rods, Bolts, Nuts, and Washers: As follows:

   1. Unheaded Rods: ASTM A 36.

   2. Headed Bolts: ASTM A 307, Grade A; carbon-steel, hex-head bolts; and carbon-steel nuts.

   3. Headed Bolts: ASTM A 325, Type 1, heavy hex steel structural bolts and heavy hex carbon-steel nuts.

   4. Washers: ASTM A 36.

J. Nonhigh-Strength Bolts, Nuts, and Washers: ASTM A 307, Grade A; carbon-steel, hex-head bolts; carbon-steel nuts; and flat, unhardened steel washers.

   1. Finish: Plain, uncoated.

K. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy hex steel structural bolts, heavy hex carbon-steel nuts, and hardened carbon-steel washers.
   1. Finish:
      a. Interior Applications: Plain, uncoated.
      b. Exterior: Hot-dip zinc-coating, ASTM A 153, Class C.
      c. Surfaces in contact with wood or cementitious materials: Hot-dip zinc-coating, ASTM A 153, Class C.

L. Direct-Tension Indicators: ASTM F 959, Type 325, may be used at the contractor's option.
   1. Finish
      a. Interior: Plain, uncoated.
      b. Exterior: Hot-dip zinc-coating, ASTM A 153, Class C.
      c. Surfaces in contact with wood or cementitious materials: Hot-dip zinc-coating, ASTM A 153, Class C.

M. Welding Electrodes: Comply with AWS requirements.

2.2 PRIMER

A. Shop Primer for Ferrous Metal: Compatible with finish paint systems indicated, and capability of providing a sound foundation for field-applied topcoats despite prolonged exposure. Compatible with finish paint specified in Section 09 91 00 - Painting. Capable of being applied to a minimum dry film thickness of 3 mils DFT and cover surface profile created by surface preparation. Shop primer to be by the same manufacturer as the finish coat. Cross coating is not permitted.
   1. Interior Steel: Sherwin Williams Kem Kromick Universal Primer B50WZ1 White or a reviewed substitute. Shop painted steel that arrives on site with a red or gray primer will be re-primed in the field with the specified primer at the Contractor's expense.
   2. Exterior: Hot dipped galvanized.
   3. For Components Too Large To Galvanize, 1 Coat: Sherwin Williams Macropoxy High Solids B58W400 DFT white at 4 mils DFT or a reviewed substitute.

B. Galvanizing Repair Paint: Galvilite Cold Galvanizing Repair Compound, Esterified Epoxy Based Zinc Rich Metal Primer by ZRC Worldwide or a reviewed substitute. Use to repair all damaged galvanizing. As a minimum, galvanizing repair shall comply with the following:
   1. Specifications: Fed. Spec. DOD-P-21035A and Mil Spec. Mil-P-26915A
   2. Registration: ISO 9001
   3. VOC Compliant
   4. Zinc in Dried Film: 95 percent, ASTM D520 Type III
   5. Percent Solids: 52 percent by volume.
   6. Pencil Hardness: 2H per ASTM D3363
   7. UL: Recognized by UL as being equivalent to hot dipped galvanized
   8. Impact Resistance: Greater than 30 inch-lbs. per ASTM D2794
   9. Abrasion Resistance: 11.5 liters per dry mil when tested at 3 mils DFT per ASTM D98
   10. Dry Time to Touch: 20-30 minutes at 1.5 mils DFT
   11. Recoat Time: 24-48 hours

2.3 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage compensating agents, plasticizing and water-reducing agents, complying with ASTM C 1107, of consistency suitable for application, and a 30-minute working time.

2.4 FABRICATION

A. Fabricate and assemble structural steel in shop to greatest extent possible. Fabricate structural steel according to AISC specifications referenced in this Section and in Shop Drawings.

1. Camber structural steel members where indicated.

2. Identify high-strength structural steel according to ASTM A 6 and maintain markings until steel has been erected.

3. Mark and match-mark materials for field assembly.

4. Fabricate for delivery a sequence that will expedite erection and minimize field handling of structural steel.

5. Complete structural steel assemblies, including welding of units, before starting shop-priming operations.

6. Comply with fabrication tolerance limits of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for structural steel.

B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.

1. Plane thermally cut edges to be welded.

C. Finishing: Accurately mill ends of columns and other members transmitting loads in bearing.

D. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer's printed instructions.

E. Steel Wall Framing: Select true and straight members for fabricating steel wall framing to be attached to structural steel framing. Straighten as required to provide uniform, square, and true members in completed wall framing.

F. Holes: Provide holes required for securing other work to structural steel framing and for passage of other work through steel framing members, as shown on Shop Drawings.

1. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame-cut holes or enlarge holes by burning or by use of drift pins. Drill holes in bearing plates.

2. Weld threaded nuts to framing and other specialty items as indicated to receive other work.

2.5 SHOP CONNECTIONS

A. Shop install and tighten high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1. Bolts: ASTM A 325 high-strength bolts, unless otherwise indicated.

2. Connection Type: Snug tightened, unless indicated as slip-critical, direct-tension, or tensioned shear/bearing connections.

B. Weld Connections: Comply with AWS D1.1 for procedures, appearance and quality of welds, and methods used in correcting welding work.

2.6 SHOP PRIMING

A. Hot-dip galvanize all ferrous metal in exterior locations, in exterior walls, and in contact with cementitious or masonry construction, or with treated wood.

B. Shop prime steel surfaces, except the following:
1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
2. Surfaces to be field welded.
3. Surfaces to be high-strength bolted with slip-critical connections.
4. Surfaces to receive sprayed-on fireproofing.
5. Galvanized surfaces.
6. Faying surfaces.

C. Surface Preparation: Clean surfaces to be painted. Remove loose rust, loose mill scale, and spatter, slag, or flux deposits. Prepare surfaces according to SSPC specifications as follows:

1. Prior To Performing Other Surface Preparation: Perform SSPC-SP 2 "Solvent Cleaning."
2. Steel That Will Be Exposed To Weather After Occupancy: Perform SSPC SP6 – “Commercial Blast”.
3. Interior Surfaces: Perform SSPC-SP 3 "Power Tool Cleaning."

D. Shop Priming
1. Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes or to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with requirements of SSPC-PA 1 "Paint Application Specification No. 1" for shop painting. Apply shop primer to cover profile of surface preparation.

2. Immediately after surface preparation, apply primer according to manufacturer's instructions and at rate recommended by SSPC to provide a dry film thickness of not less than 3.0 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

3. Do not allow prepared and cleaned surfaces to remain unprimed over night or for longer than 8 hours before priming. Surfaces not primed within these parameters shall be recleaned prior to priming.

4. Stripe paint corners, crevices, bolts, rivets, welds, and edges. Spray all Bolts and rivets from at least 4 different angles. Cover all sides of rivets and bolts equally.

5. Apply 2 coats of shop paint to inaccessible surfaces after assembly or erection. Change color of second coat to distinguish it from first.

E. Galvanizing: For those items indicated for galvanizing, apply zinc coating by the hot-dip process complying with the following requirements. If not indicated, then galvanize all ferrous metals exposed to moisture or weather, and that are in contact with wood, masonry, or cementitious materials:
1. ASTM A 153 for galvanizing iron and steel hardware.

2. ASTM A 123 for galvanizing both fabricated and unfabricated iron and steel products made of uncoated rolled, pressed, and forged shapes, plates, bars, and strip 0.0299 inch thick or thicker.

3. Galvanize steel and fasteners in the following conditions:
   a. Where indicated
   b. All steel in contact with earth, wood, and insulation. Surfaces to receive sprayed fireproofing are not to be galvanized unless recommended by the fire proofing manufacturer. Galvanize entire member even if only a portion of the member is in contact with previously mentioned materials or surfaces.
   c. All steel that will be exposed to weather or to frequent moist conditions.

4. Prepare all surfaces to be galvanized according to SSPC SP6 – Commercial Blast.

F. Steel that arrives on site with rusted or damaged surfaces may be inferred as improper handling, surface preparation, or shop priming and will be corrected at the fabricator's expense or may be rejected if rusting is excessive. The General Contractor shall be responsible for all steel that is accepted with rusting or damaged surfaces.

2.7 GALVANIZING

A. Hot-Dip Galvanized Finish: Galvanize as follows:
   1. Steel items: Apply zinc coating by the hot-dip process to structural steel for galvanizing according to ASTM A 123, G90 in the following conditions:
   2. ASTM A 153 for galvanizing iron and steel hardware, G90.

B. Galvanize steel and fasteners in the following conditions:
   1. Where indicated
   2. All steel in contact with earth, cementitious materials, wood, and insulation. Surfaces to receive sprayed fireproofing are not to be galvanized unless recommended by the fire proofing manufacturer. Galvanize entire member even if only a portion of the member is in contact with previously mentioned materials or surfaces.
   3. All steel that will be exposed to weather or to frequent moist conditions.

C. Prepare all surfaces to be galvanized according to SSPC SP6 – Commercial Blast.

2.8 SOURCE QUALITY CONTROL

A. Responsibility for an independent testing agency is defined in Section 01410 – Testing Laboratory Services to perform shop inspections and tests of all shop welds and bolted connections and to prepare test reports.

   1. Testing agency will conduct and interpret tests and state in each report whether test specimens comply with or deviate from requirements. The testing agency shall submit copies of all reports to the Contractor and the Architect.
   2. Provide testing agency with access to places where structural steel Work is being fabricated or produced so required inspection and testing can be accomplished.

B. Correct deficiencies in or remove and replace structural steel that inspections and test reports indicate do not comply with specified requirements.

C. Additional testing, at Contractor's expense, will be performed to determine compliance of corrected Work with specified requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Before erection proceeds, and with the steel erector present, verify elevations of concrete and masonry bearing surfaces and locations of anchorages for compliance with requirements.

B. Do not proceed with erection until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place, unless otherwise indicated. Provide temporary guy lines to achieve proper alignment of structures as erection proceeds.

B. Temporary Planking: Provide temporary planking and working platforms as necessary to effectively complete work.

C. Remove all traces of caked dirt, mud, etc. from all surfaces, and touch-up all rusted and damaged primer prior to hanging.

3.3 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC specifications referenced in this Section.

B. Base and Bearing Plates: Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen surfaces prior to setting base and bearing plates. Clean bottom surface of base and bearing plates.

1. Set base and bearing plates for structural members on wedges, shims, or setting nuts as required.

2. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of base or bearing plate prior to packing with grout.

3. Pack grout solidly between bearing surfaces and plates so no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure.

a. Comply with manufacturer's instructions for proprietary grout materials.

C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

D. Align and adjust various members forming part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.

E. Splice members only where indicated.

F. Gas Cutting: Do NOT use gas cutting torches in field for correcting fabrication errors in structural framing. Cutting will be permitted only on secondary members which are not under stress, as acceptable to Engineer. Finish gas-cut sections equal to a sheared appearance when permitted.

G. Do not use thermal cutting during erection.

H. Do not enlarge unfair holes in members by burning or by using drift pins. Ream holes that must be enlarged to admit bolts.

I. Back Priming: For all unprimed steel and steel with damaged primer or galvanizing, back prime, including all edges and concealed surfaces, of all ferrous and galvanized metal prior to installation. Apply primer to the same specifications as for the exposed surfaces. Treat all cut edges, end cuts, welds, and otherwise disturbed surfaces in the same way. Ferrous items shall be completely encapsulated with primer. Installed items not back-primed shall be removed, properly primed, and reinstalled at the Contractor’s expense. Damaged materials shall be replaced. This provision applies to all ferrous and galvanized steel that is installed in exterior locations, in unconditioned spaces, and that are in contact with wood or cementitious materials. However, do not prime faying surfaces, surfaces that are to receive sprayed fire proofing, or other scheduled or noted surfaces not to be primed. Comply with surface preparation and priming specified in Section 09 91 00 – Painting.

3.4 FIELD CONNECTIONS

A. Install and tighten nonhigh-strength bolts, except where high-strength bolts are indicated.

B. Install and tighten high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1. Bolts: ASTM A 325 high-strength bolts, unless otherwise indicated.

2. Connection Type: Snug tightened, unless indicated as slip-critical, direct-tension, or tensioned shear/bearing connections.

C. Weld Connections: Comply with AWS D1.1 for procedures, appearance and quality of welds, and methods used in correcting welding work.

1. Comply with AISC specifications referenced in this Section for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Testing will be provided as described under Section 01400 – Quality Control to perform field inspections and tests and to prepare test reports.

1. Testing agency will conduct and interpret tests and state in each report whether installed and tested Work complies with or deviates from requirements.

B. Correct deficiencies in or remove and replace structural steel that inspections and test reports indicate do not comply with specified requirements.

C. Additional testing, at Contractor's expense, will be performed to determine compliance of corrected Work with specified requirements.

D. Field-bolted connections will be tested and inspected according to RCSC's "Load and Resistance Factor Design Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
1. Direct-tension indicator gaps will be verified to comply with ASTM F 959, Table 2.

E. In addition to visual inspection, field-welded connections will be inspected and tested according to AWS D1.1 and the inspection procedures listed below, at testing agency's option and judgment based on conditions, specific situations, previously conducted visual inspection.

1. Liquid Penetrant Inspection: ASTM E 165.
2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
3. Radiographic Inspection: ASTM E 94 and ASTM E 142; minimum quality level "2-2T."
4. Ultrasonic Inspection: ASTM E 164.

3.6 CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and primer damaged during handling and erection. Apply paint to exposed areas using same material as used for shop painting. Perform all surface preparation and priming as described for shop performed surface preparation and priming in Part 2 of this specification.
1. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and apply galvanizing repair paint according to ASTM A 780. Perform all surface preparation as described for shop performed surface preparation in Part 2 of this specification.

END OF SECTION 05 12 00

SECTION 05 40 00 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Exterior steel-stud walls.
2. Interior load-bearing steel-stud walls.
3. Field surface preparation and field touch-up.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 6 Section "Rough Carpentry" for sheathing applied to exterior steel framing.
2. Division 9 Section "Gypsum Board Assemblies" for gypsum board and nonload-bearing metal-stud framing and ceiling-suspension assemblies.

1.3 PERFORMANCE REQUIREMENTS

A. AISI "Specifications": Calculate structural characteristics of cold-formed metal framing according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" and the following::

1. Center for Cold-Formed Steel Structures (CCFSS) Technical Bulletin, Vol. 2, No. 1, February 1993 "AISI Specification Provisions for Screw Connections."

B. Structural Performance: Engineer, fabricate, and erect cold-formed metal framing to withstand design loads within limits and under conditions required.
1. Design Loads: As indicated.
2. Design framing systems to withstand design loads without deflections greater than the following unless noted otherwise on the Structural Drawings:
   a. Exterior Walls: Lateral deflection of L/600 of the wall height backing brick veneer.
   b. Interior Load-Bearing Walls: Lateral deflection of L/240 of the wall height.
   c. Exterior Nonload-Bearing Curtainwall: Lateral deflection of L/240 of the wall height.

3. Design framing systems 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 subject to a maximum ambient temperature change (range) of 120 deg F.
4. Design framing system to accommodate deflection of primary building structure and construction tolerances, and to maintain clearances at openings.

C. Design exterior nonload-bearing curtainwall framing to accommodate lateral deflection without regard to contribution of sheathing materials.

D. Engineering Responsibility: Engage a fabricator who assumes undivided responsibility for engineering cold-formed metal framing by employing a qualified professional engineer registered in the state of the project to prepare design calculations, shop drawings, and other structural data.

1.4 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Provide shop drawings prepared by cold-formed metal framing manufacturer. Shop drawings, drawings, or documents showing location, layout, spacings, sizes, thicknesses, and types of cold-formed metal framing, fabrication, fastening and anchorage details, including mechanical fasteners. Show reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachments to other units of Work.

1. For cold-formed metal framing indicated to comply with design loadings, include structural calculations sealed and signed by the qualified professional engineer registered in the state of the project who was responsible for its preparation.

C. Mill certificates indicating that their products comply with requirements, including uncoated steel thickness, yield strength, tensile strength, total elongation, and galvanized-coating thickness.

D. Welder certificates signed by Contractor certifying that welders comply with requirements specified under the "Quality Assurance" Article.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has completed cold-formed metal framing similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Welding Standards: Comply with applicable provisions of AWS D1.1 "Structural Welding Code--Steel" and AWS D1.3 "Structural Welding Code--Sheet Steel."

1. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

C. Professional Engineer Qualifications: A professional engineer legally authorized to practice in the jurisdiction where Project is located and experienced in providing engineering services of the kind indicated that have resulted in the installation of cold-formed metal framing similar to this Project in material, design, and extent and that have a record of successful in-service performance.

D. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings."

E. Substitute Requests For A Specified Entity

1. Provisions, requirements, and stipulations stated under this paragraph of this specification apply not only to this specification, but they also apply to all other specifications that are included in the project manual, on the drawings or are otherwise a part of the Contract Documents even if not so stated in these documents. Information requested under this paragraph heading is the minimum required information for consideration and evaluation and additional information may be requested. This information is required in addition to information required by any substitute request forms that may be included in the Project Manual or Contract Documents, or otherwise provided.

2. Include the following information on the cover page of the request:
   a. Name of Project and project number as shown in the header of the specification
   b. Date request is being made.
   c. Name of person, company, and contact information of person requesting substitute.
   d. Specification title and number and drawing number where the specified product is listed or shown.
   e. Exact name of the specified entity and substitute entity. .

3. When requesting a substitute, include all requested and required supporting data, specifications, and performance criteria. The Architect must receive this substitute request no later than the time stated elsewhere for submitting product substitutions. If no time is stated, then 10 days prior to date of bid opening. When a Request For Substitute Form is included in the Project Manual, properly complete the form and include it with the submittal.

4. Verbal requests for a substitute or requests that do not comply with these provisions are not acceptable, will be rejected, and will not extend the submittal deadline. Submittals that are incomplete have vague or unspecific answers (“Better”. “Cheaper”. “More competitive”, etc.); that lack supporting data to substantiate equal or superior quality/design; that do not include the requested proof, verification, reports, and substantiating documentation; or are received after submittal deadline will be rejected. Provide convincing answers as to why the substitute should be approved. Rejection or disapproval will not extend the submittal deadline.
   a. If the substitute entity differs from specified entity, compare the substitute entity with the specified entity in a tabular format that clearly shows all the differences.

5. Include the following information on all requests for substitutes:
   a. Length of time the manufacturer has been in business.
   b. Whether the manufacturer operated under any other name, and if so, under what name and when?
   c. Length of time the substitute entity has been on the market.
   d. Whether the substitute entity has been marketed under any other name, and if so, under what name and when?
   e. Who will install and service the substitute entity?
   f. Whether the installer is trained and certified by the manufacturer? If so, describe how this training and certification are achieved and if training records are maintained?
   g. All required changes in the project design that will be required to incorporate the substitute entity.
   h. Describe any known problems or failures associated with the substitute entity? If there are any, provide details.

6. The manufacturer's published literature, description, capabilities, operating and performance parameters, options, accessories, etc. of all submitted substitutes shall meet or exceed those published by the manufacturer of the specified entity even if they are not specifically mentioned in the Contract Documents. Additionally, manufacturers whose standards are less than those of the specified entity but are capable of producing an entity hat meets the specified entity shall not, for the convenience of their normal production methods, vary from the specified entity standards.

7. Where test data and standards are being submitted as supporting data and for comparison with the specified item, comply with the following requirements. Submittals not complying with these provision will be considered incomplete, unacceptable, and will be rejected:
   a. All substitutes shall meet all of the minimum performance criteria of the specified entity.
   b. Submit certified data provided by an independent testing laboratory.
   c. Prepare supporting data in side-by-side tabular form showing the submitted criteria next to each specified performance criteria and denoting the differences between the specified item the substitute item.
   d. Show submitted data using same tests and standards and with the values and results in the same units of measure as those shown for the specified item.
   e. Where a performance criterion is not listed in the specifications, comply with the specified product manufacturer's published data for performance criteria.
   f. Where the specified entity requires certifications, registrations, approvals, policies, practices, etc., submit proof that the substitute entity is in compliance.

8. Each and all requests for substitutes shall be signed by the person making the submittal. By signing the submittal, the person requesting the substitute certifies and agrees to the following requirements. Requests without the signature of a responsible person will be rejected.
   a. That the specifications have been read and are understood,
   b. That the entity being submitted meets or exceeds all provisions of the specifications,
   c. That all submitted information is true and accurate,
   d. Will remove the substitute entity and replace it with an acceptable product, at his expense, if it is determined that the substitute does not meet the specifications as certified.
   e. Agrees to pay for all necessary design changes and increased construction costs to incorporate the substitute entity.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling in accordance with AISI's "Code of Standard Practice".

B. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation in accordance with AISI's "Code of Standard Practice".

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering cold-formed metal framing that may be incorporated in the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide cold-formed metal framing by one of the following:
1. Allied Studco, Inc.
2. Clark Western Building Systems
3. Consolidated Fabricators Corp.
4. Consolidated Systems, Inc.
5. Design Shapes in Steel.
6. Dietrich Industries, Inc.
7. MarinoWare; Div. of Ware Industries, Inc.
8. Super Stud Building Products, Inc.
9. The Steel Network (TSN)

2.2 MATERIALS

A. Galvanized-Steel Sheet: ASTM A 653/A653M, and ASTM A 1003/A 1003M zinc coated according to ASTM A 924, and as follows::
1. Coating Designation: G 60 (Z 180).
2. Grade: As indicated on the Drawings.

2.3 WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs of web depths indicated, with lipped flanges, and complying with the Structural Drawings. Gauge shall be as required to meet the specified deflection for both interior and exterior load bearing walls. However, provide a minimum 16 gauge unless noted otherwise on the structural Drawings.

B. Headers and Jambs: Manufacturer’s proprietary shape used to form header beams and jambs, columns or posts, of web depths indicated, unpunched, with stiffened flanges and as follows:
1. Subject to compliance with requirements, provide one of the following;
   a. Dietrich Metal Framing: Heavy Duty Studs – HDS and Header Bracket – HDSC
   b. Brady Innovations ProX Header®

C. Deflection Track Slotted: Manufacturer’s single, deep-leg, U-shaped steel track: punched with vertical slots in both legs. Steel Sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
1. Subject to compliance with requirements, provide: Dietrich Metal Framing, SLP-TRK® Slotted Deflection Track by Brady Innovations or equivalent.

D. Channel Bridging or Bracing: U-Channel Assembly; Base metal thickness of .0538 inch (1.37mm) and minimum ½ inch (12.7mm) wide flanges.
1. Subject to compliance with requirements, provide one of the following:
2. Dietrich Metal Framing: Spazzer® 5400 Bridging and Bracing Bar (SPZS)] [Spazzer® Bar Guard (SPBG)]
3. U-Channel Assembly:1-1/2 inches

a. Dietrich Metal Framing; EasyClip™ U-Series™ Clip Angle or equivalent.

2.4 JOIST FRAMING

A. Steel Joists: Manufacturer's standard C-shaped steel joists, unpunched, of web depths indicated, with lipped flanges, and complying with the Structural Drawings.

2.5 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories of the same material and finish used for framing members, with a minimum yield strength of 33,000 psi.

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
1. Supplementary framing.
2. Bracing, bridging, and solid blocking.
3. Web stiffeners.
4. Gusset plates.
5. Deflection track and vertical slide clips.
6. Reinforcement plates.

2.6 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A 36, zinc coated by the hot-dip process according to ASTM A 123.

B. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times the design load, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

C. Powder-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times the design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency.

D. Mechanical Fasteners: Corrosion-resistant coated, self-drilling, self-threading steel drill screws.

1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

E. Welding Electrodes: Comply with AWS standards.

2.7 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: Galvilite Cold Galvanizing Repair Compound, Esterified Epoxy Based Zinc Rich Metal Primer by ZRC Worldwide or a reviewed substitute. Use to repair all damaged galvanizing. As a minimum, galvanizing repair shall comply with the following:
1. Specifications: Fed. Spec. DOD-P-21035A and Mil Spec. Mil-P-26915A
2. Registration: ISO 9001
3. VOC Compliant

4. Zinc in Dried Film: 95 percent, ASTM D520 Type III
5. Percent Solids: 52 percent by volume.
6. Pencil Hardness: 2H per ASTM D3363
7. UL: Recognized by UL as being equivalent to hot dipped galvanized
8. Impact Resistance: Greater than 30 inch-lbs. per ASTM D2794
9. Abrasion Resistance: 11.5 liters per dry mil when tested at 3 mils DFT per ASTM D98
10. Dry Time to Touch: 20-30 minutes at 1.5 mils DFT
11. Recoat Time: 24-48 hours

B. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, Portland cement, shrinkage-compensating agents, plasticizing and water-reducing agents, complying with ASTM C 1107, with fluid consistency and a 30-minute working time.

2.8 FABRICATION

A. Fabricate cold-formed metal framing and accessories plumb, square, true to line, and with connections securely fastened, according to manufacturer's recommendations and the requirements of this Section. Perform fabrication in the shop.

1. Fabricate framing assemblies in jig templates.
2. Cut framing members by sawing or shearing; do not torch cut.
3. Fasten cold-formed metal framing members by welding or screw fastening, as standard with fabricator. Wire tying of framing members is not permitted.

    a. Comply with AWS 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 cold-framed metal framing manufacturer's instructions with screw penetrating joined members by not less than 3 exposed screw threads.
4. Fasten other materials to cold-formed metal framing by welding, bolting, or screw fastening, according to manufacturer's recommendations.

B. Fabrication Tolerances: Fabricate assemblies to a maximum allowable tolerance variation from plumb, level, and true to line of 1/8 inch in 10 feet and as follows:

1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
2. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch.

C. All members to be used in an exterior wall or partition or that will be exposed to weather shall be galvanized after fabrication.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting substrates and abutting structural framing for compliance with requirements, including installation tolerances and other conditions affecting performance of cold-formed metal framing. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Grout bearing surfaces uniform and level to ensure full contact of bearing flanges or track webs on supporting concrete or masonry construction.

3.3 INSTALLATION, GENERAL

A. Cold-formed metal framing may be shop or field fabricated for installation, or it may be field assembled.

B. Install cold-formed metal framing and accessories plumb, square, true to line, and with connections securely fastened, according to manufacturer's recommendations and the requirements of this Section.

1. Cut framing members by sawing or shearing; do not torch cut.
2. Fasten cold-formed metal framing members by welding or screw fastening, as standard with fabricator. Wire tying of framing members is not permitted.

a. Comply with AWS 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 cold-framed metal framing manufacturer's instructions with screw penetrating joined members by not less than 3 exposed screw threads.

C. Install framing members in one-piece lengths, unless splice connections are indicated for track or tension members.

D. Provide temporary bracing and leave in place until framing is permanently stabilized.

E. Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both sides of joints.

F. Fasten reinforcement plate over web penetrations that exceed size of manufacturer's standard punched openings.

G. Erection Tolerances: Install cold-formed metal framing to a maximum allowable tolerance variation from plumb, level, and true to line of 1/8 inch in 10 feet and as follows:

1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

H. Welds, End Cut, Etc.
1. Prior to erection, clean field welds, end cuts, bolted connections, and abraded areas of damaged shop primer.

2. Surface Preparation: Remove loose rust, and spatter, slag, flux deposits from all surfaces, and remove all sharp an dragged edges and burrs. Prepare surfaces according to SSPC specifications as follows:

    a. Prior To Performing Other Surface Preparation: Perform SSPC-SP 1 "Solvent Cleaning."
    b. Perform SSPC-SP 3 "Power Tool Cleaning." After solvent cleaning.

3. Priming:
    a. Immediately after surface preparation, apply primer according to manufacturer's instructions and at rate recommended by SSPC to provide a dry film thickness of not less than 2.0 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
    b. Touchup painted surfaces with same type of shop paint used on adjacent surfaces.

4. Galvanizing: For galvanized members, clean surfaces as required, and apply galvanizing repair touch-up.

3.4 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 spacings recommended by the manufacturer, but not greater than the following:
    1. Spacing: 24 inches for nail or power-driven anchors.
    2. Spacing: 32 inches for cast-in-place or expansion anchors.

B. Squarely seat studs against webs of top and bottom tracks. Fasten both flanges of studs to top and bottom track. Space studs as follows:

    1. Stud Spacing: 16 inches unless noted otherwise in the plans.

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.

D. Align studs vertically where wall-framing continuity is interrupted by floor framing. Where studs cannot be aligned, continuously reinforce track to transfer loads.

E. Anchor studs abutting structural columns or walls, including masonry walls, to supporting structure as indicated.

F. Install headers over wall openings wider than the stud spacing. Locate headers above openings as indicated. Fabricate headers of compound shapes indicated or required to transfer load to supporting studs, complete with clip-angle connectors, web stiffeners, or gusset plates.

    1. Frame wall openings with not less than a double stud at each jamb of frame as indicated or required by manufacturer.
    2. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with clip angles or by welding, and space jack studs same as full-height wall studs.

G. Install supplementary framing, blocking, and bracing in stud framing indicated to support fixtures, equipment, services, casework, heavy trim, furnishings, and similar work requiring attachment to framing.

1. Where type of supplementary support is not indicated, comply with stud manufacturer's recommendations and industry standards in each case, considering weight or load resulting from item supported.

H. Install horizontal bridging in stud system, spaced in rows not more than 60 inches apart. Fasten at each stud intersection.

1. Bridging: Cold-formed steel channel, clip angle fastened to webs of punched studs.

I. Install steel-sheet diagonal bracing straps to both stud flanges, terminate at and fasten to reinforced top and bottom track. Fasten clip-angle connectors to multiple studs at ends of bracing and anchor to structure.

J. Install miscellaneous framing and connections, including supplementary framing, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.5 NONLOAD-BEARING CURTAINWALL INSTALLATION

A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.

B. Squarely seat studs against webs of top and bottom tracks. Fasten both flanges of studs to top and bottom track, unless otherwise indicated. Space studs as follows:

1. Stud Spacing: 16 inches.

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.

D. Isolate steel framing from building structure as indicated to prevent transfer of vertical loads while providing lateral support. If not indicated, coordinate with the Structural Engineer.

1. Install deflection track and anchor to building structure.
2. Connect studs with vertical slide clips to continuous angles or supplementary framing anchored to building structure.

E. Install horizontal bridging in curtainwall studs, spaced in rows not more than 60 inches apart. Fasten at each stud intersection.
1. Bridging: Cold-formed steel channel, clip angle fastened to webs of punched studs.

F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, fasteners, and stud girts, to provide a complete and stable curtainwall-framing system.

3.6 FIELD QUALITY CONTROL

A. Testing Agency: Responsibility for an independent testing agency is defined in Section 01 40 00 – Quality Requirements to perform field quality control testing. All reports shall be sent to the Architect and Engineer.

B. Field and shop welds will be subject to inspection and testing.

C. Testing agency will report test results promptly and in writing to Contractor and Architect.

D. Remove and replace Work that does not comply with specified requirements.

E. Additional testing will be performed to determine compliance of corrected Work with specified requirements.

3.8 REPAIRS AND PROTECTION

A, Immediately after erection, clean field welds made after erection, bolted connections, and abraded areas of shop paint, and primer damaged during handling and erection.

B. Surface Preparation: Remove loose rust, loose mill scale, and spatter, slag, or flux deposits from all surfaces, including welds and end cuts. Prepare surfaces according to SSPC specifications as follows:

1. Prior To Performing Other Surface Preparation: Perform SSPC-SP 2 "Solvent Cleaning."
2. Perform SSPC-SP 3 "Power Tool Cleaning." After solvent cleaning.

C. Priming:
1. Immediately after surface preparation, apply primer according to manufacturer's instructions and at rate recommended by SSPC to provide a dry film thickness of not less than 2.0 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
2. Touchup painted surfaces with same type of shop paint used on adjacent surfaces.

D. Galvanizing: For galvanized members, clean surfaces as required, and apply galvanizing repair touch-up.

E. Protect gypsum sheathing that will be exposed to weather for more than one month as follows:

1. Protect cutouts, corners, and joints in the sheathing by filling with a flexible sealant or by applying tape recommended by sheathing manufacturer at the time sheathing is applied.

F. Provide final protection and maintain conditions in a manner acceptable to manufacturer and Installer to ensure that cold-formed metal framing is without damage or deterioration at the time of Substantial Completion.

END OF SECTION 05 40 00

SECTION 05 50 00 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following metal fabrications:

1. Loose bearing and leveling plates.
2. Loose steel lintels.
3. Shelf and relieving angles
4. Miscellaneous framing and supports for applications where framing and supports are not specified in other sections.
5. Miscellaneous steel trim and edgings.
6. Ladders
7. Field surface preparation and field touch-up.

B. Related Sections: The following Sections contain requirements that relate to this Section:
1. Division 04 Section “Unit Masonry” for control and expansion joints at shelf angles
2. Division 05 Section "Structural Steel Framing" for structural steel framing system components.
3. Division 09 Section "Painting" for touch up of metal fabrications.

1.3 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 01 Specification Sections.

B. Shop drawings detailing fabrication and erection of each metal fabrication indicated. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide templates for anchors and bolts specified for installation under other Sections.
1. Show method and details of bracing, including type and size of members and connections to be used, for all roof penetrations that are 12 inches or greater in diameter.

C. Samples representative of materials and finished products as may be requested by Architect.

D. Welder certificates signed by Contractor certifying that welders comply with requirements specified under the "Quality Assurance" Article.

E. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include a list of completed projects with project name, addresses, names of architects and owners, and other information specified.

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: Engage a firm experienced in fabricating structural steel similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to fabricate structural steel without delaying the Work. Steel fabricator shall meet the following minimum requirements:
   1. Minimum of 10 years' continuous experience on projects of similar size and complexity.
   2. Have AISC certification.
   3. Be able to perform the specified surface preparation requirements.
   4. Be able to apply inorganic zinc primers and high build epoxy primers.

B. Welding Standards: Comply with applicable provisions of AWS D1.1 "Structural Welding Code--Steel," AWS D1.2 "Structural Welding Code--Aluminum," and AWS D1.3 "Structural Welding Code--Sheet Steel."

   1. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

1.5 PROJECT CONDITIONS

A. Field Measurements: Check actual locations of walls and other construction to which metal fabrications must fit by accurate field measurements before fabrication. Show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver metal fabrications to Project site in such quantities and at such times to ensure continuity of installation.
   1. At delivery and prior to unloading, examine all steel for signs of thin or no shop primer. If shop-primed steel has numerous signs of improper packing, handling, or preparation, as evidenced by numerous breaks, chips, scratches, and heavily rusted areas in the shop primer, do not accept the steel. Where existing primer appears to be thin as evidenced by shadows or variegated appearance, or rust bloom, check thickness of primer with a magnetic thickness tester such as a Positester.
   2. If unloaded, staged, or erected shop-primed steel is found to have low shop-primer as described above, the Contractor shall be responsible for bringing the required surface preparation and priming to bring the shop primer thickness to the specified dry film thickness, even if the steel is erected.

B. Store materials to permit easy access for inspection and identification. Keep steel members off ground by using pallets, platforms, or other supports. Handle and protect steel members and packaged materials from damage, corrosion, and deterioration. Do not erect rust steel.

   1. Store fasteners in a protected place. Clean and relubricate bolts and nuts that become dry or rusty before use.

2. Stack in such a manner that surface water will properly drain. If materials are to be stored for an extended period of time, cover in such a way that rain will not fall on the material, but air will flow freely through the stack.

3. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.

4. Store steel so as to be protected from mud and dirt. Remove all traces of mud and dirt prior to erecting. Mud and dirt shall be removed carefully to prevent damage to the primer.

1.7 SEQUENCING

A. Supply anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, templates, instructions, and directions, as required, for installation.

PART 2 - PRODUCTS

2.1 FERROUS METALS

A. Metal Surfaces, General: For metal fabrications exposed to view in the completed Work, provide materials selected for their surface flatness, smoothness, and freedom from surface blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

B. Steel Plates, Shapes, and Bars: ASTM A 36.

C. Cast-in-Place Anchors in Concrete: Anchors of type indicated below, fabricated from corrosion-resistant materials capable of sustaining, without failure, the load imposed within a safety factor of 4, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.

1. Threaded or wedge type; galvanized ferrous castings, either ASTM A 47 malleable iron or ASTM A 27 cast steel. Provide bolts, washers, and shims as required, hot-dip galvanized per ASTM A 153.

D. Welding Rods and Bare Electrodes: Select according to AWS specifications for the metal alloy to be welded.

2.2 PAINT

A. Shop Primer for Ferrous Metal: Compatible with finish paint systems indicated, and capability of providing a sound foundation for field-applied topcoats despite prolonged exposure. Compatible with finish paint specified in Division 09 Section - Painting. Capable of being applied to a minimum dry film thickness of 3 mils DFT and cover surface profile created by surface preparation. Shop primer to be by the same manufacturer as the finish coat. Cross coating is not permitted.

1. Interior Steel: Sherwin Williams Kem Kromick Universal Primer B50WZ1 White or a reviewed substitute. Shop painted steel that arrives on site with a red or gray primer will be re-primed in the field with the specified primer at the Contractor's expense.
2. Exterior: Hot dipped galvanized
3. For Components Too Large To Galvanize, 1 Coat: Sherwin Williams Macropoxy High Solids B58W400 DFT white at 4 mils DFT or a reviewed substitute.

B. Galvanizing Repair Paint: C. Galvanizing Repair Paint: Galvilite Cold Galvanizing Repair Compound, Esterified Epoxy Based Zinc Rich Metal Primer by ZRC Worldwide or a reviewed substitute. Use to repair all damaged galvanizing. As a minimum, galvanizing repair shall comply with the following:
1. Specifications: Fed. Spec. DOD-P-21035A and Mil Spec. Mil-P-26915A
2. Registration: ISO 9001
3. VOC Compliant
4. Zinc in Dried Film: 95 percent, ASTM D520 Type III
5. Percent Solids: 52 percent by volume.
6. Pencil Hardness: 2H per ASTM D3363
7. UL: Recognized by UL as being equivalent to hot dipped galvanized
8. Impact Resistance: Greater than 30 inch-lbs. per ASTM D2794
9. Abrasion Resistance: 11.5 liters per dry mil when tested at 3 mils DFT per ASTM D98
10. Dry Time to Touch: 20-30 minutes at 1.5 mils DFT
11. Recoat Time: 24-48 hours

2.3 FASTENERS

A. General: Provide plated fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating. Select fasteners for the type, grade, and class required.
1. All fasteners in an exterior application or that are in contact with wood or cementitious materials shall be galvanized in accordance with ASTM A153.

B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A, with hex nuts, ASTM A 563, and, where indicated, flat washers.

C. Machine Screws: ANSI B18.6.3.

D. Lag Bolts: ANSI B18.2.1.

E. Wood Screws: Flat head, carbon steel, ANSI B18.6.1.

F. Plain Washers: Round, carbon steel, ANSI B18.22.1.

G. Lock Washers: Helical, spring type, carbon steel, ANSI B18.21.1.

H. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

1. Material: Carbon steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.

2. Material: Group 1 alloy 304 or 316 stainless-steel bolts and nuts complying with ASTM F 593 and ASTM F 594.

I. Toggle Bolts: FS FF-B-588, tumble-wing type, class and style as required.

2.4 GROUT

A. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

B. Products: Subject to compliance with requirements, provide one of the following:

1. Nonshrink, Nonmetallic Grouts:

a. B-6 Construction Grout; W. R. Bonsal Co.
b. Diamond-Crete Grout; Concrete Service Materials Co.
c. Supreme; Cormix Construction Chemicals.
d. Sure-grip High Performance Grout; Dayton Superior Corp.
e. Euco N-S Grout; Euclid Chemical Co.
f. Five Star Grout; Five Star Products.
g. Vibropruf #11; Lambert Corp.
h. Crystex; L & M Construction Chemicals, Inc.
i. Masterflow 928 and 713; Master Builders Technologies, Inc.
j. Sealtight 588 Grout; W. R. Meadows, Inc.
k. Sonogrout 14; Sonneborn Building Products--ChemRex, Inc.
l. Kemset; The Spray-Cure Company.

2.5 FABRICATION, GENERAL

A. Form metal fabrications from materials of size, thickness, and shapes indicated but not less than that needed to comply with performance requirements indicated. Work to dimensions indicated or accepted on shop drawings, using proven details of fabrication and support. Use type of materials indicated or specified for various components of each metal fabrication.

B. Galvanize all ferrous metal
1. In contact with concrete, masonry, earth
2. Used for exterior applications
3. Bearing plates for joists, beams, and lintels in masonry walls .

C. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges.

D. Allow for thermal movement resulting from the following maximum change (range) in ambient temperature in the design, fabrication, and installation of installed metal assemblies to prevent buckling, opening up of joints, and overstressing of welds and fasteners. Base design calculations on actual surface temperatures of metals due to both solar heat gain and nighttime sky heat loss.

1. Temperature Change (Range): 100 deg F.

E. Shear and punch metals cleanly and accurately. Remove burrs.

F. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

G. Remove sharp or rough areas on exposed traffic surfaces.

H. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing, and contour of welded surface matches those adjacent.

I. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.

J. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

K. 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. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

L. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

M. Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.

2.6 LOOSE BEARING AND LEVELING PLATES

A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction, made flat, free from warps or twists, and of the required thickness and bearing area. Drill plates to receive anchor bolts and for grouting as required. Galvanize after fabrication.

2.7 LOOSE STEEL LINTELS

A. Fabricate loose structural steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated.

B. Weld adjoining members together to form a single unit where indicated.

C. Size loose lintels for equal bearing of 1 inch per foot of clear span but not less than 8 inches bearing at each side of openings, unless otherwise indicated.

2.8 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports for applications indicated that are not a part of structural steel framework as required to complete the Work.

B. Fabricate units to sizes, shapes, and profiles indicated and required to receive other adjacent construction retained by framing and supports. Fabricate from structural steel shapes, plates, and steel bars of welded construction using mitered joints for field connection. Cut, drill, and tap units to receive hardware, hangers, and similar items.

1. Equip units with integrally welded anchors for casting into concrete or building into masonry. Furnish inserts if units must be installed after concrete is placed.

a. Except as otherwise indicated, space anchors 24 inches o.c. and provide minimum anchor units in the form of steel straps 1-1/4 inches wide by 1/4 inch thick by 8 inches long.

2.9 MISCELLANEOUS STEEL TRIM

A. Unless otherwise indicated, fabricate units from structural steel shapes, plates, and bars of profiles shown with continuously welded joints, and smooth exposed edges. Miter corners and use concealed field splices wherever possible.

B. Provide cutouts, fittings, and anchorages as required to coordinate assembly and installation with other work. Provide anchors, welded to trim, for embedding in concrete or masonry construction, spaced not more than 6 inches from each end, 6 inches from corners, and 24 inches o.c., unless otherwise indicated.

2.11 LADDERS

A. Steel Ladders, Vertical
1. Fabricate to dimensions and shapes detailed. Coat each rung with aluminum-oxide granules set in epoxy-resin adhesive to provide slip-resistant rungs. If not detailed then fabricate as follows:
a. General: Fabricate ladders for the locations shown, with dimensions, spacings, details, and anchorages as indicated. Comply with requirements of ANSI A14.3.
b. Siderails: Continuous, steel, 1/2-by-2-1/2-inch flat bars, with eased edges, spaced 18 inches apart.
c. Bar Rungs: 3/4-inch- diameter steel bars, spaced 12 inches o.c.
d. Fit rungs in centerline of side rails, plug weld and grind smooth on outer rail faces.
e. Support each ladder at top and bottom and at intermediate points spaced not more than 60 inches o.c. with welded or bolted steel brackets.
1) Size brackets to support design dead and live loads indicated and to hold centerline of ladder rungs clear of the wall surface by not less than 7 inches.
2) Extend side rails 42 inches above top rung, and return rails to wall or structure unless other secure handholds are provided. If the adjacent

structure does not extend above the top rung, goose-neck the extended rails back to the structure to provide secure ladder access.

f. Provide nonslip surfaces on top of each rung by coating with abrasive material metallically bonded to the rung by a proprietary process such as one of the following:
   1) Mebac, IKG Borden.
   2) SLIP-NOT, W. S. Molnar Co.

B. Ship's Ladder, Steel:
   1. Construction: Open type construction with structural steel channel or steel plate stringers.
   2. Stringers: Structural steel channels or plate:
   3. Rungs: Steel checkered plate or steel grating, as indicated rungs.
   4. Hand Rails: Steel pipe complying with Section 05522 – Steel Pipe Handrail.
   5. Landing Platform: Steel checkered plate or steel grating. Provide in thickness to meet expected loads and span supports with no deflection. Provide with guardrails to match rails on ladder.
   6. Fittings, Brackets, Etc. All steel as recommended by and provided by the ladder manufacturer/fabricator to match ladder.
   7. Fasteners: Corrosion-resistant of suitable size and design for the components to be fastened.

2.12 FINISHES, GENERAL

A. Comply with NAAMM "Metal Finishes Manual" for recommendations relative to applying and designing finishes.

B. Finish metal fabrications after assembly.

C. Hot-dip galvanize all ferrous metal in exterior locations, in exterior walls, and in contact with cementitious or masonry construction, or with treated wood.

2.13 SHOP PRIMING

A. Shop prime steel surfaces not galvanized except the following:
   1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
   2. Surfaces to be field welded.
   3. Surfaces to be high-strength bolted with slip-critical connections.
   4. Surfaces to receive sprayed-on fireproofing.
   5. Galvanized surfaces.
   6. Faying surfaces.

B. Preparation for Shop Priming: Clean surfaces to be painted. Remove loose rust, loose mill scale, and spatter, slag, or flux deposits. Prepare uncoated ferrous metal surfaces to comply with requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications:.

   1. Exteriors (SSPC Zone 1B): SSPC-SP 2 "Solvent Cleaning." followed by SSPC-SP 6 "Commercial Blast Cleaning" for metals to be galvanized, and metals scheduled for exterior use ."

2. Interiors (SSPC Zone 1A): SSPC-SP 2 "Solvent Cleaning." followed by SSPC-SP 3 "Power Tool Cleaning."

C. Shop Priming
1. Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes or to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with requirements of SSPC-PA 1 "Paint Application Specification No. 1" for shop painting. Apply shop primer to cover profile of surface preparation.

2. Immediately after surface preparation, apply primer according to manufacturer's instructions and at rate recommended by SSPC to provide a dry film thickness of not less than 3.0 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

3. Do not allow prepared and cleaned surfaces to remain unprimed over night or for longer than 8 hours before priming. Surfaces not primed within these parameters shall be recleaned prior to priming.

4. Stripe paint corners, crevices, bolts, rivets, welds, and edges. Spray all Bolts and rivets from at least 4 different angles. Cover all sides of rivets and bolts equally.

5. Apply 2 coats of shop paint to inaccessible surfaces after assembly or erection. Change color of second coat to distinguish it from first.

D. Galvanizing: For those items indicated for galvanizing, apply zinc coating by the hot-dip process complying with the following requirements. If not indicated, then galvanize all ferrous metals exposed to moisture or weather, and that are in contact with wood, masonry, or cementitious materials:
1. ASTM A 153 for galvanizing iron and steel hardware.

2. ASTM A 123 for galvanizing both fabricated and unfabricated iron and steel products made of uncoated rolled, pressed, and forged shapes, plates, bars, and strip 0.0299 inch thick or thicker.

3. Galvanize steel and fasteners in the following conditions:
   a. Where indicated
   b. All steel in contact with earth, cementitious materials, wood, and insulation. Surfaces to receive sprayed fireproofing are not to be galvanized unless recommended by the fire proofing manufacturer. Galvanize entire member even is only a potion of the member is in contact.
   c. All steel that will be exposed to weather or to frequent moist conditions.

4. Prepare all surfaces to be galvanized according to SSPC SP6 – Commercial Blast.

E. Steel that arrives on site with rusted or damaged surfaces may be inferred as improper handling, surface preparation, or shop priming and will be corrected at the fabricator’s expense or may be rejected if rusting is excessive. The General Contractor shall be responsible for all steel that is accepted with rusting or damaged surfaces.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installing anchorages, including concrete inserts, sleeves, anchor bolts, and miscellaneous items having integral anchors that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

B. Set sleeves in concrete with tops flush with finish surface elevations. Protect sleeves from water and concrete entry.

3.2 INSTALLATION, GENERAL

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction. Include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors as required.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing miscellaneous metal fabrications. Set metal fabrication accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete masonry or similar construction.

D. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop-welded because of shipping size limitations. Do not weld, cut, or abrade the surfaces of exterior units that have been hot-dip galvanized after fabrication and are intended for bolted or screwed field connections.

E. Shelf Angles:
1. Attach shelf angles to structural members. Do not attach shelf angles to steel studs.
2. Break shelf angles at all corners where building expansion joints and masonry control joints will be installed. Do not extend shelf angle through expansion and control joints.

F. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

2. Obtain fusion without undercut or overlap.

3. Remove welding flux immediately.

4. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing, and contour of welded surface matches those adjacent.

G. Roof Penetration Framing: Provide and install permanent bracing and supports around all roof penetrations that are 12 inches in diameter or greater.

H. Aluminum Ladders
1. Use aluminum vertical ladders in exterior installations and elsewhere as indicated.
2. General: Use heavy mastic or thin gasket material to separate aluminum mounting brackets from masonry. Apply mastic to aluminum surfaces in contact with the masonry, and allow mastic to dry prior to joining. Do not apply mastic to masonry.
3. Install ship's ladder where shown according to the manufacturer's instructions. Ensure that the ladder is anchored securely and to the recommended angle.

I. Spiral Stair:
1. Install according to manufacturer's instructions to dimensions, radius, rise, and curve shown on the Drawings and approved shop drawings.
2. Do nor perform field welding.
3. Erect in a solid, rigid manner, secure, properly plumbed and suspended installation.
4. Touch-up all nicks, and scratches; repair all blemishes.

J. Pipe Bollards
1. Anchor bollards to existing construction with postinstalled anchors and bolts. Provide four 3/4-inch (19-mm) anchors at each bollard, unless otherwise indicated. Embed anchors at least 4 inches (100 mm) in existing concrete.
2. Fill bollards solidly with concrete, mounding top surface to form a cone. Finish to a smooth trowel finish.

K. Wall/Corner Protection
1. Install where and as indicated with screws
2. Install to height and lengths indicated.
3. Install with neat and tight joints and seams with edges parallel to finished floor.
4. Remove all sharp surfaces, edges, and imperfections.

L. Back Priming: For all unprimed steel and steel with damaged primer or galvanizing, back prime, including all edges and concealed surfaces, of all ferrous and galvanized metal prior to installation. Apply primer to the same specifications as for the exposed surfaces. Treat all cut edges, end cuts, welds, and otherwise disturbed surfaces in the same way. Ferrous items shall be completely encapsulated with primer. Installed items not back-primed shall be removed, properly primed, and reinstalled at the Contractor's expense. Damaged materials shall be replaced. This provision applies to all ferrous and galvanized steel that is installed in exterior locations, in unconditioned spaces, and that are in contact with wood or cementitious materials. However, do not prime faying surfaces, surfaces that are to receive sprayed fire proofing, or other scheduled or noted surfaces not to be primed. Comply with surface preparation and priming specified in Section 09 91 00 – Painting.
1. Protect primed and finished steel that is in contact with masonry and cementitious surfaces from abrasion and corrosion caused by alkali action. Protection shall not interfere with rigidity of installation.

3.3 SETTING LOOSE PLATES

A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of bearing plates.

B. Set loose leveling and bearing plates on wedges or other adjustable devices. After the bearing members have been positioned and plumbed, tighten the anchor bolts. Do not remove wedges or shims, but if protruding, cut off flush with the edge of the bearing plate before packing with nonshrink, nonmetallic grout.

1. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.4 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and primer damaged during handling and erection. Apply paint to exposed areas using same material as used for shop painting. Perform all surface preparation and priming as described for shop performed surface preparation and priming in Part 2 of this specification.
   1. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and apply galvanizing repair paint according to ASTM A 780. Perform all surface preparation as described for shop performed surface preparation in Part 2 of this specification.

END OF SECTION 05 50 00

SECTION 06 10 00 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:
   1. Wood furring, grounds, nailers, and blocking.
   2. Sheathing.
   3. Building Wrap.

1.3 DEFINITIONS

A. Rough Carpentry: Carpentry work not specified in other Sections and not exposed, unless otherwise specified.

1.4 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 01 Specification Sections.

B. Material certificates for dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the American Lumber Standards Committee's (ALSC) Board of Review.

C. Wood treatment data as follows, including chemical treatment manufacturer's instructions for handling, storing, installing, and finishing treated materials:

   1. For each type of preservative-treated wood product, include certification by treating plant stating type of preservative solution and pressure process used, net amount of preservative retained, and compliance with applicable standards and rules, regulations, standards, and restrictions of applicable governing authorities.

   2. For waterborne-treated products, include statement that moisture content of treated materials was reduced to levels indicated before shipment to Project site.

D. Material test reports from a qualified independent testing agency indicating and interpreting test results relative to compliance of fire-retardant-treated wood products with requirements indicated.

E. Certification that furnished, untreated plywood meets requirements for a Class C (Flame Spread of 200 or less) Classification in accordance with ASTM E84.

F. Warranty of chemical treatment manufacturer for each type of treatment.

G. Substitute Requests For A Specified Entity

1. Provisions, requirements, and stipulations stated under this paragraph of this specification apply not only to this specification, but they also apply to all other specifications that are included in the project manual, on the drawings or are otherwise a part of the Contract Documents even if not so stated in these documents. Information requested under this paragraph heading is the minimum required information for consideration and evaluation and additional information may be requested. This information is required in addition to information required by any substitute request forms that may be included in the Project Manual or Contract Documents, or otherwise provided.

2. Where the Contract Documents list at least three entities (products, materials, components, systems, manufacturers, installers, methods, etc.), the Architect reserves the option to reject any and all requests for a substitute. Where the Contract Documents list only one entity without “Or equal” or similar language, substitutes will not be considered. Where the Contract Documents list less than 3 entities, substitutes may be reviewed and evaluated on an individual base.

3. Include the following information on the cover page of the request:
   a. Name of Project and project number as shown in the header of the specification
   b. Date request is being made.
   c. Name of person, company, and contact information of person requesting substitute.
   d. Specification title and number and drawing number where the specified product is listed or shown.
   e. Exact name of the specified entity and substitute entity. .

4. When requesting a substitute, include all requested and required supporting data, specifications, and performance criteria. The Architect must receive this substitute request no later than the time stated elsewhere for submitting product substitutions. If no time is stated, then 10 days prior to date of bid opening. When a Request For Substitute Form is included in the Project Manual, properly complete the form and include it with the submittal.

5. Verbal requests for a substitute or requests that do not comply with these provisions are not acceptable, will be rejected, and will not extend the submittal deadline. Submittals that are incomplete have vague or unspecific answers (“Better”. “Cheaper”. “More competitive”, etc.); that lack supporting data to substantiate equal or superior quality/design; that do not include the requested proof, verification, reports, and substantiating documentation; or are received after submittal deadline will be rejected. Provide convincing answers as to why the substitute should be approved. Rejection or disapproval will not extend the submittal deadline.
   a. If the substitute entity differs from specified entity, compare the substitute entity with the specified entity in a tabular format that clearly shows all the differences.

6. Include the following information on all requests for substitutes:
   a. Length of time the manufacturer has been in business.
   b. Whether the manufacturer operated under any other name, and if so, under what name and when?
   c. Length of time the substitute entity has been on the market.
   d. Whether the substitute entity has been marketed under any other name, and if so, under what name and when?

e. Who will install and service the substitute entity?
f. Whether the installer is trained and certified by the manufacturer? If so, describe how this training and certification are achieved and if training records are maintained?
g. All required changes in the project design that will be required to incorporate the substitute entity.
h. Describe any known problems or failures associated with the substitute entity? If there are any, provide details.

7. The manufacturer's published literature, description, capabilities, operating and performance parameters, options, accessories, etc. of all submitted substitutes shall meet or exceed those published by the manufacturer of the specified entity even if they are not specifically mentioned in the Contract Documents. Additionally, manufacturers whose standards are less than those of the specified entity but are capable of producing an entity hat meets the specified entity shall not, for the convenience of their normal production methods, vary from the specified entity standards.

8. Where test data and standards are being submitted as supporting data and for comparison with the specified item, comply with the following requirements. Submittals not complying with these provisions will be considered incomplete, unacceptable, and will be rejected:
   a. All substitutes shall meet all of the minimum performance criteria of the specified entity.
   b. Submit certified data provided by an independent testing laboratory.
   c. Prepare supporting data in side-by-side tabular form showing the submitted criteria next to each specified performance criteria and denoting the differences between the specified item the substitute item.
   d. Show submitted data using same tests and standards and with the values and results in the same units of measure as those shown for the specified item.
   e. Where a performance criterion is not listed in the specifications, comply with the specified product manufacturer's published data for performance criteria.
   f. Where the specified entity requires certifications, registrations, approvals, policies, practices, etc., submit proof that the substitute entity is in compliance.

9. Each and all requests for substitutes shall be signed by the person making the submittal. By signing the submittal, the person requesting the substitute certifies and agrees to the following requirements. Requests without the signature of a responsible person will be rejected.
   a. That the specifications have been read and are understood,
   b. That the entity being submitted meets or exceeds all provisions of the specifications,
   c. That all submitted information is true and accurate,
   d. Will remove the substitute entity and replace it with an acceptable product, at his expense, if it is determined that the substitute does not meet the specifications as certified.
   e. Agrees to pay for all necessary design changes and increased construction costs to incorporate the substitute entity.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Keep materials under cover and dry. Protect from weather and contact with damp or wet surfaces. Stack lumber, plywood, and other panels. Provide for air circulation within and around stacks and under temporary coverings.
   1. Protect all lumber from rain, fog, snow, dew, and all other forms of moisture that may alter moisture content above specified requirements. The moisture content of lumber and plywood may be checked in the field with a reliable moisture meter.
   2. For lumber and plywood pressure treated with waterborne chemicals, place spacers between each bundle to provide air circulation.
   3. Lumber to be used in roofing construction shall be stored to permit free circulation between each piece. Take all precautions to prevent warping, twisting, racking, and other distortions and to keep wood within the specified moisture content.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   1. Plywood
      a. Boise Cascade Corporation
      b. Georgia-Pacific
      c. Louisiana-Pacific Corporation
      d. Weyerhaeuser Company

   2. Wood-Preservative-Treated Materials:
      a. Baxter: J. H. Baxter Co.
      b. Hoover Treated Wood Products, Inc.
      c. Osmose Wood Preserving, Inc.
      d. Willamette Industries, Inc.
      e. Cox Industries

2.2 LUMBER, GENERAL

A. Lumber Standards: Comply with DOC PS 20, "American Softwood Lumber Standard," and with applicable grading rules of inspection agencies certified by ALSC's Board of Review.
   1. Texture: Smooth, flat, tight grain surface that will not telegraph grain through painted finish. Solid lumber stock, finger joints not acceptable. All wood and lumber shall be straight, flat, and true without bows, warps, splinters, cracks, nicks, or gouges.

B. Inspection Agencies: Inspection agencies, and the abbreviations used to reference them, include the following:

   1. NELMA - Northeastern Lumber Manufacturers Association.
   2. SPIB - Southern Pine Inspection Bureau.
   3. WCLIB - West Coast Lumber Inspection Bureau.
   4. WWPA - Western Wood Products Association.

C. Grade Stamps: Provide lumber with each piece factory marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.

1. For exposed lumber, furnish pieces with grade stamps applied to ends or back of each piece, or omit grade stamps and provide grade-compliance certificates issued by inspection agency.

D. 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.

1. Provide dressed lumber, S4S, unless otherwise indicated.

2. Kiln dry-dry lumber to 19 percent maximum moisture content prior to dressing for 2-inch nominal thickness or less, unless otherwise indicated.

3. All lumber shall be sound, properly seasoned, and dry and be free of twists, warps, bends, racking, knots, sap, and bark. Edges and sides shall be uniform in dimension and shape with no signs of bark removal.

2.3 WOOD-PRESERVATIVE-TREATED MATERIALS

A. General:
1. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.
2. Where lumber or plywood is indicated as preservative treated or is specified to be treated, comply with applicable requirements of AWPA C2 (lumber) and AWPA C9 (plywood). Comply with EPA and VOC requirements for treated materials. Use only materials that are approved for use by the applicable governing authorities for the intended application. Preservative materials shall provide performance equal to CCA when used in comparable conditions, locations, and applications. Where CCA is not acceptable to governing authorities, use alternative preservative materials such as ASQ that will provide performance equal to CCA, and that are acceptable to governing authorities.
3. Mark each treated item with the Quality Mark Requirements of an inspection agency approved by ALSC's Board of Review.
4. Obtain lumber only from true lumber yards that specialize in lumber and wood building materials and that are capable of kiln-drying lumber that meets these drying requirements or can provide such lumber.
5. All lumber with moisture content exceeding 19 percent will be rejected. If this lumber is installed, it shall be removed and replaced with dry lumber at the Contractor’s expense. This provision will be strictly enforced.

B. Treat indicated items and the following:
1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking, furring, stripping, framing, supporting members, and similar concealed members in contact with masonry or concrete.
3. Wood supporting members used in the construction of suspended decks or porch decks, moist or humid air, or enclosed construction that is exterior to the building envelope.
4. Wood framing members less than 18 inches above grade.
5. Wood floor plates that are installed over concrete slabs directly in contact with earth.

C. Drying Requirements
   1. Prior to sizing and pressure treating lumber, dry to 19 percent.
   2. After treatment, kiln-dry lumber and plywood to a maximum moisture content
      a. Lumber: 19 percent
      b. Plywood: 15 percent.

D. Retention Rates. Minimum:
   2. for lumber treated with ACQ: 0.40 pcf.
   3. for lumber treated with CA-B: 0.21 pcf.
   4. for lumber treated with CA-A: 0.41 pcf

E. Complete fabrication of treated items before treatment, where possible. If cut, drilled, or scratched, or otherwise abraded after treatment, apply field treatment complying with AWPA M4 to cut surfaces. Inspect each piece of lumber or plywood after drying and discard damaged or defective pieces.

F. Separation Sheet: Peel and stick high temperature resistance-type with a minimum softening temperature of 260 deg. F. PolyStick MU by Polyglass, Strongseal Plus HT CETCO, or equal by WR Grace for separating treated wood from metal.

2.4 DIMENSION LUMBER

A. General: Provide dimension lumber of grades indicated according to the ALSC National Grading Rule (NGR) provisions of the inspection agency indicated.

2.5 MISCELLANEOUS LUMBER

A. General: Provide lumber for support or attachment of other construction, including cant strips, bucks, nailers, blocking, furring, grounds, stripping, and similar members.

B. Fabricate miscellaneous lumber from dimension lumber of sizes indicated and into shapes shown.

C. Moisture Content: 19 percent maximum for lumber items not specified to receive wood preservative treatment.

D. Grade: For dimension lumber sizes, provide No. 3 or Standard grade lumber per ALSC's NGRs of any species. For board-size lumber, provide No. 3 Common grade per NELMA or WWPA; No. 2 grade per SPIB; or Standard grade per WCLIB or WWPA of any species.

2.6 PLYWOOD, GENERAL

A. Structural composite lumber made from wood veneers with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D5456 and manufactured with an exterior-type adhesive complying with ASTM D2559 and containing no urea formaldehyde.

B. Provide plywood panels complying with DOC PS 1, "U.S. Product Standard for Construction and Industrial Plywood," where plywood is indicated. Factory mark structural-use panels with APA trademark evidencing compliance with grade requirements. Certification: Provide certification

that plywood, untreated with fire-retardent, meets Standard Building Code Congress requirements for a flame spread of 200 or less (Class C) when tested in accordance with ASTM E84.

1. Provide the following minimum standard:
   a. Extreme Fiber Stress in Bending, Edgewise: **3100 psi** for 12-inch nominal-depth members.
   b. Modulus of Elasticity, Edgewise: **2,000,000** .

2.7 CONCEALED, PERFORMANCE-RATED STRUCTURAL-USE PANELS

A. General: Where structural-use panels are indicated for the following concealed types of applications, provide APA-performance-rated panels complying with requirements designated under each application for grade, span rating, exposure durability classification, and edge detail (where applicable).

1. Thickness: Provide panels meeting requirements specified but not less than thickness indicated.

2.8 STRUCTURAL-USE PANELS FOR BACKING

A. Plywood Backing Panels: For mounting electrical or telephone equipment, provide fire-retardant-treated plywood panels with grade, C-D Plugged Exposure 1, in thickness indicated or, if not indicated, not less than 15/32 inch thick.

2.9 FASTENERS

A. General: Provide fasteners of size and type indicated and that comply with requirements specified in this Article for material and manufacture.

1. Where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with a hot-dip zinc coating per ASTM A 153 or of Type 304 stainless steel.
2. Treated Wood: All fasteners and connectors in contact with treated wood shall be Type 304 stainless steel or hot dipped galvanized per ASTM A153, G185. No exceptions. Mechanically galvanized is not acceptable.
3. For roof blocking and nailers, comply with fastener size as required to meet specified wind uplift forces.
   a. NES NER-272 for power-driven fasteners.
   b. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
4. Fasteners in contact with wood treated with fire retardant material shall be of a corrosion proof material recommended by the fire retardant treatment manufacturer for the type treatment used. Submit manufacturer’s recommendation with the shop drawings. Recommendations shall include test evaluations and reports showing the provided fire retardant treatment does not promote, contribute to, or accelerate corrosion of fasteners.

B. Nails, Wire, Brads, and Staples: FS FF-N-105. Nails shall be of the thickness required to penetrate 2/3 of the substrate.

C. Power-Driven Fasteners: CABO NER-272.

D. Wood Screws: ASME B18.6.1.

E. Lag Bolts: ASME B18.2.1.

F. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.

G. Fasteners For Plywood Roof Sheathing: Galvanized screws with appropriate plate of size as recommended by APA to meet specified wind uplift. Where installed over a gymnasiums, auditorium, etc., the point of fasteners shall not extend so as to impale basketballs, volleyballs, soccer balls, etc.

2.10 SHEATHING

A. Fiberglass Faced (Paperless) Sheathing: 5/8-inch-thick aggregated portland cement product faced on both surfaces with an embedded polymer-coated glass-fiber mesh and recommended by the manufacturer for exterior applications. One surface of board shall have a rough texture for adhesive bonding. Board shall have an ASTM C 947 flexural strength of 1000 lb/sq. in. and shall show no deterioration when subjected to 1000 freeze-thaw cycles per ASTM C 666, Procedure B. DensGlas Gold or reviewed substitute.
   1. Joint Tape: Water resistant, non-asphaltic and reinforced-type and width acceptable to the sheathing manufacture and that meet the EIFS manufacturer's requirements for the specified warranty. Tape must be compatible with the fiberglass reinforced sheathing and provide permanent bond to the sheathing. (Alternatively, Dow 790 silicone sealant or other as recommended by the paperless sheathing manufacturer).
   2. Fasteners for Fiberglass Reinforced Sheathing: 1-5/8 inches, No. 8 wafer-head steel drill screws complying with ASTM C 954, with an organic-polymer coating or other corrosion-protective coating having a salt-spray resistance of more than 500 hours per ASTM B 117.
   3. Void and Penetration Sealant: As recommended by the sheathing manufacturer to seal voids created by penetrations through the sheathing. If none recommended, then Dow Great Stuff Pro Big Gap Filler.

2.11 MOISTURE CONTROL

A. Plastic Cover: Black, 8 mil thick polyethylene conforming to ASTM D2103 and having a perm rating of 0.030.

B. Tape: As recommended by the manufacturer.

2.12 BUILDING WRAP

A. Manufacturers: Specified materials are by DuPont (E. I. du Pont de Nemours and Company). Equal products by one of the following may be submitted for review:
   1. Celotex Corporation (The); Building Products Division.
   2. PACTIV GreenGuard
   3. Tenneco Building Products.

B Products
   1. Tyvek Commercial Wrap

C. Building Wrap Tape: Pressure-sensitive plastic tape recommended by building wrap manufacturer for sealing joints and penetrations in building wrap.

D. Fastening: Method, system, and materials as recommended by the manufacturer to provide complete, continuous, and secure, fastening/adhesion at perimeter and joints to prevent flapping, flutter, separation, and other movement during and after installation.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Discard units of material with defects that impair quality of rough carpentry and that are too small to use with minimum number of joints or optimum joint arrangement.

B. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted.

C. Fit rough carpentry to other construction; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds, and similar supports to allow attachment of other construction.

D. Apply field treatment complying with AWPA M4 to cut or abraded surfaces of preservative-treated lumber and plywood.

E. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. CABO NER-272 for power-driven staples, P-nails, and allied fasteners.

2. "Table 1705.1--Fastening Schedule," of the Current IBC.

F. Use common wire nails, unless otherwise indicated. Use finishing nails for finish work. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood; predrill as required.

G. Use hot-dip galvanized nails where rough carpentry is exposed to weather, in ground contact, fastens treated wood, or in area of high relative humidity.

H. Countersink nail heads on exposed carpentry work and fill holes with wood filler.

I. Back Priming: For all wood materials scheduled to be painted, including treated wood, back prime, including all edges and concealed surfaces, prior to installation. Apply primer to the same specifications as for the exposed surfaces. Treat all cut edges, end cuts, and disturbed surfaces the same way. Wood items shall be completely encapsulated with primer. Installed items not back-primed shall be removed, properly primed, and reinstalled at the Contractor’s expense. Damaged materials shall be replaced. This provision applies to both interior and exterior installations.

J. Treated Wood: Where metal, including aluminum and stainless steel, both coated and uncoated will contact treated wood, separate the metal from the treated wood with the specified separation

sheet. Place the adhesive side of the separation sheet in contact with the metal. Metal items to be separated include but are not limited to plates, shims, washers, fasteners, etc.

3.2 WOOD GROUNDS, NAILERS, BLOCKING, AND SLEEPERS

A. Install wood grounds, nailers, blocking, and sleepers where shown and where required for screeding or attaching other work. Form to shapes shown and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated. Build into masonry during installation of masonry work. Where possible, anchor to formwork before concrete placement.
   1. Provide proper blocking, supports, and reinforcement behind all points to receive applied or suspended loads such as handrails, toilet accessories, coat hooks, door stops, handrails, cabinets, casework, TV brackets, projection screens, etc. Reinforcement shall be rigid enough to allow drawers loaded to rated capacity to be fully extended without causing casework to sag, droop, bind, or other distortions and to not pull away from the mounts or fasteners and without causing fasteners to loosen or pull from mounts or walls.

C. Install permanent grounds of dressed, preservative-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 SHEATHING

A. Fiberglass Reinforced (Paperless)
   1. Install sheathing to the metal framing to comply with manufacturer's recommendations. Install with galvanized steel drill screws. Space fasteners no more than 8 inches o.c. along framing with perimeter fasteners at least 3/8 inch but less than 5/8 inch from edges of boards. Use care not to damage the moisture barrier. Repair all cuts, tears, and penetrations to the moisture barrier.
      a. Stucco: Where stucco is to be applied over sheathing, provide a 1/8 joint between unit of sheathing.

   2. Provide for 3/4 inch edge bearing over supports. Trim units as necessary to achieve proper edge bearing. Fasten to comply with manufacturer's recommended spacing and referenced fastening schedule. Fit units tightly against each other and around openings.

   3. Tape all joints in accordance with the manufacturer’s instructions. Install tape smoothly and evenly centered over joints without wrinkles, creases, edge or end curl.
      a. Sealant: When sealant is approved by the sheathing manufacturer, apply a continuous bead of sealant in the horizontal and vertical joints. Force sealant into joints and smooth surface of sealant flush with sheathing.

   4. Seal all voids in sheathing caused by various penetrations such as structural elements, anchors and ties, etc. with void and penetration sealant. Ensure sealant completely fills voids and gaps to create an air and water tight seal. Remove excess from the surface to leave smooth, even, level, and flush seal.

3.4 MOISTURE PROTECTION

A. General
1. It is understood that moisture content of wood can fluctuate because of variations in ambient/atmospheric conditions. However, normally, this will not adversely affect properly dried and stored wood. Treated wood with a moisture content above the specified level shall not be received, staged, or installed.
2. Nailers and blocking that have a moisture content above the specified level at the time roof installation begins shall be removed and replaced with acceptable nailers and blocking.
3. After wood nailers and blocking have been installed, take all precautions deemed necessary to keep the wood within the specified moisture content. These precautions can included, but are not limited to, covering and leaving wood exposed to sun or to dry air or dry breezes.
4. Exterior wood exposed to weather shall be covered when rain is imminent. Uncover exposed wood as soon as weather has cleared to allow any moisture trapped under the cover to escape. Wet wood is subject to removal and replacement with dry wood.

END OF SECTION 06 10 00

SECTION 07 92 00 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes interior and exterior joint sealants, including sealants in exterior concrete slabs on grade.

1.3 SYSTEM PERFORMANCE REQUIREMENTS

A. Provide elastomeric joint sealants that have been produced and installed to establish and to maintain watertight continuous seals without causing staining or deterioration of joint substrates.

1. Failure of installed sealants includes, but is not limited to, the following:

a. Adhesive failure.
b. Cohesive failure.
c. Puncture failure.
d. Surface chalking.
e. Surface color change.
f. Staining of adjacent surfaces.
g. Surface crazing greater than 3 mils deep.

1.4 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data from manufacturers for each joint sealant product required.

C. Samples for verification purposes of each type and color of joint sealant required. Install joint sealant samples in 1/2-inch wide joints formed between two 6-inch long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

D. Certificates from manufacturers of joint sealants attesting that their products comply with specification requirements and are suitable for the use indicated.

E. Product test reports for each type of joint sealants indicated, evidencing compliance with requirements specified.

F. Manufacturer’s Guarantee: Furnish sealant manufacturer’s guarantee against non-performance of sealant as listed under Warranties.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has completed joint sealant applications similar in material, design, and extent to that indicated for Project that have resulted in construction with a record of successful in-service performance.

1. For exterior applications and joints subject to movement, the installer shall be an experienced waterproofing contractor that specializes in installing the type sealants specified.

B. Single Source Responsibility for Joint Sealant Materials: Obtain joint sealant materials from a single manufacturer for each different product required.

1. Testing will not be required when joint sealant manufacturer is able to submit joint preparation data required above that are acceptable to Architect and are based on previous testing of current sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.

C. Product Testing: Provide comprehensive test data for each type of joint sealant based on tests conducted by a qualified independent testing laboratory on current product formulations within a 24-month period preceding date of Contractor's submittal of test results to Architect.

1. Test elastomeric sealants for compliance with requirements specified by reference to ASTM C 920. Include test results for hardness, stain resistance, adhesion and cohesion under cyclic movement (per ASTM C 719), low-temperature flexibility, modulus of elasticity at 100 percent strain, effects of heat aging, and effects of accelerated weathering.

2. Arrange for all adhesion and other testing required by the sealant manufacturer for compliance with specified warranty requirements.

3. A technical representative of the sealant manufacturer shall be present at the beginning of sealant operations. This technical representative shall demonstrate proper surface preparation and application procedures for each type sealant to be used, for each type substrate and each type conditions. Record the date of this visit, who attended the demonstration, and submit a copy of the record to the Architect.

D. Substitute Requests For A Specified Entity
1. Provisions, requirements, and stipulations stated under this paragraph of this specification apply not only to this specification, but they also apply to all other specifications that are included in the project manual, on the drawings or are otherwise a part of the Contract Documents even if not so stated in these documents. Information requested under this paragraph heading is the minimum required information for consideration and evaluation and additional information may be requested. This information is required in addition to information required by any substitute request forms that may be included in the Project Manual or Contract Documents, or otherwise provided.

2. Include the following information on the cover page of the request:
   a. Name of Project and project number as shown in the header of the specification
   b. Date request is being made.
   c. Name of person, company, and contact information of person requesting substitute.

d. Specification title and number and drawing number where the specified product is listed or shown.
e. Exact name of the specified entity and substitute entity. .

3. When requesting a substitute, include all requested and required supporting data, specifications, and performance criteria. The Architect must receive this substitute request no later than the time stated elsewhere for submitting product substitutions. If no time is stated, then 10 days prior to date of bid opening. When a Request For Substitute Form is included in the Project Manual, properly complete the form and include it with the submittal.

4. Verbal requests for a substitute or requests that do not comply with these provisions are not acceptable, will be rejected, and will not extend the submittal deadline. Submittals that are incomplete have vague or unspecific answers (“Better”. “Cheaper”. “More competitive”, etc.); that lack supporting data to substantiate equal or superior quality/design; that do not include the requested proof, verification, reports, and substantiating documentation; or are received after submittal deadline will be rejected. Provide convincing answers as to why the substitute should be approved. Rejection or disapproval will not extend the submittal deadline.
   a. If the substitute entity differs from specified entity, compare the substitute entity with the specified entity in a tabular format that clearly shows all the differences.

5. Include the following information on all requests for substitutes:
   a. Length of time the manufacturer has been in business.
   b. Whether the manufacturer operated under any other name, and if so, under what name and when?
   c. Length of time the substitute entity has been on the market.
   d. Whether the substitute entity has been marketed under any other name, and if so, under what name and when?
   e. Who will install and service the substitute entity?
   f. Whether the installer is trained and certified by the manufacturer? If so, describe how this training and certification are achieved and if training records are maintained?
   g. All required changes in the project design that will be required to incorporate the substitute entity.
   h. Describe any known problems or failures associated with the substitute entity? If there are any, provide details.

6. The manufacturer’s published literature, description, capabilities, operating and performance parameters, options, accessories, etc. of all submitted substitutes shall meet or exceed those published by the manufacturer of the specified entity even if they are not specifically mentioned in the Contract Documents. Additionally, manufacturers whose standards are less than those of the specified entity but are capable of producing an entity hat meets the specified entity shall not, for the convenience of their normal production methods, vary from the specified entity standards.

7. Where test data and standards are being submitted as supporting data and for comparison with the specified item, comply with the following requirements. Submittals not complying with these provisions will be considered incomplete, unacceptable, and will be rejected:
   a. All substitutes shall meet all of the minimum performance criteria of the specified entity.
   b. Submit certified data provided by an independent testing laboratory.

c. Prepare supporting data in side-by-side tabular form showing the submitted criteria next to each specified performance criteria and denoting the differences between the specified item the substitute item.
d. Show submitted data using same tests and standards and with the values and results in the same units of measure as those shown for the specified item.
e. Where a performance criterion is not listed in the specifications, comply with the specified product manufacturer's published data for performance criteria.
f. Where the specified entity requires certifications, registrations, approvals, policies, practices, etc., submit proof that the substitute entity is in compliance.

8. Each and all requests for substitutes shall be signed by the person making the submittal. By signing the submittal, the person requesting the substitute certifies and agrees to the following requirements. Requests without the signature of a responsible person will be rejected.
   a. That the specifications have been read and are understood,
   b. That the entity being submitted meets or exceeds all provisions of the specifications,
   c. That all submitted information is true and accurate,
   d. Will remove the substitute entity and replace it with an acceptable product, at his expense, if it is determined that the substitute does not meet the specifications as certified.
   e. Agrees to pay for all necessary design changes and increased construction costs to incorporate the substitute entity.

1.6 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 or when joint substrates are wet.

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, or where joint-width ratio is not as recommended by the sealant manufacturer.

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.

1.7 WARRANTY

A. Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
   1. Warranty Period: Two years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer's standard form in which elastomeric sealant manufacturer agrees to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period from date of Substantial Completion as follows:

1. All Silicone Sealants: 20 years.

C. Failure of any one of combination of criteria listed in Performance Requirements during the warranty period will be considered non-performance. Special warranties specified in this Article exclude deterioration or failure of elastomeric joint sealants from the following:

1 Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.
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.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backer, 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.

B. Colors: Provide color of exposed joint sealants to comply with selections made by Architect from manufacturer’s full range of standard colors for products of type indicated.

C. VOC Content of Interior Sealants: Provide all sealants and sealant primers for use inside the weatherproofing system that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Architectural Sealants: 250 g/L.

2.2 ELASTOMERIC JOINT SEALANTS

A. The following sealants are referenced in the Sealant Schedule at the end of this Section:

1. Polyurethane:

a. Sealant P1: Two-part, non-sag, ASTM C920 and ASTM D1850, Type II. Provide one of the following or reviewed substitute:

1. Tremco Vulkem 227
2. Pecora Dynatrol II
3. Sonneborn Sonolastic NP-II
4. Dow Corning Contractor’s Weatherproofing Sealant, CWS (±25)
5. Dow Corning Contractor’s Concrete Sealant, CCS (±50)

b. Sealant P2: Two-part, self-leveling, ASTM C920 and ASTM D1850, Type II. Provide the following or reviewed substitute:

1. Pecora Dynatrol II-SG
2. Tremco Vulkem 245
3. Tremco THC 900

4. Dow Corning Parking Structure Sealant (SL)

c. Sealant P3: Non-Sag

1. Pecora Dyna Tred (non-sag)
2. Dow Corning Parking Structure Sealant (NS)

2. Silicone:

a. Sealant S1: White, mildew resistant. Provide one of the following or reviewed substitute:

1. Dow Corning 994
2. Dow Corning 786 Mildew resistant
3. General Electric 1700
4. Pecora 898
5. Tremco Tremsil 600

b Sealant S2: General Building, ASTM C920. Provide one of the following or reviewed substitute:

1. Dow Corning 795
2. Dow Corning 756 SMS
3. General Electric Silpruf
4. Pecora 864
5. Tremco Spectrem 2 or Spectrem 3

c. Sealant S3: Perimeter sealing, ASTM C920: Provide one of the following or a reviewed substitute:
1. Dow Corning 790
2. Dow Corning 756 SMS
3. Pecora 890
4 Tremco Spectrem 1

3. Acrylic Latex:

a. Sealant L1: ASTM C834: Provide one of the following or reviewed substitute:

1. Tremco 834
2. Pecora AC-20 + Silicone
3. Sonneborn Sonolac

4. Acoustical Sealant:

a. Sealant A1: Provide the following or reviewed substitute:
1. Pecora BA-98 or AC-20-FTR
2. Tremco Acoustical Sealant

5. Hybrid Sealant
a, H1: ASTM C920, Type M, Grade NS, Class 25, two-part sealant
1. Pecora Pro-Sil SCT 1

2.3 JOINT SEALANT BACKING

A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers and other joint fillers; and are approved for applications approved by sealant manufacturer based on field experience and laboratory testing.

B. Plastic Foam Joint Fillers: Preformed, compressible, resilient, nonstaining, nonwaxing, nonextruding strips of flexible plastic foam of material indicated below and of size, shape, and density to control sealant depth and otherwise contribute to producing optimum sealant performance. Size joint filer to a diameter recommended by the sealant manufacturer for the specific width of the joint being filled. However, minimum diameter shall be 50% greater than joint width.

1. Closed-cell polyethylene foam, nonabsorbent to liquid water and gas, nonoutgassing in unruptured state.
2. Proprietary, reticulated, closed-cell polymeric foam, nonoutgassing, with a density of 2.5 pcf and tensile strength of 35 psi per ASTM D 1623, and with water absorption less than 0.02 g/cc per ASTM C 1083.

C. 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.

2.4 MISCELLANEOUS MATERIALS

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

B. Cleaners for Nonporous Surfaces: Chemical cleaners 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.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants 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.

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 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), sealing compound, sealers, old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.

2. Clean concrete, masonry, 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.

B. Substrate Testing: Test masonry substrate for adhesion and staining.

C. Joint Priming: Prime joint substrates 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.

D. 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.

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 C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Installation of Sealant Backings: Install sealant backings to comply with the following requirements:

1. Install joint fillers of type recommended by sealant manufacturer 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 width/depth ratio that allows optimum sealant movement capability.

    a. Do not leave gaps between ends of joint fillers or overlap ends
    b. Do not twist multiple small sizes to make a larger size.
    c. Do not stretch, twist, puncture, or tear joint fillers.
    d. Remove absorbent joint fillers that have become wet prior to sealant application and replace with dry material.

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. Install appropriate and correct sealant in all junctures such as joints, seams, terminations, intersections, formed by entities such as a material, product, component, system, or equipment when the manufacture of the entity does not provide closures for a juncture items. Sealant shall be installed at both like and unlike entities.

F. Install sealant free of air pockets, foreign embedded matter, ridges and sags.

G. For exterior joints, install sealants when the ambient temperatures are approximately midpoint of the normal yearly temperature extremes.

I. Tooling
1. Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform surface.
2. Tool sealant surface to configuration recommended by the sealant manufacture for the intended application.
3. Ensure that all air pockets are eliminated.
4. Ensure that sealant has full contact and adhesion with sides of joint.
5. Remove excess sealants from surfaces adjacent to joint.
6. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

3.4 CLEANING

A. 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.

3.5 PROTECTION

A. 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 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 installations with repaired areas are indistinguishable from original work.

3.6 FIELD TESTING

A. A technical representative of the sealant manufacturer shall make periodic site visits during sealant application and at the completion if installation to inspect installed sealants and to perform adhesion tests on installed adhesives. Perform inspection and adhesion tests on random samples each type sealant installed, each type substrate, and each type condition and prepare a log of the inspections and tests performed. As a minimum, the log shall include the following information, with copies submitted to the Contractor and the Architect:
a. Date of inspection and testing.
b. Project name and location.
c. Room or Area where inspection and testing were made.
d. Name of technical representative.
c. Substrate (Includes but is not limited to, aluminum curtain wall, windows, masonry, tile, concrete, toilet fixtures, etc.).
d. Type sealant.

e. Sealant and joint condition.
f. Adhesion Test Results along with normal readings. +

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d. Type sealant.
e. Sealant and joint condition.
f. Adhesion Test Results along with normal readings. +

3.7 RECALKING EXISTING JOINTS

A. Where joints identified by the Owner and Architect are to be re-calked, perform the following:
1. Remove all existing sealant, calking, and backing material.
2. Remove all debris, dirt, grime, grease, soil, loose material, etc down to clean natural substrate
3. Install applicable sealant according to the sealant schedule.
4. Comply with all applicable provisions of these specifications and the respective manufacturer's instructions.

SEALANT SCHEDULE

Scheduled sealants are specified under materials. Sealant applications are not limited to the following scheduled.

EXTERIOR APPLICATIONS

APPLICATION	SEALANT
General Use	S2
Perimeter of Openings	S2 or S3
Coping Joints	S2
Sheet metal flashing	S2
Vertical joints subject to movement	S2 or S3
Horizontal joints	P3
Non-moving joints that will require painting	H1

INTERIOR APPLICATIONS

APPLICATION	SEALANT

Perimeter of Wall Openings	P1 or S1
All terminations of wall intersections	P1 or S1
Exposed Central Joints on Drywall	P1 or S2
Perimeter of Bathroom Fixtures	S1
General Use, Joints not Subject to Movement	L1
Control and Expansion Joints in Masonry	P1 or S2
Joints at Tops of Masonry Walls	P1 or S2
Acoustical Walls and Ceilings	A1
Horizontal Joints, tile joints in floor at door sills	P2 or P3
Joints subject to abuse, one-part sealant	Dyna-Flex-SC
Non-moving joints that will require painting	H1

END OF SECTION 07 92 00

SECTION 09 21 16 - GYPSUM BOARD ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:
   1. Nonload-bearing steel framing members for gypsum board assemblies.
   2. Shaft wall assemblies
   3. Correcting all defects including those highlighted by the primer installed by the painting contractor.
   4. Ceiling grids

B. Related Sections: The following Sections contain requirements that relate to this Section:
   1. Division 7 Section “Building Insulation” for thermal insulation.

C. Contractor’s Investigation: Prior to Contract Execution, the Contractor shall have thoroughly investigated the entities such as employees, consultants, subcontractors, manufacturers, suppliers, etc. and other entities that will performing work or supplying materials, products, equipment, or systems for this project to ensure that they meet all of the qualifications and requirements mentioned or implied in the Contract Documents. If it is later determined that any of the previously mentioned entities do not meet the qualifications and requirements specified in the Contract Documents, the Contractor will be required to replace that entity with a qualified entity at no increase in Contract sum or Contract Time.

1.3 DEFINITIONS

A. Gypsum Board Construction Terminology: Refer to ASTM C 11 and GA-505 for definitions of terms for gypsum board assemblies not defined in this Section or in other referenced standards.

1.4 ASSEMBLY PERFORMANCE REQUIREMENTS

A. Fire Resistance: Provide gypsum board assemblies with fire-resistance ratings indicated.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

1.5 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product Data for each type of product specified.

C. Shop Drawings showing locations, fabrication, and installation of control and expansion joints including plans, elevations, sections, details of components, and attachments to other units of Work.

D. Shaft Wall Submittals
   1. Product data from manufacturers for each type of gypsum board shaft-wall assembly specified.
   2. Assembly test reports from a qualified independent testing agency certifying and substantiating compliance of gypsum board shaft-wall assemblies with structural and sound-attenuation performance requirements based on tests performed on manufacturers' standard assemblies representing those indicated.
   3. Fire-test-response reports from testing and inspecting agency substantiating compliance of gypsum board shaft-wall assemblies with fire-resistivity performance requirements.
   4. Fire-Test-Response Characteristics: Provide gypsum board shaft-wall assemblies that comply with the following requirements:
      a. Fire-resistivity tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency includes UL, Warnock Hersey, or another agency performing testing and follow-up services that is acceptable to authorities having jurisdiction.
      b. Gypsum board wall assemblies indicated are identical in materials and construction to those tested for fire resistivity per ASTM E 119. Products used in the assembly shall carry a classification label from a testing laboratory acceptable to authority having jurisdiction
      c. Provide fire resistance ratings as indicated on the Drawings. If not indicated, then provide fire resistance ratings required by the local governing authorities. Fire-resistance-rated assemblies are indicated by GA File Numbers in GA-600 "Fire Resistance Design Manual," design designations listed in the UL "Fire Resistance Directory," or by Warnock Hersey or another qualified testing and inspecting agency.

1.6 QUALITY ASSURANCE

A. Single-Source Responsibility for Steel Framing: Obtain steel framing members for gypsum board assemblies from a single manufacturer, unless otherwise indicated.

B. Single-Source Responsibility for Panel Products: Obtain each type of gypsum board and other panel products from a single manufacturer.

C. Single-Source Responsibility for Finishing Materials: Obtain finishing materials from either the same manufacturer that supplies gypsum board and other panel products or from a manufacturer acceptable to gypsum board manufacturer.

D. Fire-Test-Response Characteristics: Where fire-resistance-rated gypsum board assemblies are indicated, provide gypsum board assemblies that comply with the GA File Numbers in GA-600 "Fire Resistance Design Manual" or design designations in UL "Fire Resistance Directory" or in the listing of another testing and inspecting agency acceptable to authorities having jurisdiction.

   1. Deflection and Firestop Track: Top runner provided in fire-resistance-rated assemblies indicated is labeled and listed by UL, Warnock Hersey, or another testing and inspecting agency acceptable to authorities having jurisdiction.

E. Seismic Requirements: Materials and installation for wall, partitions, and ceilings shall comply with seismic requirements for the specific seismic requirements for the seismic zone where the project is located.

F. Mockup:
1. Prior to installing wallboard, construct mockup to verify selections made under sample submittals and to demonstrate aesthetic effects as well as other qualities of materials and execution. Build mockups to comply with the following requirements, using each type of specified materials and procedures for final unit of Work.
   a. Notify Architect and materials manufacturer one week in advance of the dates and times when mockups will be constructed.
   b. Locate mockups on site in the locations indicated or, if not indicated, as directed by Architect. Construct of sufficient size to allow inclusion of following installations:
   c. Build full size mockups for each type of installation.
   e. Protect accepted mockups
   f. Retain and maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.. When directed by the Architect, approved mockups may become a part of the completed work.
      (1) Acceptance of mockups is for color, texture, terminations, aesthetic qualities of workmanship; and other material and construction qualities specifically determined by Architect. Show the following: Framing, fastening, seams, trim, finishing, and terminations.
      (2) Acceptance 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.
      (3) If mockup is not a part of the actual construction, demolish and remove mockups from Project site, when directed by the Architect.
      (4) Accepted mockups in an undisturbed condition at the time of Substantial Completion may become part of the completed Work.
2. Judging
   a. Evaluate under normal lighting conditions that are to be expected for the area. Lighting can be natural, artificial, parallel or perpendicular to the surfaces being judged. Parallel lighting is preferred for evaluating surfaces to receive a painted finish.
   b. Evaluate ceiling from standing position on the floor.
   c. Evaluate walls from 6 feet away.

F. Installation Compliance: As a minimum, comply with manufacturer's instructions, ASTM C 754, ASTM 840, GA 216, GA 214, and all applicable publications provision of all applicable Gypsum Association Publications.

G. Pre-Installation Conference:
1. Conduct a pre installation conference with the General Contractor, painting contactor, drywall contractor, and Architect in attendance. Discuss and reach agreement on
   a. Staging and storing of drywall
   b. Environmental requirements for storing and installing drywall
   c. Inspection, judging, and approval provisions and procedures, and when and at what stages of installation they will be performed.
   d. Various levels of drywall finish required
   e. Taping requirements
   f. acceptable imperfections.
   g. Mock-up locations
   h. Framing considerations
   i. Responsibilities of the painting contractor

j. Responsibilities of the drywall contractor
k. Requirements of the painting contractor
1. How drywall hanging, joint work, taping, and finishing stages will be signed off and approved before proceeding to the next stage and the levels of acceptance of each stage.
m. The painting contractor will evaluate the drywall conditions after primer application and drywall contractor will correct all defects including those highlighted by the primer.
n. Do not paint over gypsum wall board surfaces that are to receive porcelain marker board resurfacing sheets.

H. Substitute Requests For A Specified Entity

1. Provisions, requirements, and stipulations stated under this paragraph of this specification apply not only to this specification, but they also apply to all other specifications that are included in the project manual, on the drawings or are otherwise a part of the Contract Documents even if not so stated in these documents. Information requested under this paragraph heading is the minimum required information for consideration and evaluation and additional information may be requested. This information is required in addition to information required by any substitute request forms that may be included in the Project Manual or Contract Documents, or otherwise provided.

2. Where the Contract Documents list at least three entities (products, materials, components, systems, manufacturers, installers, methods, etc.), the Architect reserves the option to reject any and all requests for a substitute. Where the Contract Documents list only one entity without “Or equal” or similar language, substitutes will not be considered. Where the Contract Documents list less than 3 entities, substitutes may be reviewed and evaluated on an individual base.

3. Include the following information on the cover page of the request:
   a. Name of Project and project number as shown in the header of the specification
   b. Date request is being made.
   c. Name of person, company, and contact information of person requesting substitute.
   d. Specification title and number and drawing number where the specified product is listed or shown.
   e. Exact name of the specified entity and substitute entity. .

4. When requesting a substitute, include all requested and required supporting data, specifications, and performance criteria. The Architect must receive this substitute request no later than the time stated elsewhere for submitting product substitutions. If no time is stated, then 10 days prior to date of bid opening. When a Request For Substitute Form is included in the Project Manual, properly complete the form and include it with the submittal.

5. Verbal requests for a substitute or requests that do not comply with these provisions are not acceptable, will be rejected, and will not extend the submittal deadline. Submittals that are incomplete have vague or unspecific answers (“Better”. “Cheaper”. “More competitive”, etc.); that lack supporting data to substantiate equal or superior quality/design; that do not include the requested proof, verification, reports, and substantiating documentation; or are received after submittal deadline will be rejected. Provide convincing answers as to why the substitute should be approved. Rejection or disapproval will not extend the submittal deadline.
   a. If the substitute entity differs from specified entity, compare the substitute entity with the specified entity in a tabular format that clearly shows all the differences.

6. Include the following information on all requests for substitutes:
    a. Length of time the manufacturer has been in business.
    b. Whether the manufacturer operated under any other name, and if so, under what name and when?
    c. Length of time the substitute entity has been on the market.
    d. Whether the substitute entity has been marketed under any other name, and if so, under what name and when?
    e. Who will install and service the substitute entity?
    f. Whether the installer is trained and certified by the manufacturer? If so, describe how this training and certification are achieved and if training records are maintained?
    g. All required changes in the project design that will be required to incorporate the substitute entity.
    h. Describe any known problems or failures associated with the substitute entity? If there are any, provide details.

7. The manufacturer's published literature, description, capabilities, operating and performance parameters, options, accessories, etc. of all submitted substitutes shall meet or exceed those published by the manufacturer of the specified entity even if they are not specifically mentioned in the Contract Documents. Additionally, manufacturers whose standards are less than those of the specified entity but are capable of producing an entity hat meets the specified entity shall not, for the convenience of their normal production methods, vary from the specified entity standards.

8. Where test data and standards are being submitted as supporting data and for comparison with the specified item, comply with the following requirements. Submittals not complying with these provision will be considered incomplete, unacceptable, and will be rejected:
    a. All substitutes shall meet all of the minimum performance criteria of the specified entity.
    b. Submit certified data provided by an independent testing laboratory.
    c. Prepare supporting data in side-by-side tabular form showing the submitted criteria next to each specified performance criteria and denoting the differences between the specified item the substitute item.
    d. Show submitted data using same tests and standards and with the values and results in the same units of measure as those shown for the specified item.
    e. Where a performance criterion is not listed in the specifications, comply with the specified product manufacturer's published data for performance criteria.
    f. Where the specified entity requires certifications, registrations, approvals, policies, practices, etc., submit proof that the substitute entity is in compliance.

9. Each and all requests for substitutes shall be signed by the person making the submittal. By signing the submittal, the person requesting the substitute certifies and agrees to the following requirements. Requests without the signature of a responsible person will be rejected.
    a. That the specifications have been read and are understood,
    b. That the entity being submitted meets or exceeds all provisions of the specifications,
    c. That all submitted information is true and accurate,
    d. Will remove the substitute entity and replace it with an acceptable product, at his expense, if it is determined that the substitute does not meet the specifications as certified.

e. Agrees to pay for all necessary design changes and increased construction costs to incorporate the substitute entity.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.

B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Neatly stack gypsum panels flat to prevent sagging.

C. Steel framing and related accessories shall be stored and handled in accordance with the A.I.S.I.'s "Code of Standard Practice."

1.8 PROJECT CONDITIONS

A. Environmental Conditions, General: Establish and maintain environmental conditions for applying and finishing gypsum board to comply with ASTM C 840 requirements or gypsum board manufacturer's recommendations, whichever are more stringent.

B. Do not install gypsum wall board, sheet/board materials, or absorptive listed in this section until the structure is completely in the dry, including roof, windows, and doors are in place.

C. Room Temperatures: In cold weather, use controlled heat to maintain temperature between 55 and 70 deg F before, during, and after installation and during taping, and finishing operations. Maintain these temperature conditions continuously after until permanent heating is in operation. Propane, kerosene, or salamander type heaters or heaters that produce fumes, smoke, or moisture are not acceptable.

D. Ventilation: Ventilate building spaces as required to dry joint treatment materials. Avoid drafts during hot, dry weather to prevent finishing materials from drying too rapidly.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Steel Framing and Furring:
   a. CLARKWESTERN Building Systems
   b. Consolidated Systems, Inc.
   c. Dietrich Industries, Inc.
   d. Marino/Ware (formerly Marino Industries Corp.).
   e. National Gypsum Co.; Gold Bond Building Products Division. (studs: shaftwall only)
   f. The Steel Network (TSN)

2. Gypsum Board and Related Products:
   a. Certainteed

b. Georgia-Pacific Corp.
c. Lafarge
d. National Gypsum Co.; Gold Bond Building Products Division.
e. United States Gypsum Co.

2.2 STEEL FRAMING COMPONENTS FOR FURRED CEILINGS

A. General: Provide components complying with ASTM C754 for materials and sizes, unless indicated otherwise.

B. Steel Studs for Furring Channels: Meeting requirements of ASTM C645-08; C-channel, roll-formed from hot-dipped galvanized steel; complying with ASTM A1003 and ASTM A653 G40 or equivalent corrosion resistant coating with flange edges of studs bent back 90 degrees and doubled over to form 3/16-inch-wide minimum lip (return), and complying with the following requirements for minimum thickness of base (uncoated) metal and for depth:

1. Thickness: As recommended by the steel framing manufacturer to comply with framing spans indicated on the Drawings, specified loads, and deflection. However, minimum 22 gauge for interior and 16 gauge for exterior, unless otherwise indicated.
2. Depth: As indicated.
3. Protective Coating: ASTM A 653 and ASTM A 1003, G 40 hot-dip galvanized coating.

C. Steel Rigid Furring Channels: ASTM C 645-08, hat shaped, depth of 7/8 inch and minimum thickness of base (uncoated) metal as follows:

1. Thickness: 22 gauge for interior and 16 gauge for exterior, unless otherwise indicated.
2. Protective Coating: ASTM A 924, G 40 hot-dip galvanized coating.
3. Provide with required accessories, bridging, Z-strips, etc. for a complete installation.

D. Grid Suspension System for Interior Ceilings: ASTM C 645, manufacturer's standard direct-hung grid suspension system composed of main beams and cross-furring members that interlock to form a modular supporting network. Provide hanger wire, rod, clamps, and accessories to expected design ceiling loades. State loads in the shop drawings.

2.3 STEEL FRAMING FOR WALLS AND PARTITIONS

A. General: Provide steel framing members to comply with framing height and spacing indicated on the Drawings, specified loads and deflection, and framing sizes However, minimum 22 gauge for interior and 16 gauge for exterior complying with the following requirements. Equivalent gauge framing is not an acceptable substitute for the specified gauge. Equivalent gauge framing found on the project site will be removed and replaced with the specified gauge at the Contractor’s expense - even if installed.

1. Component Sizes and Spacing: As indicated but not less than required to comply with ASTM C574 under the following maximum deflection and lateral loading conditions:
   a. Maximum Deflection: l/240 at 5 lb per sq. ft.
   b. Protective Coating: ASTM A 653/A 653M, and ASTM A 1003/A 1003M G 40 hot-dip galvanized

2. Abuse Resistant Drywall areas: steel framing members are to be minimum 20 gauge, 16 inches o.c. 20 gauge equivalent studs are not acceptable.

B. Steel Studs and Runners: Meeting requirements of ASTM C645-08; C-channel, roll-formed from hot-dipped galvanized steel; complying with ASTM A1003 and ASTM A653 G40 or equivalent corrosion resistant coating with flange edges of studs bent back 90 degrees and doubled over to form 3/16-inch-wide minimum lip (return), and complying with the following requirements for minimum thickness of base (uncoated) metal and for depth:

1. Thickness: As recommended; however, minimum 22 gauge for interior and 16 gauge for exterior.
2. Depth: As indicated.

C. Deflection and Firestop Track: Top runner designed to allow partition heads to expand and contract with movement of structure above while maintaining continuity of the assembly. Comply with requirements of ASTM C 645 except configuration, of thickness indicated for studs and width to accommodate depth of studs indicated with flanges offset at midpoint to accommodate gypsum board thickness.
1. Offset Configuration: Shadow-line design with offset projecting out from depth of stud.
2. Available Product: Subject to compliance with requirements, a product that may be incorporated in the Work includes, but is not limited to, "Fire Trak" manufactured by Fire Trak Corp.

D. Furring Brackets: Serrated-arm type, adjustable, fabricated from corrosion-resistant steel sheet complying with ASTM C 645, minimum thickness of base (uncoated) metal of 21 (0.0329) gauge designed for screw attachment to steel studs and steel rigid furring channels used for furring.
1. Subject to compliance with requirements, provide Dietrich™ Metal Framing Adjustable Wall Furring Bracket.

E. Fasteners for Metal Framing: Provide fasteners of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel framing and furring members securely to substrates involved; complying with the recommendations of gypsum board manufacturers for applications indicated.

F. Curved Track For Ceiling and Wall: Flex-C-Trac or Dietrich Metal Framing; UltraSTEEL™ Framing Contour Track (CNTB), fully adjustable and galvanized. Provide in radius indicated on the Drawings.

G. Headers and Jambs: Manufacturer's proprietary shape used to form header beams and jambs, columns or posts, of web depths indicated, unpunched, with stiffened flanges and as follows:

1. Subject to compliance with requirements, provide one of the following:
2. Dietrich Metal Framing: [Heavy Duty Studs – HDS] and [Header Bracket – HDSC]
3. Brady Innovations ProX Header®

H. Channel Bridging and Bracing: U-Channel Assembly; Base metal thickness of .0538 inch (1.37mm) and minimum ½ inch (12.7mm) wide flanges.

1. Subject to compliance with requirements, provide one of the following:
2. Dietrich Metal Framing: Spazzer® 9200 Bridging and Bracing Bar
3. U-Channel Assembly: [3/4 inches] [1-1/2 inches] [2 inches]
    a. Dietrich Metal Framing; EasyClip™ U-Series™ Clip Angle or equivalent.

I. Resilient Channel: ½ inch [12.7mm] deep, steel sheet members designed to reduce sound transmission, galvanized G40.

1. Subject to compliance with requirements, provide Dietrich Metal Framing Resilient Channel [RCSD] [RCUR] (25 gauge)(20 gauge).

J. Flat Strap and Backing Plate: Sheet for blocking and bracing in length and width indicated.

1. Subject to compliance with requirements, provide Dietrich Metal Framing: Danback™ Fire Treated Wood Backing Plate [D16F] [D24F]
2. Galvanized Sheet Steel.

2.4 WALL PRODUCTS

A. GYPSUM BOARD PRODUCTS

1. General: All gypsum wall board to be gypsum board consisting of a treated gypsum core conforming with ASTM C630. Products shall have a facer and core treated with a mold inhibitor or constructed of a cellulose-free material and shall score no less than 10 per ASTM D3273. Comply with types indicated in maximum lengths available that will minimize end-to-end butt joints in each area indicated to receive gypsum board application. Sheetrock Mold Tough by USG or DensArmor Plus by Georgia Pacific or a reviewed substitute that meets or exceed specified criteria.
   a. Widths: Provide gypsum board in widths of 48 inches.
   b. Thickness: As indicated; or if not indicated, then 1/2 or 5/8 inch to comply with ASTM C840 for applicable, support spacing, partition height, and number of layers.
   c. Type: Type X. Non-sag for ceilings
   d. Edges: Tapered.

2. Gypsum Board Base Layer(s) for Multilayer Applications: Gypsum wallboard complying with general requirements and as follows:
   a. Type: Type X where indicated or required for fire-resistance-rated assemblies.
   b. Type: Sag-resistant type for ceiling surfaces, unless otherwise indicated.
   c. Edges: Square, nontapered.
   d. Thickness: As indicated.

3. Shaft Wall Board: Dens Glass Shaft Liner Ultra, fire rated non-combustible core by Georgia Pacific. Product shall be advertised as suitable to be left exposed to weather for up to 6-months. ASTM C1396

4. Water-Resistant Gypsum Backing Board: Water resistant core with glass mat moisture protection coating and glass mats both sides. The face side shall be surfaced with heat-cured copolymer water resistant coating and comply with ASTM C 1178, Type X. Dens-Shield Tile Backer" by Georgia-Pacific Corp. or a reviewed substitute.

B. Impact Resistant: Type X gypsum core, 5/8 inch thick, tapered edge, EXP Interior Extreme IR by National Gypsum, Fiberock VHI by United States Gypsum (USG), or Dens Armor Plus by Georgia Pacific with following performance criteria:

1. Surface Abrasion Resistance: 0.010 inch, maximum when tested in accordance with ASTM D 4977 Standard Test Method for Granule Adhesion to Mineral Surfaced Roofing by Abrasion

2. Indentation Resistance: 0.050 inch, maximum when tested in accordance with ASTM D 5420 Standard Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by Means of a Striker Impacted by a Falling Weight (Gardner Impact).

3. Soft Body Impact:300 ft-lbf, minimum when tested in accordance with ASTM E 695 Standard Method for Measuring Relative Resistance of Wall, Floor, and Roof Construction to Impact Loading

4. Hard Body Impact: 150 ft-lbf, minimum in accordance with ASTM C 1629 Standard Classification for Abuse-Resistant Non-decorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels

5. Moisture Absorption: Max. 5% by weight after 24 hours immersion per ASTM C473.

6. Mold/Mildew Resistance: Min 10 per ASTM D3273.

C. Use impact resistant to 8'0" AFF at all corridors and classrooms.

2.5 TRIM ACCESSORIES

A. Accessories for Interior Installation: Cornerbead, edge trim, and control joints complying with ASTM C 1047 and requirements indicated below:

1. Material: Formed metal, plastic or metal combined with paper to comply with the following:

   a. Material: Steel sheet zinc coated by hot-dip process or rolled zinc.
   b. Shapes indicated below by reference to Fig. 1 designations in ASTM C 1047:

2. Shapes

   a. Cornerbead on outside corners, unless otherwise indicated.
   b. LC-bead with both face and back flanges; face flange formed to receive joint compound. Use LC-beads for edge trim, unless otherwise indicated.
   c. L-bead with face flange only; face flange formed to receive joint compound. Use L-bead where indicated.
   d. U-bead with face and back flanges; face flange formed to be left without application of joint compound. Use U-bead where indicated.
   e. One-piece control joint formed with V-shaped slot and removable strip covering slot opening.

3. Reglets: Of the size, type, and shape indicated as manufactured by Fry Reglet Corp. Form of same material as partition framing.

2.6 JOINT TREATMENT MATERIALS

A. General: Provide joint treatment materials complying with ASTM C 475 and the recommendations of both the manufacturers of sheet products and of joint treatment materials for each application indicated.

B. Joint Tape for Gypsum Board: Use pressure-sensitive, open-weave, glass-fiber reinforcing tape with compatible joint compound where recommended by manufacturer of gypsum board and joint treatment materials for application indicated.

C. Setting-Type Joint Compounds for Gypsum Board: Factory-packaged, job-mixed, chemical-hardening powder products formulated for specific finish levels.

1. Where setting-type joint compounds are indicated as a taping compound only or for taping and filling only, use formulation that is compatible with other joint compounds applied over it.

2. For prefilling gypsum board joints, use formulation recommended by gypsum board manufacturer.

3. For filling joints and treating fasteners of water-resistant gypsum backing board behind base for ceramic tile, use formulation recommended by gypsum board manufacturer.

4. For topping compound, use sandable formulation.

D. Drying-Type Joint Compounds for Gypsum Board: Factory-packaged vinyl-based products complying with the following requirements for formulation and intended specific finish levels.
   1. Ready-Mixed Formulation: Factory-mixed product.
      a. Taping compound formulated for embedding tape and for first coat over fasteners and face flanges of trim accessories.
      b. Topping compound formulated for fill (second) and finish (third) coats.
      c. All-purpose compound formulated for both taping and topping compounds.
   2. Job-Mixed Formulation: Powder product for mixing with water at Project site.
      a. Taping compound formulated for embedding tape and for first coat over fasteners and face flanges of trim accessories.
      b. Topping compound formulated for fill (second) and finish (third) coats.
      c. All-purpose compound formulated for both taping and topping compounds.

2.7 ACOUSTICAL SEALANT

A. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834, has a flame spread and smoke developed of less than 25 per ASTM E84 and complies with the following requirements:

   1. Product is effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

B. Products: Subject to compliance with requirements, provide one of the following:
   a. PL Acoustical Sealant; ChemRex, Inc.; Contech Brands.
   b. AC-20 FTR Acoustical and Insulation Sealant; Pecora Corp.
   c. SHEETROCK Acoustical Sealant; United States Gypsum Co.

2.8 MISCELLANEOUS MATERIALS

A. General: Provide auxiliary materials for gypsum board construction that comply with referenced standards and recommendations of gypsum board manufacturer.

B. Laminating Adhesive: As recommended by the gypsum wall board manufacturer to laminate panels.

C. Fastening Adhesive: As recommended by the gypsum wall board manufacturer to fasten panel to studs.

D. Spot Grout: ASTM C 475, setting-type joint compound recommended for spot-grouting hollow metal door frames.

E. Steel drill screws complying with ASTM C 1002 for the following applications:

1. Fastening gypsum board to steel members less than 0.033 inch thick.
2. Fastening gypsum board to wood members.

F. Steel drill screws complying with ASTM C 954 for fastening gypsum board to steel members from 0.033 to 0.112 inch thick.

G. Asphalt-Saturated Organic Felt: ASTM D 226, Type I (No. 15 asphalt felt), nonperforated.

H. Foam Gaskets: Closed-cell vinyl foam adhesive-backed strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit metal stud size indicated.

2.9 SHAFT WALL ASSEMBLIES

A. Steel Framing: ASTM C 645, of profile, size, and base metal thickness required to produce assemblies complying with Part 1 "Assembly Performance Requirements" Article; with sectional properties computed to conform with AISI "North American "Specification for the Design of Cold-Formed Steel Structural Members". Protective Coating: G 60 hot-dip galvanized coating per ASTM A1003/A 1003M and ASTM A 653/A 653M..

B. Shaft Wall Panels: All panels used for shaft wall construction shall be suitable for weather exposure up to 6 months as advertised by the panel manufacturer.
1. Shaft Wall Liner Panels: Shaft wall liner.
2. Gypsum Wallboard: ASTM C 1396/C 1396M, type as required by fire-resistant assembly indicated,. Tapered edges.
3. Gypsum Backing Board for Multilayer Applications: ASTM C1396/C 1396M or, where backing board is not available from manufacturer, gypsum wallboard, ASTM C 1396/C 1396M, type as required by fire-resistant assembly indicated, edge configuration as standard with manufacturer.

E. Water-Resistant Gypsum Backing Board: ASTM C 1396/C 1396M, type as required by fire-resistant assembly indicated.

F. Accessories: Corner beads, edge trim, and control joints of material and shapes specified in the Division 9 Section referenced below that comply with gypsum board shaft-wall assembly manufacturer's recommendation for application indicated.

G. Gypsum Wallboard Joint Treatment Materials: Provide materials complying with ASTM C 475 and recommendations of gypsum board shaft-wall assembly manufacturer for the applications indicated, and as specified in Division 9 Section "Gypsum Board Assemblies."

H. Laminating Adhesive: Special adhesive or joint compound recommended for laminating gypsum boards of type indicated.

I. Steel drill screws complying with ASTM C 1002 for fastening gypsum board to steel members less than 0.03 inch thick.

J. Steel drill screws complying with ASTM C 954 for fastening gypsum board to steel members from 0.033 to 0.112 inch thick.

K. Runner Fasteners: Power-driven fasteners of type indicated below and of size and material required to withstand loading conditions imposed on shaft-wall assemblies without exceeding allowable design stress of runners, fasteners, or structural substrates where anchors are embedded.
   1. Powder-Actuated Fasteners: Provide powder-actuated fasteners with the capability to sustain, without failure, a load equal to 10 times that imposed by shaft-wall assemblies, as determined from testing per ASTM E 1190 by a qualified testing agency.
   2. Postinstalled Expansion Anchors: Where indicated, provide expansion anchors with the capability to sustain, without failure, a load equal to 5 times that imposed by shaft-wall assemblies, as determined from testing per ASTM E 488 by a qualified independent testing agency.

L. Spot Grout: ASTM C 475, setting-type joint compound of type recommended for spot grouting hollow metal door frames.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates to which gypsum board assemblies attach or abut, installed hollow metal frames, cast-in-anchors, and structural framing, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of assemblies specified in this Section. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Ceiling Anchorages: Coordinate installation of ceiling suspension systems with installation of overhead structural assemblies to ensure that inserts and other provisions for anchorages to building structure have been installed to receive ceiling hangers that will develop their full strength and at spacing required to support ceilings.

3.3 INSTALLING STEEL FRAMING, GENERAL

A. Steel Framing Installation Standard: Install steel framing to comply with ASTM C 754 and with ASTM C 840 requirements that apply to framing installation.
   1. Fire rated partitions to be installed in accordance with UL V450 or UL V438 or UL U419.

B. Install supplementary framing, blocking, reinforcing, and bracing at terminations in gypsum board assemblies to support fixtures, equipment services, casework, heavy trim, door stops, grab bars, toilet accessories, furnishings, or similar construction. Comply with details indicated and with recommendations of gypsum board manufacturer or, if none available, with United States Gypsum Co.'s "Gypsum Construction Handbook."

C. Isolate steel framing from building structure at locations indicated to prevent transfer of loading imposed by structural movement. Comply with details shown on Drawings.

1. Where building structure abuts ceiling perimeter or penetrates ceiling.
2. Where partition framing and wall furring abut structure, except at floor.

    a. Install deflection track top runner to attain lateral support and avoid axial loading.
    b. Install deflection and firestop track top runner at fire-resistance-rated assemblies where indicated.
        1) Attach jamb studs at openings to tracks using manufacturer's standard stud clip.

D. Do not bridge building control and expansion joints with steel framing or furring members. Independently frame both sides of joints with framing or furring members as indicated.

E. Curved Sections for Partitions: install according to manufacturer’s instructions to the radius indicated on the Drawings.

F. Reglets: Install reglets according to manufacturer’s instructions where and as indicated and to the shapes and dimensions shown on the drawings. Allow for proper installation and finishing of gypsum wallboard.

3.4 INSTALLING STEEL FRAMING FOR SUSPENDED CEILINGS

A. Suspend ceiling hangers from building structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or ceiling suspension system. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
2. 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. Secure wire hangers by looping and wire-tying, either directly to structures or to inserts, eyescrews, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause them to deteriorate or otherwise fail.
4. Secure flat, angle, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eyescrews, or other devices and fasteners that are secure and appropriate for structure as well as for type of hanger involved, and in a manner that will not cause them to deteriorate or otherwise fail.
5. Do not attach hangers to steel deck tabs.
6. Do not attach hangers to steel roof deck. Attach hangers to structural members.
7. Do not connect or suspend steel framing from ducts, pipes, or conduit.
8. Seismic Requirements: Provide sway-brace suspended steel framing with hangers used for support as required for specific seismic zone.

B. Install suspended steel framing components in sizes and at spacings indicated, but not less than that required by the referenced steel framing installation standard.
1. Wire Hangers: 48 inches (1219 mm) o.c.
2. Carrying Channels (Main Runners): 48 inches (1219 mm) o.c.
3. Furring Channels (Furring Members): 24 inches (610 mm) o.c.

C. Installation Tolerances: Install steel framing components for suspended ceilings so that cross-furring or grid suspension members are level to within 1/8 inch in 12 feet (3 mm in 3.6 m) as measured both lengthwise on each member and transversely between parallel members.

D. Wire-tie or clip furring members to main runners and to other structural supports as indicated.

E. Grid Suspension System: Attach perimeter wall track or angle where grid suspension system meets vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

3.5 INSTALLING STEEL FRAMING FOR WALLS AND PARTITIONS

A. Install runners (tracks) at floors, ceilings, and structural walls and columns where gypsum board stud assemblies abut other construction.

1. Do not attach steel framing, runners, etc to metal roof deck except at fire walls. Provide supplementary steel sections as necessary to attach steel framing to structural system.

2. Where studs are installed directly against exterior walls, install asphalt felt strips or foam gaskets between studs and wall.

B. Installation Tolerances: Comply with the most stringent of following tolerances or industry standards and local governing codes:
1. Wood framing shall be straight and true.
2. Framing member shall be plumb and level within 1/8 inch in 8 feet prior to attaching gypsum any siding or paneling including gypsum panels.
3. Framing members shall not vary more than 1/8 inch from the plane of the faces of adjacent members.
4. Completed framing installation shall allow gypsum drywall to be installed in accordance with Gypsum Association GA 214 and 214, and ASTM C840.

C. Extend partition framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing over frames for doors and openings and frame around ducts penetrating partitions above ceiling to provide support for gypsum board.
1. Cut studs 1/2 inch short of full height to provide perimeter relief.

D. Terminate partition framing at suspended ceilings where indicated.

E. Install steel studs and furring in sizes and at spacings indicated.
1. Single-Layer and Multi-layer Construction: Space studs 16 inches o.c., unless otherwise indicated.

F. Install steel studs so flanges point in the same direction and leading edge or end of each gypsum board panel can be attached to open (unsupported) edges of stud flanges first.

G. Frame door openings to comply with GA-219, and with applicable published recommendations of gypsum board manufacturer, unless otherwise indicated. Attach vertical studs at jambs with screws either directly to frames or to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
1. Install 2 studs at each jamb, unless otherwise indicated.
2. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint.

3. Extend jamb studs through suspended ceilings and attach to underside of floor or roof structure above.

H. Frame openings other than door openings to comply with details indicated or, if none indicated, as required for door openings. Install framing below sills of openings to match framing required above door heads.

I. Install thermal insulation as follows:

1. Erect insulation vertically and hold in place with Z-furring members spaced 24 inches o.c.
2. Erect insulation vertically and hold in place with Z-furring members spaced 600 mm o.c.

3. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.

4. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw attach short flange of furring channel to web of attached channel. Start from this furring channel with standard width insulation panel and continue in regular manner. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.

J. Blocking: Provide proper blocking, supports, and reinforcement behind all points to receive applied or suspended loads such as handrails, toilet accessories, coat hooks, door stops, handrails, cabinets, casework, wall and ceiling TV monitor brackets and supports, projection screens, etc. Reinforcement shall be rigid enough to allow drawers loaded to rated capacity to be fully extended without causing casework to sag, droop, bind, or other distortions and to not pull away from the mounts or fasteners and without causing fasteners to loosen or pull from mounts or walls.

3.6 SHAFT WALL ASSEMBLIES

A. Basic Assembly Description
1. General: Characteristics of selected components are described below for purposes of indicating gypsum board shaft-wall assemblies that are manufacturer's standard. b. Cavity Shaft-Wall Assemblies: Provide assemblies constructed of gypsum liner panels inserted between steel tracks at each end of studs; with specially shaped steel studs engaged in tracks and fitted between gypsum liner panels; and with gypsum board on finished side or sides applied to studs in the number of layers, thicknesses and arrangement indicated.
   a. Gypsum Liner Panel Thickness: As indicated. If not indicated, then as standard with panel manufacturer for shaft-wall assemblies indicated.
   b. Stud Shape: As standard with manufacturer for gypsum board shaft-wall assemblies indicated.
   c. Stud Thickness: As indicated. If not indicated, then as standard with manufacturer for gypsum board shaft-wall assemblies indicated.
   d. Stud Depth: As indicated. If not indicated, then as standard with manufacturer for gypsum board shaft-wall assemblies indicated.
   e. Room-Side Finish: As indicated. If not indicated, then as required to achieve the required UL assembly rating.

B. Installation
1. Take all possible precautions to ensure that materials are exposed to weather for a minimum amount of time before, during, and after construction.

2. Install gypsum board shaft-wall assemblies to comply with performance and other requirements indicated as well as with manufacturer's installation instructions and the following:
   a. ASTM C 754 for installing steel framing.
   b. Division 9 Section "Gypsum Board Assemblies" for applying and finishing gypsum wallboard.
3. Do not bridge building expansion joints with shaft-wall assemblies; frame both sides of joints with furring and other support as indicated.
4. Install supplementary framing in gypsum board shaft-wall assemblies around openings and as required for blocking, bracing, and support of gravity and pullout loads of fixtures, equipment, services, heavy trim, furnishings, and similar items that cannot be supported directly by shaft-wall assembly framing. When handrails are indicated for direct attachment to gypsum board shaft-wall assemblies, provide not less than a 0.0341-inch-thick by 4-inch-wide galvanized steel reinforcement strip, accurately positioned and secured behind not less than 1 gypsum board face layer of 1/2-inch or 5/8-inch thickness.
5. At penetrations in shaft wall, maintain fire-resistance rating of entire shaft-wall assembly by installing supplementary steel framing around perimeter of penetration and fire protection behind boxes containing wiring devices, elevator call buttons, elevator floor indicators, and similar items.
6. Isolate shaft-wall assemblies from building structure to prevent transfer of loading imposed by structural movement.
7. Seal gypsum board shaft-walls at perimeter of each section that abuts other work and at joints and penetrations within each section. Install acoustical sealant to withstand dislocation by air pressure differential between shaft and external spaces; comply with manufacturer's instructions and ASTM C 919.

3.7 APPLYING AND FINISHING GYPSUM BOARD, GENERAL

A. Gypsum Board Application and Finishing Standards: Install and finish gypsum panels to comply with ASTM C 840 and GA-216. The following schedule includes, but is not limited to, the following gypsum applications:

1. Normal Areas Including Inside Surfaces of Exterior Walls: Gypsum wall board
2. Ceilings And Horizontal Installations: Sag resistant
3. In All Moist Areas, Behind All Sinks And Commodes, And In Janitor Closets: Water Resistant Gypsum Backing Board.
4. High Impact Areas Where Indicated On The Drawings: Impact Resistant board.
5. Gypsum board VP to 8’-0” AFF.

B. Install gypsum panels with face side out. Do not install imperfect, damaged, or damp panels. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

C. Locate both edge or end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Avoid joints other than control joints at corners of framed openings where possible.

D. Attach gypsum panels to steel studs so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

E. Attach gypsum panels to framing provided at openings and cutouts.

F. Do not attach gypsum panels across the flat grain of wide-dimension lumber. Instead, float gypsum panels over these members using resilient channels or provide control joints to counteract wood shrinkage.

G. Grout hollow metal door frames for solid-core wood doors, hollow metal doors, and doors over 32 inches wide. Apply spot grout at each jamb anchor clip and immediately insert gypsum panels into frames.

H. Form control and expansion joints with space between edges of adjoining gypsum panels, as well as supporting framing behind gypsum panels.

I. Cover both faces of steel stud partition framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases that are braced internally.

1. Except where concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.

2. Fit gypsum panels around ducts, pipes, and conduits.

3. Where partitions intersect open 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.

J. Isolate perimeter of nonload-bearing gypsum board partitions at structural abutments, except floors, as detailed. Provide 1/4- to 1/2-inch-wide spaces at these locations and trim edges with U-bead edge trim where edges of gypsum panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
1. Except for carpet finishes, maintain a 1/2 inch space between the bottom of gypsum board and the top of the finished floor.

K. Floating Construction: Where feasible, including where recommended by manufacturer, install gypsum panels over wood framing, with floating internal corner construction.

L. Space fasteners in gypsum panels according to referenced gypsum board application and finishing standard and manufacturer's recommendations.
1. Space screws a maximum of 12 inches o.c. for vertical applications.

M. Space fasteners in panels that are tile substrates a maximum of 8 inches o.c.

3.8 GYPSUM BOARD APPLICATION METHODS

A. Single-Layer Application: Install gypsum wallboard panels as follows:

1. On partitions/walls, apply gypsum panels vertically (parallel to framing), unless otherwise indicated, and provide panel lengths that will minimize end joints.

2. Wet Areas: Install moisture resistant gypsum board in moist and damp areas and where indicated on the Drawings, including restrooms, kitchen areas, locker rooms, janitors closets, etc.).
3. On ceilings, apply gypsum panels prior to wall/partition board application to the greatest extent possible and at right angles to framing, unless indicated otherwise.
4. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.

B. Single-Layer Fastening Methods: Apply gypsum panels to supports as follows:
   1. Fasten with screws.

C. Multilayer Application on Partitions/Walls: Apply gypsum board indicated for base layers and gypsum wallboard 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. Stagger joints on opposite sides of partitions.
   1. On Z-furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.

D. Multilayer Fastening Methods: Apply base layers of gypsum panels and face layer to base layers as follows:
   1. Fasten both base layers and face layers separately to supports with screws.
   2. Fasten base layers with screws and face layer with adhesive and supplementary fasteners.
   3. Fasten base layers to wood supports with nails and face layer with adhesive and supplementary fasteners.

3.9 INSTALLING TRIM ACCESSORIES

A. General: For trim accessories with back flanges, fasten to framing with the same fasteners used to fasten gypsum board. Otherwise, fasten trim accessories according to accessory manufacturer's directions for type, length, and spacing of fasteners.

B. Install cornerbead at external corners.

C. Install edge trim where edge of gypsum panels would otherwise be exposed. Provide edge trim type with face flange formed to receive joint compound, except where other types are indicated.

   1. Install LC-bead where gypsum panels are tightly abutted to other construction and back flange can be attached to framing or supporting members.
   2. Install L-bead where edge trims can only be installed after gypsum panels have been erected.

D. Control Joints: Install control joints according to Gypsum Association Publication GA-216, ASTM C 840, and manufacturer's recommendations, and in specific locations approved by Architect for visual effect, and as follows:
   1. Walls (rated and non-rated): Install control joints as follows:
      a. Where a partition or wall traverses a building construction joint such as an expansion joint, seismic stress relief joints, and building control elements.
      b. Where a wall or partition extends in a continuous straight plane for more than 30 linear feet

   2. Ceilings: Install control joints as follows:
      a. Traversing A Building Construction Joint: Install control joints where ceiling traverses a building construction joint such as an expansion joint, seismic stress relief joints, and building control elements.
      b. Interior Ceilings Constructed With Perimeter Stress Relief: Install control joints so that the distance between control joints does not exceed 50 linear feet and area does not exceed 2500 square feet.

c. Interior Ceilings Constructed Without Perimeter Stress Relief; Install control joints so that the distance between control joints is not more than 30 linear feet and total area between control joints is not more than 900 square feet.
d. Exterior Ceilings And Soffits: Install control joints so that the distance between control joints is not more than 30 linear feet and total area between control joints is not more than 900 square feet.
e. Where Ceiling Framing Members Change Direction: Install a control joint or intermediate blocking.

3.10 FINISHING GYPSUM BOARD ASSEMBLIES

A. General: Treat gypsum board joints, interior angles, flanges of cornerbead, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration and levels of specified gypsum board finish.

B. Prefill open joints, rounded or beveled edges, and damaged areas using setting-type joint compound.

C. Apply joint tape over gypsum board joints, except those with trim accessories having flanges not requiring tape to prevent cracks from developing in joint treatment at flange edges. .

D. Apply joint tape over gypsum board joints and to flanges of trim accessories as recommended by trim accessory manufacturer.

E. Levels of Gypsum Board Finish: Provide the following levels of gypsum board finish per GA-214.
1. Level 4 for gypsum board surfaces for surfaces to receive wall covering.
2. Level 5 for gypsum board surfaces for painted surfaces.

F. Use one of the following joint compound combinations as applicable to the finish levels specified:
1. Embedding and First Coat: Setting-type joint compound. Fill (Second) Coat: Setting-type joint compound. Finish (Third) Coat: Sandable, setting-type joint compound.

2. Embedding and First Coat: Setting-type joint compound. Fill (Second) Coat: Setting-type joint compound. Finish (Third) Coat: Ready-mixed, drying-type, all-purpose or topping compound.

3. Embedding and First Coat: Ready-mixed, drying-type, all-purpose or taping compound. Fill (Second) Coat: Ready-mixed, drying-type, all-purpose or topping compound. Finish (Third) Coat: Ready-mixed, drying-type, all-purpose or topping compound.

4. Embedding and First Coat: Job-mixed, drying-type, taping compound. Fill (Second) Coat: Job-mixed, drying-type, topping compound. Finish (Third) Coat: Job-mixed, drying-type, topping compound.

5. Embedding and First Coat: Job-mixed, drying-type, all-purpose compound. Fill (Second) Coat: Job-mixed, drying-type, all-purpose compound. Finish (Third) Coat: Job-mixed, drying-type, all-purpose compound.

6. Embedding and First Coat: Setting-type compound. Fill (Second) Coat: Setting-type compound. Finish (Third) Coat: Job-mixed, drying-type, all-purpose compound.

G. For Level 4 gypsum board finish, embed tape in joint compound and apply first, fill (second), and finish (third) coats of joint compound over joints, angles, fastener heads, and accessories. Touch up and sand between coats and after last coat as needed to produce a surface free of visual defects and ready for decoration.

H. Where Level 5 gypsum board finish is required, embed tape in joint compound and apply first, fill (second), and finish (third) coats of joint compound over joints, angles, fastener heads, and accessories; and apply a thin, uniform skim coat of joint compound over entire surface. For skim coat, use joint compound specified for third coat, or a product specially formulated for this purpose and acceptable to gypsum board manufacturer. Touch up and sand between coats and after last coat as needed to produce a surface free of visual defects, tool marks, and ridges and ready for decoration.

I. Wall Board to Receive Porcelain Resurfacing Panels: Prepare surfaces to receive porcelain resurfacing panels to a condition, suitable to the resurfacing panel manufacturer including but not limited:
1. Joints
2. Stability
3. Flatness
4. Levelness
5. Surface texture
6. Surface condition
7. Gypsum wall board surfaces that are to receive porcelain marker board resurfacing sheets are not to be painted.

3.11 CLEANING AND PROTECTION

A. Promptly remove any residual joint compound from adjacent surfaces.

B. Provide final protection and maintain conditions, in a manner acceptable to Installer, that ensure gypsum board assemblies are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 09 21 16

SECTION 09 51 23 - ACOUSTICAL TILE CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following types of acoustical ceiling tile and applicable suspension systems as indicated on the Drawings:
   1. Regular acoustical lay-in tile:

1.3 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 01 Specification Sections.

B. Product data for each type of product specified.

C. Coordination drawings for reflected ceiling plans drawn accurately to scale and coordinating penetrations and ceiling-mounted items. Show the following:
   1. Ceiling suspension system members.
   2. Method of attaching suspension system hangers to building structure.
   3. Ceiling-mounted items including light fixtures; air outlets and inlets; speakers; sprinklers; and special moldings at walls, column penetrations, and other junctures of acoustical ceilings with adjoining construction.
   4. Show locations of seismic restraints and methods of attachment.

D. Samples for initial selection in the form of manufacturer's color charts consisting of actual acoustical tiles or sections of tiles showing the full range of colors, textures, and patterns available for each type of tile indicated.

E. Samples for verification of each type of exposed finish required, prepared on samples of size indicated below. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.
   1. Full-size samples of each tile type, pattern, and color.
   2. Set of 12-inch-long samples of concealed suspension system members.
   3. Set of 12-inch-long samples of exposed moldings for each color and system type required.

F. Qualification data for firms and persons specified in the "Quality Assurance" Article 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.

G. Research reports or evaluation reports of the model code organization acceptable to authorities having jurisdiction that show compliance of acoustical tile ceilings and components with the building code in effect for the Project.

H. Product test reports from a qualified independent testing agency that are based on its testing of current products for compliance of acoustical tile ceilings and components with requirements.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has completed acoustical tile ceilings similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Fire-Test-Response Characteristics: Provide acoustical tile ceilings that comply with the following requirements:
   1. Fire-response tests are performed by a qualified testing and inspecting agency. Qualified testing and inspecting agencies include Underwriters Laboratories (UL), Warnock Hersey, or another agency that is acceptable to authorities having jurisdiction and that performs testing and follow-up services.
   2. Surface-burning characteristics of acoustical tiles comply with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84.
   3. Acoustical tile ceilings indicated are identical in materials and construction to those tested for fire resistance per ASTM E 119.
   4. Fire-resistance-rated, acoustical tile ceilings are indicated by design designations listed in the UL "Fire Resistance Directory," in the Warnock Hersey "Certification Listings," or in the listing of another qualified testing and inspecting agency.
   5. Products are identified with appropriate markings of applicable testing and inspecting agency.

C. Single-Source Responsibility for Ceiling Tile: Obtain each type of acoustical ceiling tile from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.

D. Single-Source Responsibility for Suspension System: Obtain each suspension system from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.
   1. Obtain both acoustical ceiling units and suspension system from the same manufacturer.

E. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings."

F. Substitute Requests For A Specified Entity
   1. Provisions, requirements, and stipulations stated under this paragraph of this specification apply not only to this specification, but they also apply to all other specifications that are included in the project manual, on the drawings or are otherwise a part of the Contract Documents even if not so stated in these documents. Information requested under this paragraph heading is the minimum required information for consideration and evaluation and additional information may be requested. This information is required in addition to information required by any substitute request forms that may be included in the Project Manual or Contract Documents, or otherwise provided.
   2. Include the following information on the cover page of the request:
      a. Name of Project and project number as shown in the header of the specification
      b. Date request is being made.
      c. Name of person, company, and contact information of person requesting substitute.
      d. Specification title and number and drawing number where the specified product is listed or shown.

e. Exact name of the specified entity and substitute entity. .

3. When requesting a substitute, include all requested and required supporting data, specifications, and performance criteria. The Architect must receive this substitute request no later than the time stated elsewhere for submitting product substitutions. If no time is stated, then 10 days prior to date of bid opening. When a Request For Substitute Form is included in the Project Manual, properly complete the form and include it with the submittal.
4. Verbal requests for a substitute or requests that do not comply with these provisions are not acceptable, will be rejected, and will not extend the submittal deadline. Submittals that are incomplete have vague or unspecific answers (“Better”. “Cheaper”. “More competitive”, etc.); that lack supporting data to substantiate equal or superior quality/design; that do not include the requested proof, verification, reports, and substantiating documentation; or are received after submittal deadline will be rejected. Provide convincing answers as to why the substitute should be approved. Rejection or disapproval will not extend the submittal deadline.
   a. If the substitute entity differs from specified entity, compare the substitute entity with the specified entity in a tabular format that clearly shows all the differences.
5. Include the following information on all requests for substitutes:
   a. Length of time the manufacturer has been in business.
   b. Whether the manufacturer operated under any other name, and if so, under what name and when?
   c. Length of time the substitute entity has been on the market.
   d. Whether the substitute entity has been marketed under any other name, and if so, under what name and when?
   e. Who will install and service the substitute entity?
   f. Whether the installer is trained and certified by the manufacturer? If so, describe how this training and certification are achieved and if training records are maintained?
   g. All required changes in the project design that will be required to incorporate the substitute entity.
   h. Describe any known problems or failures associated with the substitute entity? If there are any, provide details.
6. The manufacturer’s published literature, description, capabilities, operating and performance parameters, options, accessories, etc. of all submitted substitutes shall meet or exceed those published by the manufacturer of the specified entity even if they are not specifically mentioned in the Contract Documents. Additionally, manufacturers whose standards are less than those of the specified entity but are capable of producing an entity hat meets the specified entity shall not, for the convenience of their normal production methods, vary from the specified entity standards.
7. Where test data and standards are being submitted as supporting data and for comparison with the specified item, comply with the following requirements. Submittals not complying with these provisions will be considered incomplete, unacceptable, and will be rejected:
   a. All substitutes shall meet all of the minimum performance criteria of the specified entity.
   b. Submit certified data provided by an independent testing laboratory.
   c. Prepare supporting data in side-by-side tabular form showing the submitted criteria next to each specified performance criteria and denoting the differences between the specified item the substitute item.
   d. Show submitted data using same tests and standards and with the values and results in the same units of measure as those shown for the specified item.
   e. Where a performance criterion is not listed in the specifications, comply with the specified product manufacturer’s published data for performance criteria.

f. Where the specified entity requires certifications, registrations, approvals, policies, practices, etc., submit proof that the substitute entity is in compliance.

8. Each and all requests for substitutes shall be signed by the person making the submittal. By signing the submittal, the person requesting the substitute certifies and agrees to the following requirements. Requests without the signature of a responsible person will be rejected.
   a. That the specifications have been read and are understood,
   b. That the entity being submitted meets or exceeds all provisions of the specifications,
   c. That all submitted information is true and accurate,
   d. Will remove the substitute entity and replace it with an acceptable product, at his expense, if it is determined that the substitute does not meet the specifications as certified.
   e. Agrees to pay for all necessary design changes and increased construction costs to incorporate the substitute entity.

G. Seismic Performance: Acoustical ceiling shall withstand the effects of earthquake motions determined according to ASCE/SEI 7 or local governing authorities whichever is more stringent.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical tiles and suspension system components to Project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical tiles, permit them to reach room temperature and stabilized moisture content.

C. Handle acoustical tiles carefully to avoid chipping edges or damaging units in any way.

1.6 PROJECT CONDITIONS

A. Space Enclosure and Environmental Limitations: Do not install acoustical tile ceilings until spaces are enclosed and weatherproof, wet-work in spaces is completed and dry, work above ceilings is complete, and ambient temperature and humidity conditions are being maintained at the levels indicated for Project when occupied for its intended use.

1.7 COORDINATION

A. Coordinate layout and installation of acoustical tiles and suspension system components with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system components (if any), and partition assemblies (if any).

1.8 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels clearly describing contents.
   1. Acoustical Ceiling Tile: Furnish quantity of full-size units equal to 2.0 percent of amount installed.
   2. Suspension System Components: Furnish quantity of each component equal to 2.0 percent of amount installed.

PART 2 - PRODUCTS

2.1 ACOUSTICAL TILE

A. Provide manufacturer's standard tiles of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances, unless otherwise indicated.

B. Provide acoustical tiles manufactured with products and components that inhibit the formation and growth of fungus, mold, mildew, and gram-positive and gram-negative bacteria.

C. Acoustical Tile: Tile Products specified are intended to establish expected quality, size, design, pattern, finish, texture, composition, and performance and are not intended to limit competition. Subject to compliance with requirements, equivalent products from the following manufacturers may be submitted for review:
   1. Regular Acoustical Lay-In Tile: 24 inches by 24 inches by 5/8 inch, non-directional fissured; classified as RH-90, unless indicated otherwise. Tile shall be constructed of materials and use processes to inhibit and retard growth of mold and mildew on surfaces. Provide one of the following or a reviewed substitute:
      Square Edge
      a. Armstrong Fine Fissured, Item 1728
      b. USG Radar ClimaPlus, Item 2210.
      c. Celotex Fine Fissured Item HHF-157

2.2 METAL SUSPENSION SYSTEMS, GENERAL

A. Metal Suspension System Standard: Provide manufacturer's metal grid suspension systems of types, structural classifications, and finishes indicated that comply with applicable ASTM C 635 requirements for all load values applicable to suspension and that meet local seismic conditions specified under Part 3 of this specification. However, as a minimum, provide intermediate duty suspension systems.

B. Finishes and Colors: Provide manufacturer's standard factory-applied baked enamel finish for type of system indicated. Color as selected by Architect. Provide moisture-resistant finish where moisture resistant tile are used.

C. Attachment Devices: Size for 5 times the design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.

D. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
   1. Zinc-Coated Carbon Steel Wire: ASTM A 641, Class 1 zinc coating, soft temper.
   2. Size: Select wire diameter so that its stress at 3 times the hanger design load (ASTM C 635, Table 1, Direct Hung), will be less than the yield stress of wire, but provide not less than 0.106-inch-diameter wire.

E. Hanger Rods: Mild steel, zinc coated, or protected with rust-inhibitive paint.

F. Flat Hangers: Mild steel, zinc coated, or protected with rust-inhibitive paint.

G. Angle Hangers: Angles with legs not less than 7/8 inch wide, formed with 0.0396-inch-thick galvanized-steel sheet complying with ASTM A 446, G 90 Coating Designation, with bolted connections and 5/16-inch-diameter bolts.

H. Sheet-Metal Edge Moldings and Trim: 2-inch wide flange and tile bearing surface of Type and profile indicated, or if not indicated, manufacturer's recommended moldings for edges and penetrations that fit acoustical tile edge details and suspension systems indicated; formed from sheet metal of same material and finish as that used for exposed flanges of suspension system runners. Finish to match suspension system.
   1. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.
   2. Seismic Conditions: Where seismic conditions are applicable, provide molding of size, design, and material to meet local seismic requirements. 2-inch minimum support.

2.3 SUSPENSION SYSTEMS

A. Direct-Hung, Exposed Grid, Double-Web Suspension System: Main and cross runners roll-formed of commercial quality hot-dipped galvanized steel per ASTM A635; capping prefinished, hot-dipped galvanized steel with baked enamel finish. Color as indicated. Other characteristics as follows:
   1. Structural Classification: Intermediate-duty system.
   2. Access: Upward, with sizes for modules formed by main runners and cross-tees for initial direct access openings throughout the ceiling with remainder of acoustical tiles progressively removable.
   3. Provide corrosion-resistant systems used with moisture resistant tile.

B. Suspension Systems
   1. Non-rated Available Products: Subject to compliance with requirements, non-rated suspension systems that may be incorporated in the Work is Prelude Series by Armstrong World Industries, Inc. or equal by one of the following:
      b. Chicago Metallic Corporation.
      c. USG Interiors, Inc.

2.4 ACOUSTICAL SEALANT

A. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 and the following requirements:
   1. Product is effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies per ASTM E 90.

B. Products: Subject to compliance with requirements, provide one of the following:
   1. Acoustical Sealant for Exposed and Concealed Joints:
      a. AC-20 FTR Acoustical and Insulation Sealant; Pecora Corp.
      b. SHEETROCK Acoustical Sealant; United States Gypsum Company.

2.5 MISCELLANEOUS MATERIALS

A. Hold Down Clips: Type recommended by the suspension system manufacturer to meet required seismic conditions specified in ASTM E580 and modified by the memorandum at the end of this section.

B. Seismic Struts: Manufacturer's standard compression struts designed to accommodate lateral forces.

C. Seismic Clips: Manufacturer's standard seismic clips designed and spaced to secure acoustical tiles in-place.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and structural framing to which acoustical tile ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Coordination: Furnish layouts for preset inserts, clips, and other ceiling anchors whose installation is specified in other Sections.
   1. Furnish concrete inserts and similar devices to other trades for installation well in advance of time needed for coordinating other work.

B. Testing Substrates: Before installing adhesively applied tile on wet-placed substrates such as cast-in-place concrete or plaster, test and verify that moisture level is below tile manufacturer's recommended limits.

C. Measure each ceiling area and establish the layout of acoustical tile to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width units at borders, and conform to the layout shown on reflected ceiling plans.

3.3 INSTALLATION

A. General: Install acoustical tile ceilings to comply with applicable publications referenced below per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook." For project location.
   1. Standard for Ceiling Suspension Systems Requiring Seismic Restraint: Comply with ASTM E 580.
   2. CISCA's Recommendations for Acoustical Ceilings: Comply with CISCA's "Guidelines for Seismic Restraint of Direct-Hung Suspended Ceiling Assemblies--Seismic Zones 3 & 4" (Seismic Design Categories D, E, and F).

B. Suspend ceiling hangers from building's structural members and as follows:
   1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of the supporting structure or of the ceiling suspension system. Install to allow all four edges of tile to engage suspension member.
   2. Splay hangers only where required to miss obstructions, and if permitted with fire-resistance-rated ceilings, to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means. When installing hangers, provide for 3/8-inch vertical and horizontal movement in suspension system.
   3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with the location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices. Size supplemental suspension

members and hangers to support ceiling loads within performance limits established by referenced standards and publications.

4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of 3 tight turns. Connect hangers either directly to structures or to inserts, eye screws, or other devices that are secure, that are appropriate for substrate, and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both the structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
6. Do not support ceilings directly from permanent metal forms. Fasten hangers to cast-in-place hanger inserts, powder-actuated fasteners, or drilled-in anchors that extend through forms into concrete.
7. Do not attach hangers to steel deck tabs.
8. Do not attach hangers to steel roof deck. Attach hangers to structural members.
9. Space hangers not more than 48 inches o.c. along each member supported directly from hangers, unless otherwise shown; and provide hangers not more than 8 inches from ends of each member.
10. Install two light fixture support wires for each light.
11. For pieces of tile that will be 3 inches wide or less, cut the final piece from a 4-foot ceiling tile board. Match color and texture, and pattern.

C. Install edge moldings and trim of type indicated at perimeter of acoustical tile ceiling area and where necessary to conceal edges of acoustical units. Miter corners; form hairline joints.
   1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
   2. Screw attach moldings to substrate at intervals not over 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.
   3. Do not use exposed fasteners, including pop rivets, on moldings and trim.

D. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

E. Install acoustical tiles in coordination with suspension system.
   1. Arrange acoustical units and orient directionally patterned units in manner indicated on the reflected ceiling plan.
   2. Hold tile field in compression by inserting leaf-type, spring-steel spacers between tile and moldings, spaced at 12 inches o.c.
   3. Protect lighting fixtures and air ducts to comply with requirements indicated for fire-resistance-rated assembly.

3.4 SEISMIC CONDITIONS

Select the applicable Seismic Category from the following that is applicable to the project location:

A. Category C
   1. Comply with (Ceiling and Interior Systems Construction Association (CISCA) recommendations and requirements for seismic activity for Category C as defined and established in the current edition of IBC , defined as follows:
      a. Category “C”: Areas subject Light to Moderate seismic activity as established in the current edition of IBC (Old Zones 0-2).
   2. Free floating architectural components must have adequate “rattle room”

a. Minimum of 12-inches clearance.
b. Must permit hangers to swing to a 45-degree angle without striking another object.

3. Installation requirements fall into two broad categories.
   a. Provide a suspension system strong enough to resist the lateral forces imposed upon it without failing.
   b. Prevent border panels from falling from the ceiling plane.
4. Suspension System Integrity: Provide minimum grid connection strength of 60 lbs.
5. Hanger wire requirements
   a. Connection to structure minimum 100 lbs.
   b. Minimum 12 Ga at 4-foot spacing
   c. Minimum 10 Ga at 5-foot spacing
   d. Plumb within 1 inch in 6 inches
6. Splay Bracing: Not required unless ceiling weight exceeds 2.5 lbs/sf
7. Light Fixtures
   a. Less than 56 lbs
      (1) 2 connectors attaching to grid
      (2) 2 slack wires
   b. Greater than 56 lbs
      (1) 2 connectors attaching to grid
      (2) Independent support to structure
8. Mechanicals
   a. Less than 20 lbs: 2 connectors attaching to grid
   b. Greater than 20 lbs and less than 56 lbs
      (1) 2 connectors attaching to grid
      (2) 2 slack wires
   c. Greater than 56 lbs: Independent support to structure
9. Partition Attachment
   a. Not permitted
   b. Ceiling must be free to float 3/8-inch in all directions.
10. Perimeter Panel Retention
    a. Prevent grid from spreading at perimeters
       (1) Spacer Bars, required at all walls.
    b. Perimeter wires: Not required if molding has minimum 7/8-inch horizontal flange.
    c. Wall molding
       (1) Minimum 7/8-inch horizontal flange or add perimeter wires
       (2) Grid attachment to molding not permitted
       (3) 3/8-inch clearance at all walls

3.5 CLEANING

A. Clean exposed surfaces of acoustical tile ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's instructions for cleaning and touchup of minor finish damage. Remove and replace tiles and other ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09 51 23

SECTION 09 65 00 - RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:
   1. Vinyl composition floor tile.

B. Resilient wall base, reducer strips, and other accessories installed with resilient floor tiles are specified in Division 09 Section "Resilient Base and Accessories."

C. Contractor's Investigation: Prior to Contract Execution, the Contractor shall have thoroughly investigated the entities such as employees, consultants, subcontractors, manufacturers, suppliers, etc. and other entities that will performing work or supplying materials, products, equipment, or systems for this project to ensure that they meet all of the qualifications and requirements mentioned or implied in the Contract Documents. If it is later determined that any of the previously mentioned entities do not meet the qualifications and requirements specified in the Contract Documents, the Contractor will be required to replace that entity with a qualified entity at no increase in Contract sum or Contract Time.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 01 Specification Sections.

B. Product data for each type of product specified.

   1. Certification by tile manufacturer that products supplied for tile installation comply with local regulations controlling use of volatile organic compounds (VOCs).

C. Samples for initial selection purposes in form of manufacturer's color charts consisting of actual tiles or sections of tiles showing full range of colors and patterns available for each type of resilient floor tile indicated.

D. Samples for verification purposes in full-size tiles of each different color and pattern of resilient floor tile specified, showing full range of variations expected in these characteristics.

E. Product certificates, in lieu of laboratory test reports when permitted by Architect, signed by manufacturer certifying that each product complies with requirements.

   1. Slip Resistance: For tile to be used on ramps and inclines, submit manufacturer's published data stating that tile meets slip resistance requirements for ADA and listing the

coefficient of friction measurements. Data shall include measurements after floor polish has been applied.

F. Maintenance data for resilient floor tile, to include in Operating and Maintenance Manual specified in Division 01.

G. Shop Drawings showing floor patters with multi-color tile. Floor pattern locations are noted in Drawings.

1.4 QUALITY ASSURANCE

A. Single-Source Responsibility for Floor Tile: Obtain each type, color, and pattern of tile from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.

B. Fire Performance Characteristics: Provide resilient floor tile with the following fire performance characteristics as determined by testing products per ASTM test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

1. Critical Radiant Flux: 0.45 watts per sq cm or more per ASTM E 648.
2. Smoke Density: Less than 450 per ASTM E 662.

C. Mockup:

1. Prior to installing floor covering, construct mockup to verify selections made under sample submittals and to demonstrate aesthetic effects as well as other qualities of materials and execution, including seams and welding. Build mockups to comply with the following requirements, using each type of specified materials and procedures for final unit of Work.
    a. Notify Architect and materials manufacturer one week in advance of the dates and times when mockups will be constructed.
    b. Locate mockups on site in the locations indicated or, if not indicated, as directed by Architect. Construct of sufficient size to allow inclusion of following installations:
        (1) Floor area.
        (2) Coved base
        (3) Grooving and welding
    c. Build mockups for each type of installation and install in sizes approximately 48 inches long by 48 inches high. However, size shall be of sufficient size to properly show intent of the Work to be performed and relationship of all installed materials.
    d. Protect accepted mockups
    e. Retain and maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work. When directed by the Architect, approved mockups may become a part of the completed work.
        (1) Acceptance of mockups is for color, texture, pattern, terminations, grooving, welding, aesthetic qualities of workmanship; and other material and construction qualities specifically determined by Architect.
        (2) Acceptance of mockups does not constitute approval of deviations from the Contract Documents contained in mockups, unless Architect specifically approves such deviations in writing.
        (3) If mockup is not a part of the actual construction, demolish and remove mockups from Project site, when directed by the Architect.

(4) Accepted mockups in an undisturbed condition at the time of Substantial Completion may become part of the completed Work.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver tiles and installation accessories to Project site in original manufacturer's unopened cartons and containers each bearing names of product and manufacturer, Project identification, and shipping and handling instructions.

B. Store flooring materials in dry spaces protected from the weather with ambient temperatures maintained between 50 deg F and 90 deg F.

C. Store tiles on flat surfaces. Move tiles and installation accessories into spaces where they will be installed at least 48 hours in advance of installation.

1.6 PROJECT CONDITIONS

A. Maintain a minimum temperature of 70 deg F in spaces to receive tiles for at least 48 hours prior to installation, during installation, and for not less than 48 hours after installation. After this period, maintain a temperature of not less than 55 deg F.

B. Do not install tiles until they are at the same temperature as the space where they are to be installed.

C. Close spaces to traffic during tile installation.

1.7 SEQUENCING AND SCHEDULING

A. Install tiles and accessories after other finishing operations, including painting, have been completed.

B. Do not install tiles over concrete slabs until the slabs have cured and are sufficiently dry to bond with adhesive as determined by tile manufacturer's recommended bond and moisture test.

1.8 EXTRA MATERIALS

A. Deliver extra materials to Owner. Furnish extra materials matching products installed as described below, packaged with protective covering for storage and identified with labels clearly describing contents.

1. Furnish not less than one box for each 50 boxes or fraction thereof, of each class, wearing surface, color, pattern and size of resilient floor tile installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, products specified are Premium tile to establish expected quality, design, style, and finish and not to limit competition.
   1. Mannington
   2. Armstrong

2.2 RESILIENT TILE

A. Vinyl Composition Tile: Manufacturer's premium grade complying with Federal Specification SS-T-312B Type IV, Comp 1. In accordance with Appendix A4.5 of the 1990 Act (ADA) *Accessibility Guidelines for Buildings and Facilities (ADAAG),* tile shall have, as a minimum, the following advertised static coefficient of friction (slip resistance) values as measured by James Test, ASTM D 2047. Tile shall maintain ADA slip resistance requirements after floor polish has been applied.
   1. Level Surfaces: 0.6
   2 Ramps: 0.8

2.3 INSTALLATION ACCESSORIES

A. Concrete Slab Primer: Nonstaining type as recommended by flooring manufacturer.

B. Underlayment and Patching Materials: As recommended by the floor covering manufacturer to meet specific installation requirements including, but not limited to, moisture emission, floor levelness, floor flatness, surface texture, warranty, etc.

C. Patching Compound: Where asbestos containing tile needs to be repaired or patched, provide patching compound suitable for patching and encapsulating asbestos, and approved by floor tile manufacturer providing the floor covering, and the governing authorities.

D. Adhesives (Cements):

   1. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

      VCT and Asphalt Tile Adhesives: Not more than 50 g/L.

   2. Waterproof: Alkali resistant epoxy adhesive, formulated biocide-type as recommended by the specific tile manufacturer. To be used in all areas subject to moisture and wetting such as in the vicinity of exterior doors, exits from shower areas, under drinking fountains, or any area subject to wetting splash or spillage. Adhesive shall ensure proper adhesion between floor covering and adhesive and between substrate and adhesive when floor covering or adhesive are subjected to moisture from above or below.
   3. Water-resistant: Alkali and water resistant, formulated biocide-type of the type recommended by tile manufacturers to suit floor tile products and substrate conditions indicated. Adhesive shall not be affected by or break down when exposed to moisture. Adhesive shall ensure proper adhesion between floor covering and adhesive and between substrate and adhesive when floor covering or adhesive are subjected to moisture from above or below.

E. Metal Edge Strips: Extruded aluminum with mill finish of width shown, of height required to protect exposed edge of tiles, and in maximum available lengths to minimize running joints.

F. Floor Polish: Type recommended by the tile manufacturer.

G. Vapor Retarder: When the specified moisture tests or other moisture tests required by the floor covering finish manufacturer do not comply with the floor covering finish manufacturer's requirements or recommendations or when there are no requirements or recommendations, then with those specified in this Section, provide a vapor retarder system recommended by the floor covering finish manufacturer. Vapor retarder system shall be compatible with the floor covering finish, the adhesive, and shall reduce water vapor transmission to an acceptable level.

PART 3 - EXECUTION

3.1 INSPECTION AND TESTING

A. Where test and inspection results (including, but not limited to, calcium chloride, relative humidity, sounding, and tests for level and flatness) indicate that moisture and surface conditions do not meet the floor finish manufacturer's requirements, the Contractor shall provide all labor, materials, and procedures to ensure that the substrate meets the floor finish manufacturer's requirements prior to installing the floor finish. Neither the Contract Sum or Contract Time will not be modified to meet this provision.

B. Record results of all tests and send copies to the Owner and Architect. Show on a floor grid where each test was conducted and the test results. As a minimum, each report shall include the following information for each test that was conducted:
1. Project name
2. Date and Time of the Test
3. Test Location (wall, room, etc) of test.
4. Name of person conducting test
5. Test results
6. Conclusions and recommendations

C. Examine subfloors and conditions, with installer and manufacturer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting performance of floor covering. Notify the Architect of conditions detrimental to the proper and timely completion of the work. Verify that there is no curing membrane on the floor. If there is a curing membrane or sealer on surfaces to receive floor covering, remove the membrane according the manufacturer's instructions. Acid-removal is not an acceptable method to remove curing membrane or sealer.
1. Substrate are free of cracks, ridges, depressions, scale, and foreign deposits of any kind.
2. Prior to installing floor system, fill moving joints and non-moving kerfs as recommended by the floor system manufacturer.
3. Ensure that concrete does not contain aggregates that are soft or break down in liquids.

3.2 PREPARATION

A. Substrate: Perform preparation and cleaning procedures according to finish floor manufacturer's instructions for particular substrate conditions involved and as specified. Provide clean, dry and neutral substrate for flooring application.

B. Remove substrate coatings, including curing compounds, and other substances that are incompatible with the floor covering and that contain soap, wax, oil, or silicone. Do not use liquid solvents or adhesive removers.

C. Patch and repair cracks, voids, and other imperfections of concrete with high strength Portland cement based patching material. Do not use gypsum based patching materials. After completion of sanding, patching and leveling, vacuum or sweep entire surface of concrete to remove loose dust and dirt before starting the installation of the material.

D. Level substrate within to floor covering manufacturers requirements noncumulative, in all directions. Sand or grind protrusions, bumps, and ridges. Patch and repair cracks and rough areas. Fill depressions.

E. Broom or vacuum clean subfloors to be covered. Following cleaning, examine subfloors for moisture, alkaline salts, carbonation, or dust. Do not use oil based sweeping compounds.

F. Primer: If required, apply concrete-slab primer, according to manufacturer's directions, where recommended by the floor covering manufacturer.

G. The building shall be dry and closed in. Flooring installation shall not begin until the installer is familiar with existing sub-floor conditions, and after completion of all other work in this area. During cold weather the room temperature shall be maintained at a minimum of 75°F.

H. Adhesion/Bond Tests: After the substrate has been properly and satisfactorily prepared, sounded, and tested for moisture, perform adhesion tests to determine compatibility of adhesive, floor finish, and subfloor. Conduct all testing after all traces of curing compounds and sealers have been removed.
   1. When performing adhesion tests, perform testing with the adhesives and floor covering to be used on this project.
   2. Conduct adhesion test as recommended by the flooring manufacturer. If none recommended, perform the following:
      a. Spread adhesive on substrate at recommended rate in two separate areas.
      b. Allow one area to remain bare and to cure for recommended curing time or a minimum of 24 hours. Apply finish floor over other area of adhesive and allow to cure for recommended curing time or a minimum of 24 hours.
      c. If adhesive can be scraped up with a putty knife, adhesion is not acceptable. Contact finish floor manufacturer for instructions. If adhesive cannot be scraped up, conditions are acceptable
      d. Record test values for each type and combination of flooring and adhesive to be used.
      e. Send copies of test reports to the Owner and the Architect.

I. Wood Subfloor - Confirm the following:
   1. Moisture content is within floor covering manufacturer’s requirements. If no requirements, then no more than 8 percent when tested with a pinless moisture meter calibrated to wood species of the substrate. Meter shall have been factory calibrated within 2 years. If moisture levels exceed manufacturer’s recommended levels, follow manufacturer’s instructions for bringing moisture to acceptable levels.
   2. Wood deck is clean, dry, sound, and properly sloped.
   3. Side joints are flush, even, and tightly butted.
   4. Fasteners are tight, straight, and fully recessed below the surface.
   5. Wood deck is fastened securely and does not wobble, shake, twist, compress, or deflect when walked on.
   6. Edges of wood deck are straight and square and are free of splinters and rough spots.
   7. Wood deck is securely fastened with no projecting fasteners and with no adjacent units in excess of 1/16 inch out of plane
   8. Wood deck is butted to perimeter terminations.

9. Depressions are filled, smoothed, and are flush and even with adjacent surfaces as recommended by the floor covering manufacturer.

3.3 INSTALLATION

A. General:
1. Comply with tile manufacturer's installation directions and other requirements indicated that are applicable to each type of tile installation included in Project.

2. To prevent a distinct color line, do not lay tile one by one from a box. Instead, before laying tile, take tile from 5 boxes and mix the tile from these boxes randomly. Lay the tile from the randomly mixed tile. Repeat this procedure until all tile has been laid.

B. Adhesives
1. Waterproof (Epoxy): Use to install tile in areas subject to moisture or wetting such as in the vicinity of exterior doors, exits from shower areas, under drinking fountains, or any area subject to wetting.
2. Moisture Resistant: Use only to install tile in areas not subject moisture or wetting.

C Lay out tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths at perimeter that equal less than one-half of a tile. Install tiles square with room axis, unless otherwise indicated.

D Match tiles for color and pattern by selecting tiles from cartons in same sequence as manufactured and packaged, if so numbered. Cut tiles neatly around all fixtures. Discard broken, cracked, chipped, or deformed tiles.

1. Lay tiles in pattern with respect to location of colors, patterns, and sizes as indicated on Drawings. If not indicated, then lay tiles with grain running in one direction.

E Scribe, cut, and fit tiles to butt tightly to vertical surfaces, permanent fixtures, built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings.

F Extend tiles into toe spaces, door reveals, closets, and similar openings.

G Maintain reference markers, holes, or openings that are in place or plainly marked for future cutting by repeating on finish flooring as marked on subfloor. Use chalk or other nonpermanent marking device.

H Install tile on covers for telephone and electrical ducts, and similar items occurring within finished floor areas. Maintain overall continuity of color and pattern with flooring installed on these covers. Tightly adhere edges to perimeter of floor around covers and to covers.

I Adhere tiles to flooring substrates without producing open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, or other surface imperfections in completed tile installation.

J Use full spread of adhesive applied to substrate in compliance with tile manufacturer's directions including those for trowel notching, adhesive mixing, and the pot life and working time of the adhesives.

K Hand roll tiles where required by tile manufacturer.

L. Apply sealant around door frames.

3.4 VISUAL REQUIREMENTS

A. Installed tile shall comply with the following visual requirements. Tile not complying with following criteria shall be removed, and replaced with acceptable tile at no additional cost:

1. No visible adhesive.
2. No humps, bumps, depressions.
3. No variations in tile dimensions.
4. No broken, chipped, cracked or out of square tile.
5. Base is even, flush, and straight and tightly fitted to wall.
6. Edges and joints are flush with adjacent edges and joints.
7. No discoloration, shading, or variations in gloss or pattern between tiles.
8. Joints and edges are straight and smooth and in line with adjacent edges and joints.
9. Joints are flush joints between tile and edge strips and between edge strips and adjoining floor system.

3.5 CLEANING AND PROTECTION

A. Perform the following operations immediately after completing tile installation:

1. Remove visible adhesive and other surface blemishes using cleaner recommended by tile manufacturers.
2. Sweep or vacuum floor thoroughly.
3. Do not wash floor until after time period recommended by resilient floor tile manufacturer.
4. Damp-mop tile to remove black marks and soil.

B. Protect flooring against mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods indicated or recommended by tile manufacturer.

1. Apply 3 coats of protective floor polish to tile surfaces that are free from soil, visible adhesive, and surface blemishes.

    a. Use commercially available cross-linked acrylic product acceptable to tile manufacturer.
    b. Coordinate selection of floor polish with Owner's maintenance service.

2. Cover tiles with undyed, untreated building paper until inspection for Substantial Completion.
3. Do not move heavy and sharp objects directly over tiles. Place plywood or hardboard panels over tiles and under objects while they are being moved. Slide or roll objects over panels without moving panels.

C. Clean tile not more than 4 days prior to dates scheduled for inspections intended to establish date of Substantial Completion in each area of Project. Clean tiles using method recommended by manufacturer.

1. Strip protective floor polish that was applied after completing installation prior to cleaning.
2. Reapply floor polish after cleaning.

END OF SECTION 09 65 00

SECTION 09 65 18 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:
1. Resilient Base.

B. Related Sections: The following Sections contain requirements that relate to this Section:
1. Division 09 flooring Sections.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 01 Specification Sections.

B. Product data for each type of product specified.

C. Samples for initial selection purposes of manufacturer's standard sample sets in form of pieces cut from each type of product specified showing full range of colors and patterns available.

D. Samples for verification purposes in manufacturer's standard sizes, but not less than 12 inches long, of each different color and pattern of product specified.

E. Product certificates, in lieu of laboratory test reports when permitted by Architect, signed by manufacturer certifying that each product complies with requirements.

1.4 QUALITY ASSURANCE

A. Single-Source Responsibility for Products: Obtain each type and color of product specified from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.

B. Fire Performance Characteristics: Provide products with the following fire performance characteristics as determined by testing products per ASTM test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
1. Critical Radiant Flux: 0.45 watts per sq. cm or more per ASTM E 648.
2. Smoke Density: Less than 450 per ASTM E 662.

C. California High Performance Schools (CHIPS) Low-Emitting Materials Table: Materials submitted for rubber base assemblies must be listed as low emitting on the CHPS website,

www.CHPS.net, or must be tested by an independent laboratory to meet CHPS Section 01350. All components of an assembly must meet Section 01350 individually or in an assembly. Rubber assemblies include tile and adhesive.

D. All chemically based products such as sealers, primers, fillers, adhesives, etc. must be approved by Owner's Office of Environmental Health and Safety (OEHS).

E. Each selected color and configuration shall be from same dye lot and color.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to Project site in original manufacturer's unopened cartons and containers, each bearing names of product and manufacturer, Project identification, and shipping and handling instructions.

B. Store products in dry spaces protected from the weather with ambient temperatures maintained between 50 deg F and 90 deg F.

C. Move products into spaces where they will be installed at least 48 hours in advance of installation.

1.6 PROJECT CONDITIONS

A. Maintain a minimum temperature of 70 deg F in spaces to receive products specified in this Section for at least 48 hours prior to installation, during installation, and for not less than 48 hours after installation. After this period, maintain a temperature of not less than 55 deg F.

B. Do not install products until they are at the same temperature as that of the space where they are to be installed.

C. Close spaces to traffic during installation of products specified in this Section.

1.7 SEQUENCING AND SCHEDULING

A. Sequence installing products specified in this Section with other construction to minimize possibility of damage and soiling during remainder of construction period.

1.8 EXTRA MATERIALS

A. Deliver extra materials to Owner. Furnish extra materials matching products installed as described below, packaged with protective covering for storage, and identified with labels clearly describing contents.
   1. Furnish not less than 10 linear feet for each 500 linear feet or fraction thereof of each different type and color of resilient wall base installed.

1.9 WARRANTY

A. Manufacturer's Material Warranty: 2 years labor and materials for a material failure.

B. Installer's Warranty: 2-years labor and materials for an installation failure.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide products by one of the following manufacturer's. Colors as selected from the manufacturer's full range of standard and custom colors.
   1. Roppe, Pinnacle Rubber Base.
   2. Flexco Company, Wallflower Premium Rubber Wall Base.
   3. Burke Base, Premium Rubber Wall Base
   4. Equal products by one of the following may be submitted for review.
      a. Johnsonite equal
      b. Mannington equal

2.2 RESILIENT BASE

A. Rubber Wall Base: Conform to ASTM F 1861; Group 2, solid (homogeneous); Type 1, TS, (thermoset) vulcanized rubber, Style A, coved, 4 inch high unless otherwise indicated, integral colors as selected, non-shrinking, 1/8 inch thick, with jobsite formed outside corners.
   1. Rubber base will be PVC free with the ability to be recycled at the end of cove base life.

B. Preformed Corners: Provide preformed inside and outside corners; 2 1/4-inch minimum returns each direction coordinate placement with the architect.

2.3 INSTALLATION ACCESSORIES

A. Adhesives:
   1. Water-resistant with formulated biocide recommended by manufacturer to suit resilient base product and substrate conditions indicated.
   2. Use adhesives that comply with the following limits for low VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24) and are acceptable to the flooring manufacturer for the intended use:
      a. VCT, Linoleum and Asphalt Tile Adhesives: Not more than 50 g/L.
      b. Rubber Floor Adhesives: Not more than 60 g/L.
   3. Waterproof: Alkali resistant epoxy adhesive, formulated biocide-type as recommended by the specific flooring manufacturer. To be used in all areas subject to moisture and wetting such as in the vicinity of exterior doors, exits from shower areas, under drinking fountains, or any area subject to wetting splash or spillage. Adhesive shall ensure proper adhesion between floor covering and adhesive and between substrate and adhesive when floor covering or adhesive are subjected to moisture from above or below. Comply with low VOC requirements.
   4. Water-resistant: Alkali and water resistant, formulated biocide-type of the type recommended by flooring manufacturers to suit floor flooring products and substrate conditions indicated. Adhesive shall not be affected by or break down when exposed to moisture. Adhesive shall ensure proper adhesion between floor covering and adhesive and between substrate and adhesive when floor covering or adhesive are subjected to moisture from above or below. Comply with low VOC requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas where installation of products specified in this Section will occur, with Installer present, to verify that substrates and conditions are satisfactory for installation and comply with manufacturer's requirements and those specified in this Section.

3.2 PREPARATION

A. General: Comply with manufacturer's installation specifications for preparing substrates indicated to receive products indicated.

B. Remove coatings, and other substances that are incompatible with base adhesives and that contain soap, wax, oil, or silicone. ,

C. Vacuum substrates to be covered immediately before installing products specified in this Section. Following cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust.

D. Bond Test:
1. After the substrate has been properly and satisfactorily prepared, sounded, and tested for moisture, conduct a bond test with each type and combination of flooring material and adhesive to be used and provided under this specification.
2. Conduct adhesion tests according to adhesive and floor covering manufacturer’s instructions.
3. Record test values for each type and combination of flooring and adhesive to be used.
4. Send copies of test reports to the Owner and the Architect.

3.3 INSTALLATION

A. General: Install products specified in this Section using methods indicated according to manufacturer's installation directions.

B. Apply resilient wall base to walls, columns, pilasters, casework, and other permanent fixtures in rooms and areas where base is required. Install wall base in lengths as long as practicable. Tightly adhere wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
1. On irregular substrates, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.
2. Install inside and exterior corners before installing straight pieces.

C. Place resilient accessories so they are butted to adjacent materials of type indicated and bond to substrates with adhesive. Install reducer strips at edges of flooring that otherwise would be exposed.

3.4 CLEANING AND PROTECTION

A. Perform the following operations immediately after completing installation:
   1. Remove visible adhesive and other surface blemishes using cleaner recommended by manufacturers of resilient product involved.

B. Protect base against mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods indicated or recommended by manufacturer of resilient product involved.
   1. Cover resilient accessories on floors and stairs with undyed, untreated building paper until inspection for Substantial Completion.

C. Clean products specified in this Section not more than 4 days prior to dates scheduled for inspections intended to establish date of Substantial Completion in each area of Project. Clean products using method recommended by manufacturer.

END OF SECTION 09 65 18

SECTION 09 91 00 - PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes surface preparation, painting, and finishing of exposed interior and exterior items and surfaces.
   1. Surface preparation, priming, and finish coats specified in this Section are in addition to shop-priming and surface treatment specified under other Sections.
   2. Custom Finishes: Where finishes are specified, the Contractor shall provide for special custom colors, patterns, and finishes as selected by the Architect.

B. Paint exposed surfaces whether or not colors are designated in schedules, except where a surface or material is specifically indicated not to be painted or is to remain natural. Where an item or surface is not specifically mentioned, paint the same as similar adjacent materials or surfaces. If color or finish is not designated, the Architect will select from standard colors or finishes available.
   1. Painting includes field-painting 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.

C. Painting is not required on prefinished items, finished metal surfaces, concealed surfaces, operating parts, and labels.
   1. Prefinished items not to be painted include the following factory-finished components:
      a. Acoustic materials.
      b. Architectural woodwork and casework.
      c. Finished mechanical and electrical equipment.
      d. Light fixtures.
      e. Switchgear.
      f. Distribution cabinets.
   2. Concealed surfaces not to be painted include wall or ceiling surfaces in the following generally inaccessible areas:
      a. Foundation spaces.
      b. Furred areas.
      c. Utility tunnels.
      d. Pipe spaces.
      e. Duct shafts.
   3. Finished metal surfaces not to be painted include:
      a. Anodized aluminum.
      b. Stainless steel.
      c. Chromium plate.
      d. Copper.
      e. Bronze.
      f. Brass.

4. Operating parts not to be painted include moving parts of operating equipment, such as 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, Factory Mutual or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.
6. Do not paint over gypsum wall board surfaces that are to receive porcelain marker board resurfacing sheets.

D. Related Sections: The following Sections contain requirements that relate to this Section:
1. Division 05 Section "Structural Steel Framing" for shop-priming structural steel.
2. Division 08 Section "Hollow Metal Doors and Frames" for shop-priming steel doors and frames.
3. Divisions 23 and 26 for painting mechanical and electrical work is specified in Divisions 23 and 26, respectively.

1.3 SUBMITTALS

A. General: Submit the following according to Conditions of the Contract and Division 1 Specification Sections.

B. Product data for each paint system specified, including block fillers and primers.
1. Provide the manufacturer's technical information including label analysis and instructions for handling, storage, and application of each material proposed for use.
2. List each material and cross-reference the specific coating, finish system, and application. Identify each material by the manufacturer's catalog number and general classification.
3. When submitting a substitute for specified paints, submit Performance Characteristics based on same tests and units of measure as listed in published data for specified products. Drying times shall be measured at same temperature and relative humidity and gloss units measured at the same angle as those listed in the manufacturer’s published literature of the specified products. If manufacture’s published literature for substitute products states conditions that differ from those for the specified materials, submit certified calculations that convert advertised conditions to meet the conditions of the specified product. Submittals not meeting this requirement will not be reviewed.
4. Certification by the manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs).
5. Where substitutes are being submitted for review, as a minimum the following listed properties of the substitute product shall meet or exceed the same published properties of the specified product. Submittals without these properties will not be reviewed:
   a. Generically the same
   b. Solids volume
   c. Solids weight
   d. Recommended spread rate
   e. Recommended dry film thickness
   f. Drying times measured under the same conditions as those specified
   g. Sheen/Gloss measured at the same angle as those specified
   h. VOC properties
   i. Abrasion resistance measured by the same testing standard and using the same units of measure.

j. Hardness
k. Chemical resistance
l. Weather/UV resistance
m. Pot life

C. Samples for initial color, gloss, and texture selection in the form of manufacturer's color charts.
1. After color selection, the Architect will furnish color chips for surfaces to be coated.

D. Samples for Verification Purposes: Provide samples of each color and material to be applied, with texture to simulate actual conditions, on representative samples of the actual substrate.
1. Provide stepped samples, defining each separate coat, including block fillers and primers. Use representative colors when preparing samples for review. Resubmit until required sheen, color, and texture are achieved. Approved samples will be used as a standard to judge, accept, or reject color, gloss, texture, and other attributes of the applied paints. The Architect will have final judgement of aesthetics of applied paints.
2. Provide a list of material and application for each coat of each sample. Label each sample as to location and application.
3. Submit samples on the following substrates for the Architect's review of color and texture only:
a. Concrete Masonry: Provide two 4 x 8-inch samples of masonry, with mortar joint in the center, for each finish and color.
b. Painted Wood: Provide two 12-inch square samples of each color and material on hardboard.
c. Stained or Natural Wood: Provide two 4 x 8-inch samples of natural and stained wood finish on actual wood surfaces.
d. Ferrous Metal: Provide two 4-inch long samples of each color and finish.

E. Paint Schedule: After all painting has been completed and accepted by the Owner, the painting contractor shall prepare and submit to the Owner an as-painted painting schedule. This schedule shall be dated, in tabular form, and shall list the following information by room name/number:
1. Room Name
2. Room Number
3. Paint Manufacturer
4. Product Name
5. Product Color
6. Product Number

F. Certifications: Submit a copy of the following certifications to the Architect:
1. For each applicator, their current lead certification, in conformance with OSHA Standard 29CFR1926.62, showing date, place, and type of certification. Lead paint certifications for each applicator shall be maintained throughout the painting contract.
2. Lead physicals for each applicator in conformance with OSHA Standard 29CFR1926.62. Lead physicals for each applicator shall be maintained throughout the painting contract.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer shall meet all of the following requirements:
1. Have products and paint systems listed with the Master Painters Institute (MPI) at the time of invitation or advertisement for bids for this project.

2. Be able to provide published complete product performance data sheets for the specified products. These sheets shall be available at the time of invitation or advertisement for bids for this project.
3. Have the production volume capacity to develop, produce and deliver the volume of paint and coatings required for this project within the required lead times to meet delivery dates without delaying the project.
4. Be actively engaged in researching and developing its own paint and coating formulations.
5. Specialize in manufacturing paint and protective coatings of the type specified for this project.
6. Employ a fully trained and experienced technical staff capable of providing necessary field support to investigate problems and failures regarding surface preparation, application, and performance of supplied paints and coatings. As a minimum, technical staff shall have their own diagnostic equipment including dry film thickness gauges, adhesion gauges, and gloss meters.

B. Applicator Qualifications: Engage an experienced applicator who has completed painting system applications similar in material and extent to those indicated for the Project that have resulted in a construction record of successful in-service performance.

C. Single-Source Responsibility: Provide primers and undercoat paint produced by the same manufacturer as the finish coats.

D. Benchmark Samples (Mockups): Provide a full-coat benchmark finish, including painting and staining, sample of each type of coating, staining and natural finish and substrate required on the Project. Comply with procedures specified in PDCA P5. Duplicate finish of approved prepared samples.
   1. The Architect will select one room or surface to represent surfaces and conditions for each type of coating and substrate to be painted or finished with a stain or natural finish.
      a. Wall Surfaces: Provide samples on at least 100 sq ft of wall surface.
      b. Small Areas and Items: The Architect will designate an item or area as required.
   2. After permanent lighting and other environmental services have been activated, apply coatings in this room or to each surface according to the Schedule or as specified. Provide required sheen, color, and texture on each surface.
      a. After finishes are accepted, the Architect will use the room or surface to evaluate coating systems of a similar nature.
   3. Final approval of colors, stains, finishes and overall aesthetics will be determined by the Architect.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the job site in the manufacturer's original, unopened packages and containers bearing manufacturer's name and label, and the following information:
   1. Product name or title of material.
   2. Product description (generic classification or binder type).
   3. Manufacturer's stock number and date of manufacture.
   4. Contents by volume, for pigment and vehicle constituents.
   5. Thinning instructions.
   6. Application instructions.
   7. Color name and number.

B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain containers used in storage in a clean condition, free of foreign materials and residue.
   1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

1.6 JOB CONDITIONS

A. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are at manufacturer's recommended temperature. If no recommendation, then between 50 deg F and 90 deg F.

B. Apply solvent-thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are at manufacturer's recommended temperature. If no recommendation, then between 45 deg F. and 95 deg F.

C. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 90 percent; or at temperatures less than 5 F deg above the dew point and falling; or to damp or wet surfaces.
   1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by the manufacturer during application and drying periods.

D Paint that is applied under conditions other than these stated conditions will be removed, surfaces prepared, and new paint applied under acceptable conditions at no additional cost.

1.7 EXTRA MATERIALS

A. Provide 1 gallon of paint for each type and color of paint applied. Furnish extra paint in manufacturer's sealed shipping containers. Containers shall only be opened by the painter manufacturer/supplier to formulate required colors/mixes. These extra materials shall not be opened or used by the Contractor without written permission from the Owner. Place a label, protected by clear plastic, on the lid of each container with the following typewritten information:
   1. Paint Manufacturer
   2. Product name and number
   3. Mixing and color formulation
   4. Painting contractor
   5. Date that the paint container is put in the Owner's inventory
   6 Room or area number where the paint applied was used.

1.8 DEFINITIONS

A. Crazing: Fine, jagged, interconnected breaks in top layer or layers of paint.

B. Intercoat Peeling: Loss of adhesion between layers of paint.

C. Peeling: Loss of adhesion of paint from substrate.

D. Alligatoring: Crazing extending to substrate.

E. Chemical Methods: Paint removal by softening the paint by applying chemical stripper, followed by sanding.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer: Paint systems and manufacturers listed in the paint schedule are by The Sherwin-Williams Company and are intended to establish expected quality, performance, and type paint and are not intended to limit competition. However products submitted for review must meet or exceed the published performance criteria of the specified product. Submitted product must be accompanied with the manufacturer's published product date sheets that show performance criteria. Prepare supporting date in side-by-side tabular form showing the submitted criteria next to each specified performance criteria. Show submitted data using same tests and standards and with the values and results in the same units of measure as those shown for the specified item. All substitutes shall meet all of the minimum performance criteria of the specified product. Submittals not complying with this provision will be considered incomplete, unacceptable, and will not be reviewed or approved. Subject to compliance with requirements, products of one of the following manufacturers may be submitted for review.
1. Duron
2. ICI Paints
3. Porter Paints
4. PPG Industries, Pittsburgh Paints

B. The applicable paint manufacturer intended for use on this project shall review the specified paint systems for accuracy, performance, and product availability. Notify the Architect of any discrepancies and compatibility between the substrates and paint systems and for intended use. Submit a letter of review and acceptance to the Architect prior to date of Bid. Failure to submit the requested letter will be inferred as acceptance of the specified paint systems.

2.2 PAINT MATERIALS, GENERAL

A. Material Compatibility: Provide block fillers, primers, finish coat materials, and related materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by the manufacturer based on testing and field experience.

B. Material Quality: Provide the manufacturer's best-quality trade sale paint material of the various coating types specified. Paint material containers not displaying manufacturer's product identification will not be acceptable.

1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the

exclusion of equivalent products of other manufacturers. Furnish the manufacturer's material data and certificates of performance for proposed substitutions.

C. Colors: Provide for selections made by Architect from manufacturer's full range of standard and custom styles, colors, textures, and patterns.

D. Lead-Based Paint Barrier: Where existing lead-based paint is to be top-coated (encapsulated) with a new finish paint, lead barrier paints, that contact the existing lead-based paints and act as an intermediate coat between the lead-based paint and the finish coat, shall be as recommended by the paint manufacturer. This barrier paint shall be acceptable to EPA, OSHA, and local governing officials for the intended purpose. Notify the Architect where specified paints are not suitable for lead-based paint top-coatings (encapsulation).

E. Gloss: The following gloss levels, as established by the Master Painter Institute (MPI) shall apply to all references to gloss/sheen/luster.

MPI Gloss Level	**Common Description**	**Gloss Units at 60 Deg.**	**Gloss Units at 20 Deg.**	**Gloss Units at 85 Deg.**
1	Flat	0 to 5 units	---------	0 to 15
2	Velvet or Matte	5 to10 units	---------	Not listed
3	Eggshell	10 to 25 units	----------	5 to 25 units
4	Satin	20 to 35 units	----------	10 to 40 units
5	Semi-Gloss	35 to 70 units	5 to 45 units	---------
6	Gloss	70 to85 units	20 to 90 units	----------
7	High Gloss	Over 85 units	Not listed	----------

2.3 CLEANING AND CHEMICAL PAINT REMOVAL MATERIALS

A. To remove stains, spots, mold, and mildew, use Extra Muscle Pre-Paint Cleaner by Great Lakes Laboratories or as required by the paint manufacturer.

B. Chemical Paint Removal: Peel-Away 7 by Dumond or a reviewed substitute that meets the following requirements:
1. Suitable for interior and exterior substrates.
2. Removes epoxies, urethanes, acrylics, chlorinated rubber, mastics, automotive and marine finishes.
3. Removes multiple coats.
4. Contains no methylene chloride or caustic or flammable chemicals.
5. Does not require surface neutralization.

C. Safety Solvent Degreaser: Z99 Safety Solvent Degreaser by Zircon or a reviewed substitute.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions under which painting will be performed for compliance with paint application requirements. Surfaces receiving paint must be thoroughly dry before paint is applied.
   1. Do not begin to apply paint until unsatisfactory conditions have been corrected.
   2. Start of painting will be construed as the Applicator's acceptance of surfaces and conditions within a particular area.

B. Moisture Testing. Test all interior and exterior wood surfaces and to be painted with pinless moisture meter to ensure moisture level complies with manufacturer's requirements. If manufacturer does not have requirements, then 15 to 16 percent maximum for exterior wood and 8 percent maximum for interior wood. No painting will be permitted if moisture content exceeds the recommended content. Record the following minimum information and submit to the Architect:
   1. Name of person making measurements
   2. Date and time of measurement
   3. Manufacturer and model no. of meter being used.
   4. Weather conditions at time of measurements (temperature in deg. F., relative humidity in %, and dew point in deg. F.
   5. Location on structure of each reading. For reference, make measurements at a protected area known to be dry to establish a base line. As a minimum, make measurements at the following locations on each side of the structure at the roof line and the grade line.
      a. Trim
      b. Sills and Jambs (window and door)
      c. Doors
      d. Windows frames
      e. Weather boards
      f. Where wood is in contact with masonry, concrete, or stone, check moisture content of these materials on the meter's relative scale.
   6. Record moisture levels in percent for each reading.

C. Cementitious Materials:
   1. Masonry: Test all masonry surfaces that were exposed to moisture and are to be painted for moisture to ensure moisture level complies with manufacturer's requirements. Test with a pinless moisture meter calibrated for masonry. Moisture shall be within the limits of the paint manufacturer. If none specified, 12 percent or less.
   2. Concrete: Test all concrete surfaces to be painted or coated for moisture to ensure moisture level complies with manufacturer's requirements. Test with a pinless moisture meter specifically designed for and calibrated for concrete. Moisture shall be within the limits of the paint manufacturer. If none specified, 8 percent or less.

D. Dry Wall:
   1. Test all dry wall to be painted for moisture content levels that are acceptable to the paint manufacturer and the dry wall manufacturer. If acceptable levels are not available, then perform moisture tests in accordance with ASTM D4263 –Test Method For Indicating Moisture In Concrete By the Plastic Sheet Method. Although this method was developed for determining moisture presence in concrete, it is also suitable for dry wall work. If there is any presence of moisture on the back of the plastic sheet after the prescribed time, the dry wall is too damp to paint. Retest in the same location after the dry wall has been allowed to dry. Continue testing for moisture until there is no trace of moisture. Submit reports showing locations where tests were conducted.

2. Typical moisture meters are not calibrated to display the actual percent moisture in drywall. If a moisture meter must be used, take the average of several moisture measurements on drywall that is known to be dry. That average will establish a base line or reference point for comparing readings on questionable drywall. Measure the questionable drywall and compare that reading with the base line measurement. The readings should not be more than 10 reference points higher than the established base line.

E. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers. Notify the Architect about anticipated problems using the materials specified over substrates primed by others.

3.2 PREPARATION

A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted, or provide surface-applied protection prior to surface preparation and painting. Remove these items, if necessary, to completely paint the items and adjacent surfaces. Following completion of painting operations in each space or area, have items reinstalled by workers skilled in the trades involved.

B. Overhead Spraying
1. In areas where overhead structure is to be sprayed, spray the overhead first starting with the highest point and working down.
2. If possible spray the overhead before the walls and floors have been finished.
3. Protect all areas from overspray and fallout.

C Cleaning: Before applying paint or other surface treatments, clean the substrates of substances that could impair the bond of the various coatings. Remove oil and grease prior to cleaning. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

D Surface Preparation: Clean and prepare surfaces to be painted according to the manufacturer's instructions for each particular substrate condition and as specified.
1. Provide barrier coats over incompatible primers or remove and reprime. Notify Architect in writing about anticipated problems using the specified finish-coat material with substrates primed by others.
2. Cementitious Materials: Prepare concrete, concrete masonry block, and brick surfaces to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen, as required, to remove glaze and establish a suitable anchor pattern for topcoats. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.
    a. Ensure materials have cured a minimum of 28 days.
    b. Use abrasive blast-cleaning methods if recommended by the paint manufacturer.
    c. Fill and smooth all depressions, spalls, cracks, fissures, etc. with repair materials compatible with the substrate and finish paint, according to manufacturer’s instructions. All prepared and repaired surfaces shall have a smooth and uniform finish when painted.
    d. Moisture: Determine moisture content of surfaces by performing appropriate tests. Do not paint surfaces where moisture content exceeds that permitted in

manufacturer's printed directions. Submit test results along with locations where measurements were made to the Architect.

e. Alkalinity: Determine alkalinity content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Ensure that pH is 10 or lower. Submit test results along with locations where measurements were made to the Architect.

f. Brick: In addition to above, perform the following:
   1) Confirm with paint manufacturer that paint to be used is suitable for clay composition and glaze of the brick.
   2) Knock down glaze as recommended by the paint manufacturer.
   3) For previously painted brick, brush blast surfaces to achieve a surface profile acceptable to the paint manufacturer.
   4) Ensure that brick surfaces are primed with alkali resistant primer prior to applying finish paint.
   5) Do not apply primers or paints until a technical representative of the paint manufacturer has accepted the prepared surfaces.

3. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off. Orbital sanders are not permitted.

   a. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
   b. Prime, stain, or seal wood to be painted immediately upon delivery. Prime edges, ends, faces, undersides, and backsides of wood, including cabinets, counters, cases, and paneling.
   c. When transparent finish is required, backprime with spar varnish.
   d. Backprime paneling on interior partitions where masonry, or other wet wall construction occurs on backside.
   e. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately upon delivery.
   f. Do not use steel wool to sand or smooth wood.
   g. Check all wood surfaces for blue stain. Remove blue stain carefully with oxalic acid or Ply Brite.
   h. Where substrate bleeds through occurs, apply as many coats of stain block as necessary to stop the bleed through. Use blocker that is recommended by the finish coat manufacturer.
   i. Wash surfaces with mild solution of household detergent and gallon clean water, applied with medium soft fiber brush. Rinse with clean water and allow to dry completely.
   j. Crazing and Intercoat Peeling: Remove all paint layers.
   k. Peeling and Alligatoring: Remove all paint layers.

4. Ferrous Metals:
   a. Prepare only those surfaces that can be safely primed that same day while allowing for manufacturer’s recommended curing time. Do not allow prepared surfaces to remain unprimed longer than 8 hours or overnight. Prepared surfaces that are allowed to remain unprimed longer than 8 hours or overnight shall be prepared again as specified even if there are no traces of rust bloom or dirt.
   b. Remove loose dirt from damaged areas with a soft brush or with clean, non-linting rags.

c. Solvent-clean to remove grease, grime, residue, and surface contamination from damaged areas according to SSPC-SP1 – Solvent Cleaning.
d. Allow all surfaces solvent cleaned to thoroughly dry.
e. Remove loose primer and paint back to sound paint according to SSPC 3 – Power Tool Cleaning. Use SSPC 2 - Hand Tool Cleaning for areas not accessible to power tool cleaning. Remove all traces of visible mill scale, flux, and weld spatter.
f. Where existing primer is glazed or shiny, knock down glaze or gloss to establish and anchor pattern for new primer.
g Where existing primer appears to be thin as evidenced by shadows or variegated appearance, check thickness of primer with a magnetic thickness tester such as a Positester. If dry film thickness of primer is less than 2 mils, perform steps b, c, d, e, and f of this procedure, and prime as specified.
h. When performing surface preparation, feather all exposed edges of existing primer to zero.

5. Galvanized Surfaces:
   a. Remove soil, cement spatter, weld flux and spatter, and other surface dirt with a stiff brush, scraper, power grinder (for weld flux and spatter), or other suitable means.
   b. Remove oil or grease by wiping or scrubbing the surface with rags or brushes wetted with suitable solvent such as mineral spirits according to SSPC-SP1-Solvent Cleaning. Perform final wiping with clean solvent and clean rags or brushes. Suitable solvents are mineral spirits, turpentine, or high-flash naphtha. If high-flash naphtha is selected, it shall be used only outdoors or in an extremely well ventilated area. Only when conditions prevent the use of flammable or toxic solvents such as MEK, mineral spirits, etc. for cleaning, then use safety solvents such Safety Kleen Premium by Safety Kleen..
   c. Should residual oils be difficult to remove, use an alkaline detergent such as trisodium phosphate (TSP). After cleaning, wash these surfaces thoroughly with water to remove the alkaline residue. Use water or water under pressure, preferably both. Follow manufacturer's instructions closely.
   d. Some materials may not be easily removed by the above solvents and detergents. If this is the case, use stronger solvents such as methyl ethyl ketone (MEK) or acetone. Use aromatic and chlorinated hydrocarbons and ketones only when there is adequate supervision to assure safe working conditions.
   e. Allow surfaces to dry completely then apply a vinyl wash primer to a minimum dry film thickness of 0.5 mil but not exceed 1.0 mil. Top coat wash primer within 8 hours or as directed by coating manufacturer.
   f. Repair galvanized surfaces with galvanizing repair paint.
   g. Test for Passivation Treatment: Prior to painting or applying any type of treatment, prep, repair material, or coating, test all galvanized steel for passivation treatment as follows:
      1.) Remove all oils and contamination as previously described.
      2.) Thoroughly sand a small area of the galvanizing with 80-150 grit sandpaper.
      3.) Saturate a small cotton swab with a 2 % solution of copper sulfate (Available at most drug stores) and dab both the sanded area and an unsanded area of the galvanized steel.
      4.) If both the sanded and unsanded areas turn black at approximately the same time (within approximately 10 seconds), the galvanizing was not treated with a passivator.
      5.) If only the unsanded area does not turns black or turns black slower than the sanded area , the galvanized steel was treated with a passivator.

6.) If neither sanded or unsanded areas turn black, then the metal is not galvanized.
7.) If test indicates the metal is galvanized steel that has been treated with a passivator, then prepare the surfaces as recommended by the paint manufacturer.

6. Previously Painted Surfaces:
   a. Remove grease, oil and dirt according to SSPC-SP-1 solvent cleaning.
   b. Only when conditions prevent the use of flammable or toxic solvents such as MEK, mineral spirits, etc. for cleaning, then use safety solvents such as F0482 by Hexcel Chemical Products, 205 N. Main Street, Lodi, NJ 07644: phone 201 / 472-6800. Consult with Hexcel for specific products applications.
   c. Remove dust, grime, loose dirt, etc. with soft brush and vacuum. Remove all loose paint back to sound paint, and knock down all gloss. Roughen, as required, to remove glaze and establish a suitable anchor pattern for topcoats. Ensure that surfaces are sufficiently abraded and roughened to provide a sound anchoring base for new paint.
   d. Where rusting conditions exist on ferrous surfaces, remove rust according to SSPC-SP2-Hand Tool Cleaning or SSPC-SP3-Power Tool Cleaning. Touch up with one coat of coating recommended by finish coating manufacturer to a dry film thickness recommended by finish coat manufacturer.
   e. Where knots in wood are exposed or have damaged or discolored the finish, scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer and finish. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
   f. Where paint is missing, damaged, dented, or concrete, concrete block, wood, and gypsum wallboard, are exposed, remove surface contamination, feather all edges to zero, sand surfaces smooth, and prime surfaces with primer recommended by finish coating manufacturer. Primer shall be compatible with the existing and new finish.
   g. Where substrate bleeds through occurs, apply as many coats of stain block as necessary to stop the bleed through. Use blocker that is recommended by the finish coat manufacturer.
   h. Where paint is loose or is not otherwise fully and tightly adhered to the substrate or to undercoates, remove all paint back to the substrate and then feather all edges to zero. If 40 percent or more of the paint on a given substrate (wall, floor, ceiling, door, column, etc.) is loose or damaged or is otherwise unsound, remove all of the paint down to the substrate. If 25 percent or more of paint on given substrate is loose or is not otherwise fully and tightly adhered to the substrate or to undercoates, the technical representative of the paint manufacturer shall approve surface preparation prior to beginning painting.
   i. Test small area of previously painted finish with new finish paint in the presence of the Owner. Apply finish paint to specified thickness. Do not continue coating this previously painted surface until test area has been reviewed by the Owner. Continue test for manufacturer's recommended published "length of time before recoating". If the previously painted surface blisters, wrinkles, dissolves, delaminates, or shows other signs of incompatibility, the previously painted surface and new finish are not compatible. Where previously painted surface is not compatible with finish coat, apply a proper barrier coat to prime coat. Allow manufacturer's suggested drying time between succeeding coat and check film of previous coat with fingernail to be certain it is cured. Notify the Owner before applying succeeding coat so that previous coat may be inspected, if necessary, and

credited as an applied coat. Failure to do so shall result in recoating at no expense to the Owner.

j. Where surrounding paint has been removed to expose substrate and the edges of removed paint have feathered to zero, touch up exposed substrate with proper and recommended primer. After touch up has properly cured, apply a complete prime coat over entire surface to be painted including the touched up surfaces.

k. A qualified technical representative from the paint manufacturer shall approve, in writing, a sample surface preparation for each type substrate to be prepared over previously painted surfaces. This approval shall state time, date, location, and substrate being evaluated. The approved sample shall be a standard for evaluating all other surface preparation for the same substrate.

l. Lead-based paints:

1) Applicators involved in the disturbance of lead-based paint must comply with OSHA 29 CFR 1926.62. OSHA requires that the employees involved in the contact of lead-based paint must be trained, must have medical examinations (if the action level is exceeded during work activities involving the disturbance of lead-based paint), and must have an exposure assessment performed. If the employee is exposed to levels over the Permissible Exposure Limit (PEL), other work engineering and personnel protective equipment requirements of OSHA must be followed in accordance with 29 CFR 1926.62.

2) Perform required personnel air monitoring to establish employee exposure assessments in accordance with OSHA 29 CFR 1926.62 when working with lead-based paints. Send copy of the air monitoring reports to the Architect.

3) Prior to the disturbance of lead-based painted surfaces, place a layer of six mil polyethylene sheeting on the floor beneath the work area. The intent of work-related activities involving the disturbance of lead-based paint is to minimize large accumulations of lead. Clean up floors and other surfaces contaminated with lead-based paint dust/chips by vacuuming and/or wet wipe methods to minimize the likelihood of lead becoming airborne. The vacuum shall be equipped with HEPA filters. Compressed air shall not be used to remove lead from any surface unless the compressed air is used in conjunction with a ventilation system designed to capture the airborne dust created by the compressed air.

4) All construction debris having painted surfaces exceeding 0.06% lead must be disposed of in a municipal solid waste landfill (lined landfill) according to SCDHEC Division of Solid and Waste Planning and Recycling pertaining to waste disposal requirements. Hazardous waste shipments shall be accompanied by a Uniform Hazardous Waste Manifest that shall be properly completed and copies returned to the Architect before the Contractor receives final payment.

5) Upon completion of all work activities involving the disturbance of lead-based painted surfaces including the exterior of the building, the Architect will conduct a final visual inspection of the areas. Provided the areas are visibly clean, clearance testing shall be performed. The clearance test will include the collection of wipe samples from the interior areas of the building. These results will be compared to current regulatory requirements as outlined EPA 40 CFR Part 745. Should the clearance samples fail to meet the regulatory requirements outlined in EPA 40 CFR Part 745, the contractor will be required to perform additional cleaning, and a second clearance test will be performed at the Contractor’s expense for all professional and laboratory fees.

6) The Owner's Environmental Consultant and will review all OSHA documentation (training documentation and medical examination data for exposure to lead-based paint), conduct periodic site visits, and review all employee exposure assessment/personnel air monitoring data.

7. Dry Wall
   a. Inspect dry wall in the presence of the General Contractor, drywall contractor and Architect to evaluate condition of drywall for painting. Ensure that all defects in drywall are corrected prior to primer application.
   b. Brush or wipe down drywall surfaces with a damp (not wet) mop to remove all loose dust.
   c. Evaluate drywall surfaces after primer has cured. Primer will highlight imperfections that must be corrected prior to application of top coats.
   d. Determine if drywall imperfections are too excessive to repair and paint and coordinate with the Architect regarding removal of drywall and replacing with new drywall. If surfaces are to be repaired and painted, fill and smooth all depressions, spalls, cracks, fissures, etc. with repair materials compatible with the substrate and finish paint, according to manufacturer's instructions. All prepared and repaired surfaces shall have a smooth and uniform finish when painted.
   e. If drywall surfaces to be painted do not meet Gypsum Association for a Level 5 finish, apply the drywall surfacer according to the manufacturer's instructions to obtain an acceptable surface for painting. An acceptable surfacer is Builders Solution Surfacer A63W100 by Sherwin Williams or a reviewed substitute.

E. Materials Preparation: Carefully mix and prepare paint materials according to manufacturer's directions.
   1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
   2. Stir material before application to produce a mixture of uniform density; stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain material before using.
   3. Use only thinners approved by the paint manufacturer and only within recommended limits.
   4. Do not store shellac in iron containers.

F. Tinting: Tint each undercoat a lighter shade to facilitate identification of each coat where multiple coats of the same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat. Should there be a disagreement in the number of coats applied and the individual coats were not tinted so as to be distinguished, then the painting contractor shall apply, at no additional cost, the additional number of coats that when added to the number of coats already applied by the painting contractor and that can be positively distinguished, will equal the number of specified coats.

3.3 APPLICATION

A. General: Apply paint according to manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied.
   1. Use only primer color that is recommended on the back of the paint manufacturer's finish color chip to achieve the required color. Where the finish color, sheen, or texture is not as represented in the approved color sample and the recommended primer was not used, apply required additional coats to achieve acceptable results. These additional coats will be applied at no increase in contract sum or time.

B. Do not paint over defective undercoat, dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
   1. Paint colors, surface treatments, and finishes are indicated in the schedules.
   2. Provide finish coats that are compatible with primers used.
   3. The number of coats and the film thickness required are the same regardless of the application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. Sand between applications where sanding is required to produce a smooth even surface according to the manufacturer's directions.
   4. Apply additional coats if undercoats, stains, or other conditions show through final coat of paint until paint film is of uniform finish, color, texture, and appearance. Give special attention to ensure that surfaces, including edges, corners, crevices, welds, and exposed fasteners, receive a dry film thickness equivalent to that of flat surfaces. The additional coats shall be applied at no additional cost to the Owner.
   5. The term exposed surfaces includes areas visible when permanent or built-in fixtures, convector covers, covers for finned tube radiation, grilles, and similar components are in place. Extend coatings in these areas, as required, to maintain the system integrity and provide desired protection.
   6. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before the final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
   7. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, nonspecular black paint.
   8. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
   9. Finish interior of wall and base cabinets and similar field-finished casework to match exterior.
   10. Finish exterior doors on tops, bottoms, and side edges same as exterior faces.
   11. Sand lightly between each succeeding enamel or varnish coat.
   12. Omit primer on metal surfaces that have been shop-primed and touch-up painted.

C. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
   1. Allow sufficient time between successive coats to permit proper drying. Do not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where application of another coat of paint does not cause the undercoat to lift or lose adhesion.

D. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to the manufacturer's directions.
   1. Brushes: Use brushes best suited for the material applied.
   2. Rollers: Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by the manufacturer for the material and texture required.
   3. Spray Equipment: Use airless spray equipment with orifice size as recommended by the manufacturer for the material and texture required.

E. Minimum Coating Thickness: Apply materials no thinner than the manufacturer's recommended spreading rate and dry film thickness for each coat. Provide the total dry film thickness of the entire system as recommended by the manufacturer.

F. Block Fillers: Apply block fillers to concrete masonry at a rate and as many coats as required to fill, seal, and smooth, and to ensure complete coverage with pores filled so that finish produces

a smooth and cleanable surface. Prior to applying an epoxy finish to CMU in the Kitchen and Cafeteria, obtain approval from the District Food Supervisor, of the application of the block filler.

G. Prime Coats: Before applying finish coats, apply a prime coat of material, as recommended by the manufacturer, to material that is required to be painted or finished and that has not been prime-coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.
   1. Back Priming: Back prime, including all edges and concealed surfaces, of all lumber, ferrous and galvanized metal prior to installation. Apply primer to the same specifications as for the exposed surfaces. Installed items not back-primed shall be removed, properly primed, and reinstalled at the Contractor's expense. Damaged materials shall be replaced. This provision applies to both interior and exterior installations. Coordinate with all carpentry and steel specifications for materials to be painted.

H. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, cloudiness, color irregularity, runs, brush marks, orange peel, nail holes, or other surface imperfections.
   1. Provide satin finish for final coats.

I. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with specified requirements.

3.4 FIELD QUALITY CONTROL

A. Each applicator shall have a clean accurate wet film gauge for use over smooth surfaces (metal, GWB, smooth and plaster and concrete, etc.). During application of each coat of paint, including primers, each applicator shall make regular measurements of the applied paint using a clean wet film gauge. The gauge shall be wiped clean after each measurement.
   1. The project painting supervisor shall complete a Project Paint Record form similar to the form at the end of this specification. The forms shall be completed at the end of each day and submitted to the Architect weekly.
      a. Date: The date measurements were taken.
      b. Location: Room or area where measurements were made.
      c. Substrate: Drywall, CMU, wood, steel doors, structural steel, etc.
      d. Applied WFT or Spread Rate Per Coat: Show the specified wet film thickness (WFT) and the actual measured wet film thickness of each coat. Show the min-max range such as 4-6 mils. If a coat is not applicable (primer is shop-applied), no entry is required.
      e. For irregular surfaces such as CMU and rough concrete and plaster, thickness shall be determined by spread rate. Spread rate is determined as follows:
         1). Check the manufacturer's published theoretic spread rate of square feet per gallon per coat.
         2). Measure off the square footage a gallon of paint is to cover on the substrate that is to be painted
         3). Apply one gallon of properly prepared paint over the measured area of substrate using equipment and procedures that will be used for actual application.
         4). If the gallon of paint completely covers the measured area in an even and uniform manner with no drips, sags, runs, or spread marks, the spread rate is acceptable. If there is paint left over, the spread rate may be too high

resulting in a coat that is too thin. If the paint runs out before completing, the spread rate may be too low resulting in a coat that is too thick.

B. If the Owner or the Architect determine that the substrate or undercoats are visible through the finish, or the finish appearance is shaded, or texture is uneven, then additional coats shall be applied, at no additional cost to the Owner, to provide an acceptable finish.

C. If the Owner or Architect suspect that substrates were not properly prepared or improper primer/finishes were used, or that coatings were not applied to the recommend or specified rate or thickness, the Owner reserves the right to engage the testing and evaluation services of the either the Architect or an independent testing agency or both. 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 materials analysis.
      b. Abrasion resistance.
      c. Apparent reflectivity including color and shading of undercoats.
      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. If test results show that material being used does not comply with specified requirements, that substrate was not properly prepared, the specified or recommended number of coats were not applied, or the thickness of each coat is not as specified or recommended, then the Contractor may be directed to stop painting, remove noncomplying paint, pay for testing, repaint surfaces coated with rejected paint, and remove rejected paint from previously painted surfaces if, upon repainting with specified paint, the two coatings are incompatible.

3.5 CLEANING

A. Cleanup: At the end of each work day, remove empty cans, rags, rubbish, and other discarded paint materials from the site.
   1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping. Be careful not to scratch or damage adjacent finished surfaces.

3.6 PROTECTION

A. Protect work of other trades, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect.

B. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.
   1. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.7 EXTERIOR PAINT SCHEDULE

A. General: Review the specified painting systems and notify the Architect of any conflict between these systems and the painting manufacturer's recommendations. Where film thickness and spread rate are not listed, apply paints at manufacturer's published thickness and rate for specified paint. Surfaces are previously painted. Test the primer with the existing undercoat to ensure that primer is compatible with the existing undercoat to ensure compatibility.

B. Wood (previously painted)
   High performance Acrylic Gloss: 2 finish coats over primer.
   1. Primer: 1 coat A 100 Alkyd Primer Y24W20 at 4 mils WFT per coat
   2. Finish: 2 coats Superpaint Ext Gloss A84W507 at 4 mils WFT per coat

C. Ferrous Metals and Galvanized Steel, 2 coats over primer
   1. Primer: 1 coat Procryl Universal Primer B66W310 at 2-4 mils DFT per coat.
   2. Finish: 2 coats Pro-Industrial Pre-Catalyzed Epoxy at 4 mils WFT each coat.

3.8 INTERIOR PAINT SCHEDULE

A. General: Refer to the finish schedule for the type of required paint for a specific surface and select the applicable paint system from those specified. Where film thickness and spread rate are not listed, apply paints at manufacturer's published thickness and rate for specified paint. Review the specified painting systems and notify the Architect of any conflict between these systems and the painting manufacturer's recommendations. Were surfaces previously painted, test the primer with the existing undercoat to ensure that primer is compatible.

B. Concrete Masonry
   1. Primer: 1 coat PrepRite 200 Latex Primer at 4 mils per coat WFT
   2. Finish: 2 coats Pro-Industrial Pre-catalyzed Epoxy at 4 mils WFT each coat.

C. Gypsum Drywall
   1. Primer: 1 coat PrepRite 200 Latex Primer at 4 mils per coat WFT
   2. Finish: 2 coats Pro-Industrial Pre-catalyzed Epoxy at 4 mils WFT each coat.

D. Wood
   Semi-Gloss Enamel Finish: 2 coats over primer
   1. Primer: 1 coat PrepRite Wall and Wood Primer at 4 mils WFT.
   2. Finish: 2 Coats Pro-Industrial Pre-catalyzed Epoxy at 4 mils WFT each coat.

E. Ferrous Metals and Galvanized Steel, 2 coats over primer
   1. Primer: 1 coat Procryl Universal Primer B66W310 at 2-4 mils DFT per coat.
   2. Finish: 2 coats Pro-Industrial Pre-Catalyzed Epoxy at 4 mils WFT each coat.

END OF SECTION 09 91 00

PAINT MANUFACTURER'S
SURFACE PREPARATION EVALUATION

Project Name: Project No.
General Contractor Painting Contractor:

DATE EVALUATED	SUBSTRATE	LOCATION	ACCEPT.	* NOT ACCEPT.

* State reasons for rejection and what needs to be done to correct rejection.

Evaluations of the above described surfaces were conducted by me as indicated in the log.

Technical Representative's Signature, Title, and Company

Paint Manufacturer

PROJECT PAINT RECORD

Project Name: Comm. No.
General Contractor Painting Contractor:

DATE	LOCATION	SURFACE	APPLIED WFT. Enter Spread rate per coat for irregular surfaces such as CMU and course concrete.					
----------	-----------	----------	First/Primer		Intermediate		Finish	
----------	-----------	----------	Spec	Actual	Spec	Actual	Spec	Actual

SECTION 31 05 23 - CEMENT CONCRETE PAVEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes exterior cement concrete pavement for the following:
   1. Driveways and roadways.
   2. Parking lots.
   3. Curbs and gutters.
   4. Walkways.

1.3 SUBMITTALS

A. Product Data: For each type of manufactured material and product indicated.

B. Design Mixes: For each concrete pavement mix. Include alternate mix designs when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.

C. Samples: 10-lb sample of exposed aggregate.

D. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated, based on comprehensive testing of current materials:

E. Material Certificates: Signed by manufacturers certifying that each of the following materials complies with requirements:
   1. Cementitious materials and aggregates.
   2. Steel reinforcement and reinforcement accessories.
   3. Fiber reinforcement.
   4. Admixtures.
   5. Curing compounds.
   6. Applied finish materials.
   7. Bonding agent or adhesive.
   8. Joint fillers.

F. Minutes of preinstallation conference.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed pavement work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.
   1. Manufacturer must be certified according to the National Ready Mix Concrete Association's Plant Certification Program.

C. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.

D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant and each aggregate from one source.

E. ACI Publications: Comply with ACI 301, "Specification for Structural Concrete," unless modified by the requirements of the Contract Documents.

F. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixes.

G. Mockups: Cast mockups of full-size sections of concrete pavement to demonstrate typical joints, surface finish, texture, color, and standard of workmanship.
   1. Build mockups in the location and of the 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. Obtain Architect's approval of mockups before starting construction.
   4. Maintain approved mockups during construction in an undisturbed condition as a standard for judging the completed pavement.
   5. Demolish and remove approved mockups from the site when directed by Architect.
   6. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

H. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."
   1. Before submitting design mixes, review concrete pavement mix design and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with concrete pavement to attend, including the following:
      a. Contractor's superintendent.
      b. Independent testing agency responsible for concrete design mixes.
      c. Ready-mix concrete producer.
      d. Concrete subcontractor.

1.5 PROJECT CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

PART 2 - PRODUCTS

2.1 FORMS

A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.
1. Use flexible or curved forms for curves of a radius 100 feet or less.

B. 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.

2.2 STEEL REINFORCEMENT

A. Plain-Steel Welded Wire Fabric: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.

B. Deformed-Steel Welded Wire Fabric: ASTM A 497, flat sheet.

C. Reinforcement Bars: ASTM A 615/A 615M, Grade 60, deformed.

D. Steel Bar Mats: ASTM A 184/A 184M; with ASTM A 615/A 615M, Grade 60, deformed bars; assembled with clips.

E. Plain Steel Wire: ASTM A 82, as drawn.

F. Joint Dowel Bars: Plain steel bars, ASTM A 615/A 615M, Grade 60. Cut bars true to length with ends square and free of burrs.

G. Tie Bars: ASTM A 615/A 615M, Grade 60, deformed.

H. Hook Bolts: ASTM A 307, Grade A, internally and externally threaded. Design hook-bolt joint assembly to hold coupling against pavement form and in position during concreting operations, and to permit removal without damage to concrete or hook bolt.

I. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcement bars, welded wire fabric, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete or fiber-reinforced concrete of greater compressive strength than concrete, and as follows:
1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.

2.3 CONCRETE MATERIALS

A. General: Use the same brand and type of cementitious material from the same manufacturer throughout the Project.

B. Portland Cement: ASTM C 150, Type I or II.

1. Fly Ash: ASTM C 618, Class F or C.
2. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

C. Blended Hydraulic Cement: ASTM C 595M, Type IS, portland blast-furnace slag cement.

D. Aggregate: ASTM C 33, uniformly graded, from a single source, with coarse aggregate as follows:
1. Class: 1N.
2. Maximum Aggregate Size: 3/4 inch nominal.
3. Do not use fine or coarse aggregates containing substances that cause spalling.

E. Water: ASTM C 94.

2.4 ADMIXTURES

A. General: Admixtures certified by manufacturer to contain not more than 0.1 percent water-soluble chloride ions by mass of cement and to be compatible with other admixtures.

B. Air-Entraining Admixture: ASTM C 260.

C. Water-Reducing and Accelerating Admixture: ASTM C 494, Type E.

2.5 FIBER REINFORCEMENT

A. Synthetic Fiber: Fibrillated polypropylene fibers engineered and designed for use in concrete pavement, complying with ASTM C 1116, Type III, 1/2 to 1-1/2 inches long.

B. Products: Subject to compliance with requirements, provide one of the following:
1. Fibrillated Fibers:
   a. Fibrasol F; Axim Concrete Technologies.
   b. Fibermesh; Fibermesh, Div. of Synthetic Technologies.
   c. Forta CR; Forta Corporation.
   d. Grace Fibers; W. R. Grace & Co., Construction Products Div.

2.6 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

E. Clear Solvent-Borne Liquid-Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.

F. Products: Subject to compliance with requirements, provide one of the following:
1. Evaporation Retarder:
   a. Finishing Aid Concentrate; Burke Group, LLC (The).
   b. Aquafilm; Conspec Marketing & Manufacturing Co., Inc.
   c. Sure Film; Dayton Superior Corporation.
   d. Eucobar; Euclid Chemical Co.
   e. Lambco Skin; Lambert Corporation.
   f. E-Con; L&M Construction Chemicals, Inc.
   g. Finishing Aid; Symons Corporation.
2. Clear Solvent-Borne Liquid-Membrane-Forming Curing Compound:
   a. Res-X Cure All Resin; Burke Group, LLC (The).
   b. RX Cure; Conspec Marketing & Manufacturing Co., Inc.
   c. Day-Chem Rez Cure; Dayton Superior Corporation.
   d. Kurez DR; Euclid Chemical Co.
   e. #64 Resin Cure; Lambert Corporation.
   f. L&M Cure DR; L&M Construction Chemicals, Inc.
   g. Resi-Chem C309; Symons Corporation.

2.7 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.

B. Pavement-Marking Paint: Alkyd-resin type; ready mixed; complying with FS TT-P-115, Type I, or AASHTO M 248, Type N.

C. Pavement-Marking Paint: Latex, water-base emulsion; ready mixed; complying with FS TT-P-1952.
1. Color: As indicated.

D. Glass Beads: AASHTO M 247.

E. Wheel Stops: Precast, air-entrained concrete; 2500-psi minimum compressive strength; approximately 6 inches high, 9 inches wide, and 84 inches long. Provide chamfered corners and drainage slots on underside, and provide holes for dowel-anchoring to substrate.
1. Dowels: Galvanized steel, diameter of 3/4 inch, minimum length 10 inches.

F. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

G. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class and grade to suit requirements, and as follows:
1. Type II, non-load bearing, for bonding freshly mixed concrete to hardened concrete.
2. Types I and II, non-load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
3. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

2.8 CONCRETE MIXES

A. Prepare design mixes, proportioned according to ACI 211.1 and ACI 301, for each type and strength of normal-weight concrete determined by either laboratory trial mixes or field experience.

B. Use a qualified independent testing agency for preparing and reporting proposed mix designs for the trial batch method.
   1. Do not use Owner's field quality-control testing agency as the independent testing agency.

C. Proportion mixes to provide concrete with the following properties:
   1. Compressive Strength (28 Days): 3000 psi.
   2. Maximum Water-Cementitious Materials Ratio: 0.50.

D. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement according to ACI 301 requirements for concrete exposed to deicing chemicals.

E. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
   1. Fly Ash: 25 percent.
   2. Combined Fly Ash and Pozzolan: 25 percent.
   3. Ground Granulated Blast-Furnace Slag: 50 percent.
   4. Combined Fly Ash or Pozzolan, and Ground Granulated Blast-Furnace Slag: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.

F. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content of 2.5 to 4.5 percent.

G. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content as follows within a tolerance of plus or minus 1.5 percent:
   1. Air Content: 5.5 percent for 1-1/2-inch maximum aggregate.
   2. Air Content: 6.0 percent for 1-inch maximum aggregate.
   3. Air Content: 6.0 percent for 3/4-inch maximum aggregate.

H. Synthetic Fiber: Uniformly disperse in concrete mix at manufacturer's recommended rate, but not less than 1.0 lb/cu. yd..

2.9 CONCRETE MIXING

A. Ready-Mixed Concrete: Comply with requirements and with ASTM C 94 and ASTM C 1116.
   1. When air temperature is between 85 deg F and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

B. Project-Site Mixing: Comply with requirements and measure, batch, and mix concrete materials and concrete according to ASTM C 94. Mix concrete materials in appropriate drum- type batch machine mixer.

1. For mixers of 1 cu. yd. or smaller capacity, continue mixing at least one and one-half minutes, but not more than five minutes after ingredients are in mixer, before any part of batch is released.
2. For mixers of capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd..
3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mix type, mix time, quantity, and amount of water added.

PART 3 - EXECUTION

3.1 PREPARATION

A. Proof-roll prepared subbase surface to check for unstable areas and verify need for additional compaction. Proceed with pavement only after nonconforming conditions have been corrected and subgrade is ready to receive pavement.

B. Remove loose material from compacted subbase surface immediately before placing concrete.

3.2 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

B. Clean forms after each use and coat with form release agent to ensure separation from concrete without damage.

3.3 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating reinforcement and with recommendations in CRSI's "Placing Reinforcing Bars" for placing and supporting reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.

C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.

D. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

E. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities, or replace units as required before placement. Set mats for a minimum 2-inch overlap to adjacent mats.

3.4 JOINTS

A. General: Construct construction, isolation, and contraction joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated.
   1. When joining existing pavement, place transverse joints to align with previously placed joints, unless otherwise indicated.

B. Construction Joints: Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour, unless pavement terminates at isolation joints.
   1. Provide preformed galvanized steel or plastic keyway-section forms or bulkhead forms with keys, unless otherwise indicated. Embed keys at least 1-1/2 inches into concrete.
   2. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of pavement strips, unless otherwise indicated.
   3. Provide tie bars at sides of pavement strips where indicated.
   4. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
   5. Use epoxy bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.
   1. Locate expansion joints at intervals of 50 feet, unless otherwise indicated.
   2. Extend joint fillers full width and depth of joint.
   3. Terminate joint filler less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.
   4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
   5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
   6. Protect top edge of joint filler during concrete placement with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

D. Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt-coat one-half of dowel length to prevent concrete bonding to one side of joint.

E. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows:
   1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with groover tool to the following radius. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover marks on concrete surfaces.
      a. Radius: 1/4 inch.
   2. 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 developing random contraction cracks.

F. Edging: Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an edging tool to the following radius. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.
   1. Radius: 1/4 inch.

3.5 CONCRETE PLACEMENT

A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcement steel, and items to be embedded or cast in. Notify other trades to permit installation of their work.

B. Remove snow, ice, or frost from subbase surface and reinforcement before placing concrete. Do not place concrete on frozen surfaces.

C. Moisten subbase to provide a uniform dampened condition at the time concrete is placed. Do not place concrete around manholes or other structures until they are at the required finish elevation and alignment.

D. Comply with requirements and with recommendations in ACI 304R for measuring, mixing, transporting, and placing concrete.

E. Do not add water to concrete during delivery, at Project site, or during placement.

F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

G. Consolidate concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures to consolidate concrete according to recommendations in ACI 309R.
   1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand-spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.

H. Place concrete in two operations; strike off initial pour for entire width of placement and to the required depth below finish surface. Lay welded wire fabric or fabricated bar mats immediately in final position. Place top layer of concrete, strike off, and screed.
   1. Remove and replace portions of bottom layer of concrete that have been placed more than 15 minutes without being covered by top layer, or use bonding agent if approved by Architect.

I. Screed pavement surfaces with a straightedge and strike off. Commence initial floating using bull floats or darbies to form an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading dry-shake surface treatments.

J. Curbs and Gutters: When automatic machine placement is used for curb and gutter placement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing as

specified for formed concrete. If results are not approved, remove and replace with formed concrete.

K. When adjoining pavement lanes are placed in separate pours, do not operate equipment on concrete until pavement has attained 85 percent of its 28-day compressive strength.

L. 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 air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
2. Do not use frozen materials or materials containing ice or snow.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators, unless otherwise specified and approved in mix designs.

M. Hot-Weather Placement: Place concrete according to recommendations in ACI 305R and as follows when hot-weather conditions exist:
1. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 deg F. 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. Cover reinforcement steel with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog-spray forms, reinforcement steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.6 CONCRETE FINISHING

A. General: Wetting of concrete surfaces during screeding, initial floating, or finishing operations is prohibited.

B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and the concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots, and fill low spots. Refloat surface immediately to uniform granular texture.
1. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.

3.7 CONCRETE PROTECTION AND CURING

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 follow recommendations in ACI 305R for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to 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. Begin curing after finishing concrete, but not before free water has disappeared from concrete surface.

D. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:
   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. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
   3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.8 PAVEMENT TOLERANCES

A. Comply with tolerances of ACI 117 and as follows:
   1. Elevation: 1/4 inch.
   2. Thickness: Plus 3/8 inch, minus 1/4 inch.
   3. Surface: Gap below 10-foot- long, unleveled straightedge not to exceed 1/4 inch.
   4. Lateral Alignment and Spacing of Tie Bars and Dowels: 1 inch.
   5. Vertical Alignment of Tie Bars and Dowels: 1/4 inch.
   6. Alignment of Tie-Bar End Relative to Line Perpendicular to Pavement Edge: 1/2 inch.
   7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Pavement Edge: Length of dowel 1/4 inch per 12 inches.
   8. Joint Spacing: 3 inches.
   9. Contraction Joint Depth: Plus 1/4 inch, no minus.
   10. Joint Width: Plus 1/8 inch, no minus.

3.9 PAVEMENT MARKING

A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.

B. Allow concrete pavement to cure for 28 days and be dry before starting pavement marking.

C. Sweep and clean surface to eliminate loose material and dust.

D. Apply paint with mechanical equipment to produce pavement markings of dimensions indicated with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.
   1. Broadcast glass spheres uniformly into wet pavement markings at a rate of 6 lb/gal..

3.10 WHEEL STOPS

A. Securely attach wheel stops into pavement with not less than two galvanized steel dowels embedded in holes cast into wheel stops. Firmly bond each dowel to wheel stop and to pavement. Extend upper portion of dowel 5 inches into wheel stop and lower portion a minimum of 5 inches into pavement.

3.11 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing and inspection agency to sample materials, perform tests, and submit test reports during concrete placement. Sampling and testing for quality control may include those specified in this Article.

B. Testing Services: Testing shall be performed according to the following requirements:
   1. Sampling Fresh Concrete: Representative samples of fresh concrete shall be obtained according to ASTM C 172, except modified for slump to comply with ASTM C 94.
   2. Slump: ASTM C 143; one test at point of placement for each compressive-strength test, but not less than one test for each day's pour of each type of concrete. Additional tests will be required when concrete consistency changes.
   3. Air Content: ASTM C 231, pressure method; one test for each compressive-strength test, but not less than one test for each day's pour of each type of air-entrained concrete.
   4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each set of compressive-strength specimens.
   5. Compression Test Specimens: ASTM C 31/C 31M; one set of four standard cylinders for each compressive-strength test, unless otherwise indicated. Cylinders shall be molded and stored for laboratory-cured test specimens unless field-cured test specimens are required.
   6. Compressive-Strength Tests: ASTM C 39; one set for each day's pour of each concrete class exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd.. One specimen shall be tested at 7 days and two specimens at 28 days; one specimen shall be retained in reserve for later testing if required.
   7. When frequency of testing will provide fewer than five compressive-strength tests for a given class of concrete, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
   8. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, current operations shall be evaluated and corrective procedures shall be provided for protecting and curing in-place concrete.
   9. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive compressive-strength test results equal or exceed specified compressive strength and no individual compressive-strength test result falls below specified compressive strength by more than 500 psi.

C. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 24 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing agency, concrete type and class, location of concrete batch in pavement, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

D. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as the sole basis for approval or rejection.

E. Additional Tests: Testing agency shall make additional tests of the concrete when test results indicate slump, air entrainment, concrete strengths, or other requirements have not been met, as directed by Architect. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed.

3.12 REPAIRS AND PROTECTION

A. Remove and replace concrete pavement that is broken, damaged, or defective, or does not meet requirements in this Section.

B. Drill test cores where directed by Architect when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to pavement with epoxy adhesive.

C. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.

D. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 31 05 23

SECTION 32 92 02 -GRASS RESTORATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This section includes repairing and replacing grassing that is damaged during the construction operations.

1.3 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product certificates signed by manufacturers certifying that their products comply with specified requirements.

1. Manufacturer's certified analysis for standard products.

2. Analysis for other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.

C. Certification of grass seed from seed vendor for each grass-seed mixture stating the botanical and common name and percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

D. Samples of each of the following:

1. 5 lb of mineral mulch for each color and texture of stone required for Project, in labeled plastic bags.

2. Edging materials and accessories to verify color selected.

E. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and address of architects and owners, and other information specified.

F. Material test reports from qualified independent testing agency indicating and interpreting test results relative to compliance of the following materials with requirements indicated.

G. The Contractor shall fully comply with all provisions of the Contract Documents including, but not limited to, providing and installing such entities as the products, materials, equipment,

components, or systems that were proposed at the time bids were received. Except for extenuating circumstances as determined by the Architect, notification of not being able to meet any of the provisions of the Contract Documents or communicating conflicts in the Contract Documents to the Architect will not be considered after receipt of bids; and the Contractor shall fully comply with the Contract Documents at no increase in Contract Sum or Contract Time.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Packaged Materials: Deliver packaged materials in containers showing weight, analysis, and name of manufacturer. Protect materials from deterioration during delivery and while stored at site.

B. Seed: Deliver seed in original sealed, labeled, and undamaged containers.

C. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." Coordinate grass schedule with the Owner for types of grass to be planted, location of grass types, planting times, and maintenance.

1.5 COORDINATION AND SCHEDULING

A. Coordinate installation of planting materials during normal planting seasons for each type of plant material required.

1.6 WARRANTY

A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

B. Special Warranty: Warrant the grass for a period of one year after date of Substantial Completion, against defects including death and unsatisfactory growth, except for defects resulting from lack of adequate maintenance, neglect, or abuse by Owner, abnormal weather conditions unusual for warranty period, or incidents that are beyond Contractor's control.

1.7 GRASS MAINTENANCE

A. Begin maintenance of grass immediately after each area is planted and continue until acceptable grass is established. Grass maintenance will end at final completion.

B. Maintain and establish grass by watering, fertilizing, weeding, mowing, trimming, replanting, and other operations. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth grass.

C. Watering: Provide and maintain temporary piping, hoses, and grass watering equipment to convey water from sources and to keep grass uniformly moist to a depth of 4 inches.

1. Water grass at the minimum rate of 1 inch per week.

D. Mow grass as soon as there is enough top growth to cut with mower set at specified height for principal species planted. Repeat mowing as required to maintain specified height without cutting more than 40 percent of the grass height. Remove no more than 40 percent of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet.

E. Postfertilization: Apply fertilizer to grass after first mowing and when grass is dry.

1. Use fertilizer that will provide actual nitrogen of at least 1 lb per 1000 sq. ft. of grass area.

PART 2 - PRODUCTS

2.1 GRASS MATERIALS

A. Grass Seed: Fresh, clean, dry, new-crop seed complying with the Association of Official Seed Analysts' "Rules for Testing Seeds" for purity and germination tolerances.

1. Seed Mixture: Provide seed of grass species and varieties, proportions by weight, and minimum percentages of purity, germination, and maximum percentage of weed seed as indicated on Schedules at the end of this Section.

2.2 TOPSOIL

A. Topsoil: ASTM D 5268, pH range of 5.5 to 7, 4 percent organic material minimum, free of stones 1 inch or larger in any dimension, and other extraneous materials harmful to plant growth.

1. Topsoil Source: Reuse surface soil stockpiled on the site. Verify suitability of surface soil to produce topsoil meeting requirements and amend when necessary. Supplement with imported topsoil when quantities are insufficient. Clean topsoil of roots, plants, sods, stones, clay lumps, and other extraneous materials harmful to plant growth. Place topsoil to a minimum of 4” using stockpiled or imported topsoil.

2.3 SOIL AMENDMENTS

A. Lime: ASTM C 602, Class T, agricultural limestone containing a minimum 80 percent calcium carbonate equivalent, with a minimum 99 percent passing a No. 8 sieve and a minimum 75 percent passing a No. 60 sieve.

2.4 FERTILIZER

A. Bonemeal: Commercial, raw, finely ground; minimum of 4 percent nitrogen and 20 percent phosphoric acid.

B. Superphosphate: Commercial, phosphate mixture, soluble; minimum of 20 percent available phosphoric acid.

C. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea-form, phosphorous, and potassium in the following composition:

1. Composition: 1 lb per 1000 sq. ft. of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.

2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.

D. Slow-Release Fertilizer: Granular fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: 10 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.

2.5 MULCHES

A. Organic Mulch: Organic mulch, free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of one of the following:

1. Type: Shredded hardwood.
2. Type: Ground or shredded bark.
3. Type: Pine straw.
4. Type: Salt hay or threshed straw.
5. Type: Wood and bark chips.
6. Type: Pine needles.
7. Type: Peanut, pecan, and cocoa-bean shells.

2.6 EROSION-CONTROL MATERIALS

A. Blankets: Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended steel wire staples, 6 inches long.

B. Fiber Mesh: Biodegradable twisted jute or spun-coir mesh, 0.92 lb per sq. yd. minimum, with 50 to 65 percent open area. Include manufacturer's recommended steel wire staples, 6 inches long.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas that have been damaged by constuction activities to determine the extent of repair. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PLANTING SOIL PREPARATION

A. Recondition existing grass areas damaged by Contractor's operations, including storage of materials or equipment and movement of vehicles. Also recondition grass areas where

settlement or washouts occur or where minor regrading is required. Remove all ruts and other traces of activity and restore to a condition ready for grassing.

B. Prepare areas damaged by construction activities as follows:

1. Grade grass areas to a smooth, even surface with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit fine grading to areas that can be planted in the immediate future. Remove trash, debris, stones larger than 1-1/2 inches in any dimension, and other objects that may interfere with planting or maintenance operations.

2. Remove sod and vegetation from diseased or unsatisfactory grass areas; do not bury into soil. Remove topsoil containing foreign materials resulting from Contractor's operations, including oil drippings, fuel spills, stone, gravel, and other construction materials, and replace with new topsoil.

    a. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of it off the Owner's property.

3. Where substantial grass remains, mow, dethatch, core aerate, and rake. Remove weeds before seeding. Where weeds are extensive, apply selective herbicides as required. Do not use pre-emergence herbicides.

4. Where grass cannot be reconditioned, remove and dispose of existing grass, vegetation, and turf damaged during construction activities. Do not turn over into soil being prepared for grasss.

5. Till surface soil to a depth of at least 6 inches. Apply required soil amendments and initial fertilizers and mix thoroughly into top 4 inches of soil. Trim high areas and fill in depressions. Till soil to a homogenous mixture of fine texture.

6. Before mixing seed, clean topsoil of roots, plants, sods, stones, clay lumps, and other extraneous materials harmful to plant growth.

7. Mix soil amendments and fertilizers with topsoil at rates indicated. Delay mixing fertilizer if planting does not follow placing of planting soil within a few days.

8. Mix planting soil either prior to planting or apply on surface of topsoil and mix thoroughly before planting.

    a. Mix lime with dry soil prior to mixing fertilizer. Prevent lime from contacting roots of acid-tolerant plants.

9. Limit subgrade preparation to areas that will be planted in the immediate future.

10. Loosen subgrade to a minimum depth of 4 inches. Remove stones larger than 1-1/2 inches in any dimension and sticks, roots, rubbish, and other extraneous materials.
    a. Clean surface soil of roots, plants, sods, stones, clay lumps, and other extraneous materials harmful to plant growth.

    b. Remove waste material, including grass, vegetation, and turf, and legally dispose of it off the Owner's property.

11. Spread planting soil mixture to depth required to meet original thickness, grades, and after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen.

    a. Place approximately 1/2 the thickness of planting soil mixture required. Work into top of loosened subgrade to create a transition layer and then place remainder of planting soil mixture.

    b. Restore prepared areas if eroded or otherwise disturbed after fine grading and before planting.

12. Moisten prepared grassing areas before planting when soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

3.3 MULCHING

A. Mulch backfilled surfaces of slopes, pits, trenches, planted areas.

B. Weed-Control Barriers: Install the following weed-control barriers according to manufacturer's recommendations, before mulching. Completely cover area to be mulched, lapping edges a minimum of 6 inches.

    1. Material and Seam Treatment: Sheet polyethylene with seams taped.

C. Organic Mulch: Apply the following average thickness of organic mulch and finish level with adjacent finish grades. Do not place mulch against trunks or stems.

    1. Thickness: 2 inches.

3.4 SEEDING

A. Sow seed with a spreader or a seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph. Evenly distribute seed by sowing equal quantities in 2 directions at right angles to each other.

    1. Do not use wet seed or seed that is moldy or otherwise damaged in transit or storage.

B. Rake seed lightly into top 1/8 inch of topsoil, roll lightly, and water with fine spray.

C. Protect seeded areas with slopes less than 1:6 against erosion by spreading straw mulch after completion of seeding operations. Spread uniformly at a minimum rate of 2 tons per acre to form a continuous blanket 1-1/2 inches loose depth over seeded areas. Spread by hand, blower, or other suitable equipment.

    1. Anchor straw mulch by crimping into topsoil by suitable mechanical equipment.

3.5 HYDROSEEDING

A. Hydroseeding: Mix specified seed, fertilizer, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogenous slurry suitable for hydraulic application.

1. Mix slurry with nonasphaltic tackifier.

3.6 CLEANUP AND PROTECTION

A. During grassing, keep pavements clean and work area in an orderly condition.

B. Protect landscaping from damage due to grassing operations, operations by other contractors and trades, and trespassers. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged landscape work as directed.

3.7 DISPOSAL OF SURPLUS AND WASTE MATERIALS

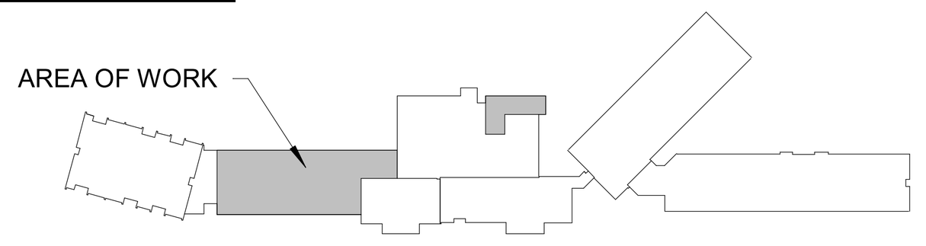
A. Disposal: Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of it off the Owner's property.

3.8 SEED MIXTURES SCHEDULE

A. Provide a seed mixture to match existing grass. If no existing provide grass accoding to the following schedule:

END OF SECTION 32 92 00

KEY PLAN



mcmillan
pazdan
smith
ARCHITECTURE

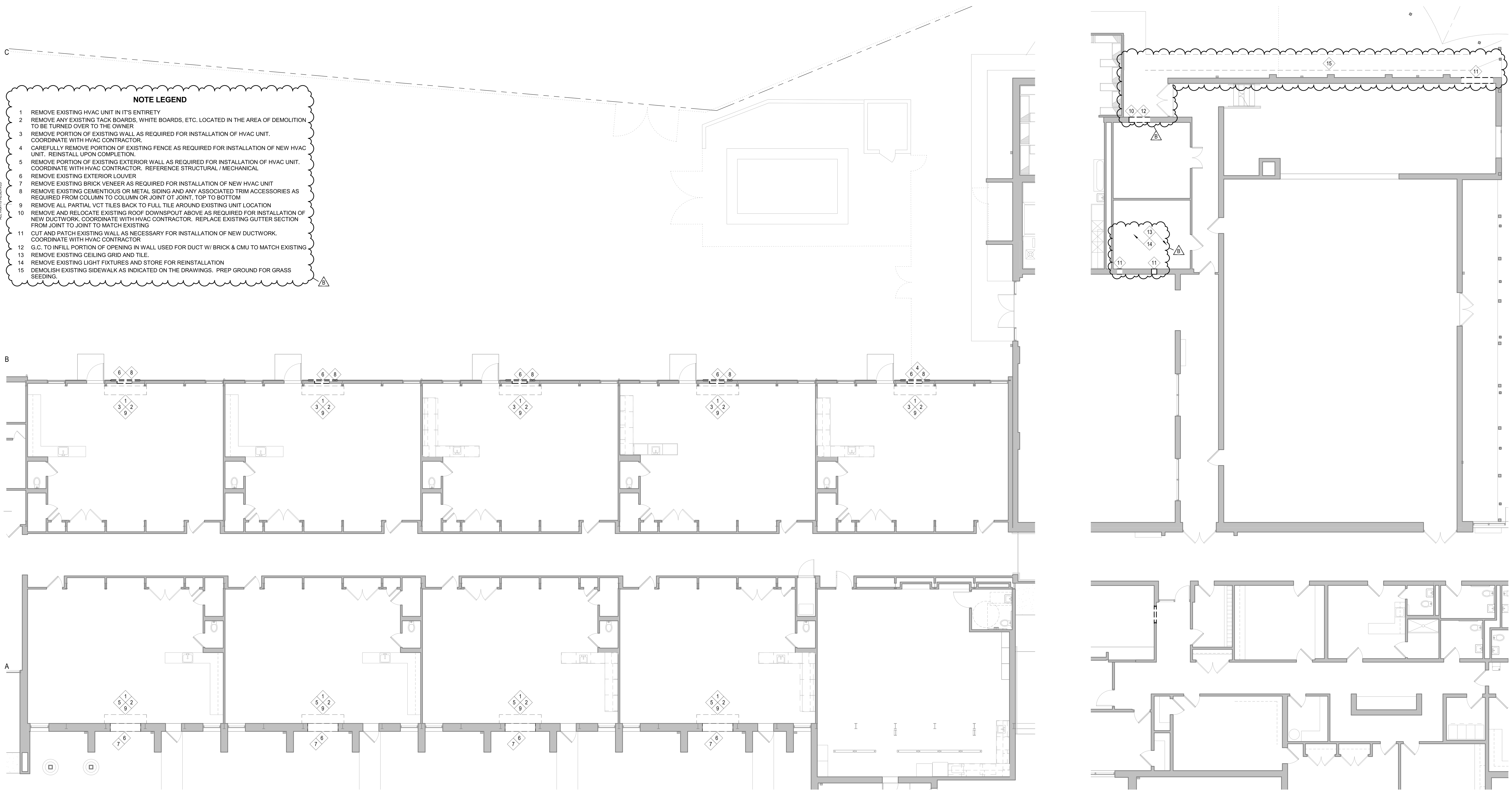
CONSULTANT LOGO

SEALS

Spartanburg Co. School District 7
IFB #19-20-10

HVAC REPLACEMENT FOR DISTRICT 7 EARLY LEARNING CENTER

301 CRECENT AVENUE
SPARTANBURG, SC 29306



NOTE LEGEND

1 REMOVE EXISTING HVAC UNIT IN IT'S ENTIRETY
2 REMOVE ANY EXISTING TACK BOARDS, WHITE BOARDS, ETC. LOCATED IN THE AREA OF DEMOLITION TO BE TURNED OVER TO THE OWNER
3 REMOVE PORTION OF EXISTING WALL AS REQUIRED FOR INSTALLATION OF HVAC UNIT. COORDINATE WITH HVAC CONTRACTOR.
4 CAREFULLY REMOVE PORTION OF EXISTING FENCE AS REQUIRED FOR INSTALLATION OF NEW HVAC UNIT. REINSTALL UPON COMPLETION.
5 REMOVE PORTION OF EXISTING EXTERIOR WALL AS REQUIRED FOR INSTALLATION OF HVAC UNIT. COORDINATE WITH HVAC CONTRACTOR. REFERENCE STRUCTURAL / MECHANICAL
6 REMOVE EXISTING EXTERIOR LOUVER
7 REMOVE EXISTING BRICK VENEER AS REQUIRED FOR INSTALLATION OF NEW HVAC UNIT
8 REMOVE EXISTING CEMENTIOUS OR METAL SIDING AND ANY ASSOCIATED TRIM ACCESSORIES AS REQUIRED FROM COLUMN TO COLUMN OR JOINT OT JOINT, TOP TO BOTTOM
9 REMOVE ALL PARTIAL VCT TILES BACK TO FULL TILE AROUND EXISTING UNIT LOCATION
10 REMOVE AND RELOCATE EXISTING ROOF DOWNSPOUT ABOVE AS REQUIRED FOR INSTALLATION OF NEW DUCTWORK. COORDINATE WITH HVAC CONTRACTOR. REPLACE EXISTING GUTTER SECTION FROM JOINT TO JOINT TO MATCH EXISTING
11 CUT AND PATCH EXISTING WALL AS NECESSARY FOR INSTALLATION OF NEW DUCTWORK. COORDINATE WITH HVAC CONTRACTOR
12 G.C. TO INFILL PORTION OF OPENING IN WALL USED FOR DUCT W/ BRICK & CMU TO MATCH EXISTING
13 REMOVE EXISTING CEILING GRID AND TILE.
14 REMOVE EXISTING LIGHT FIXTURES AND STORE FOR REINSTALLATION
15 DEMOLISH EXISTING SIDEWALK AS INDICATED ON THE DRAWINGS. PREP GROUND FOR GRASS SEEDING.

A1 / A100 **DEMOLITION PLAN**
1/8" = 1'-0"

SHEET ISSUE:

NO.	DATE	DESCRIPTION	BY
A	03/02/2020	ISSUED FOR BIDS	DLL
B	03/13/2020	ADDENDUM #1	DLL

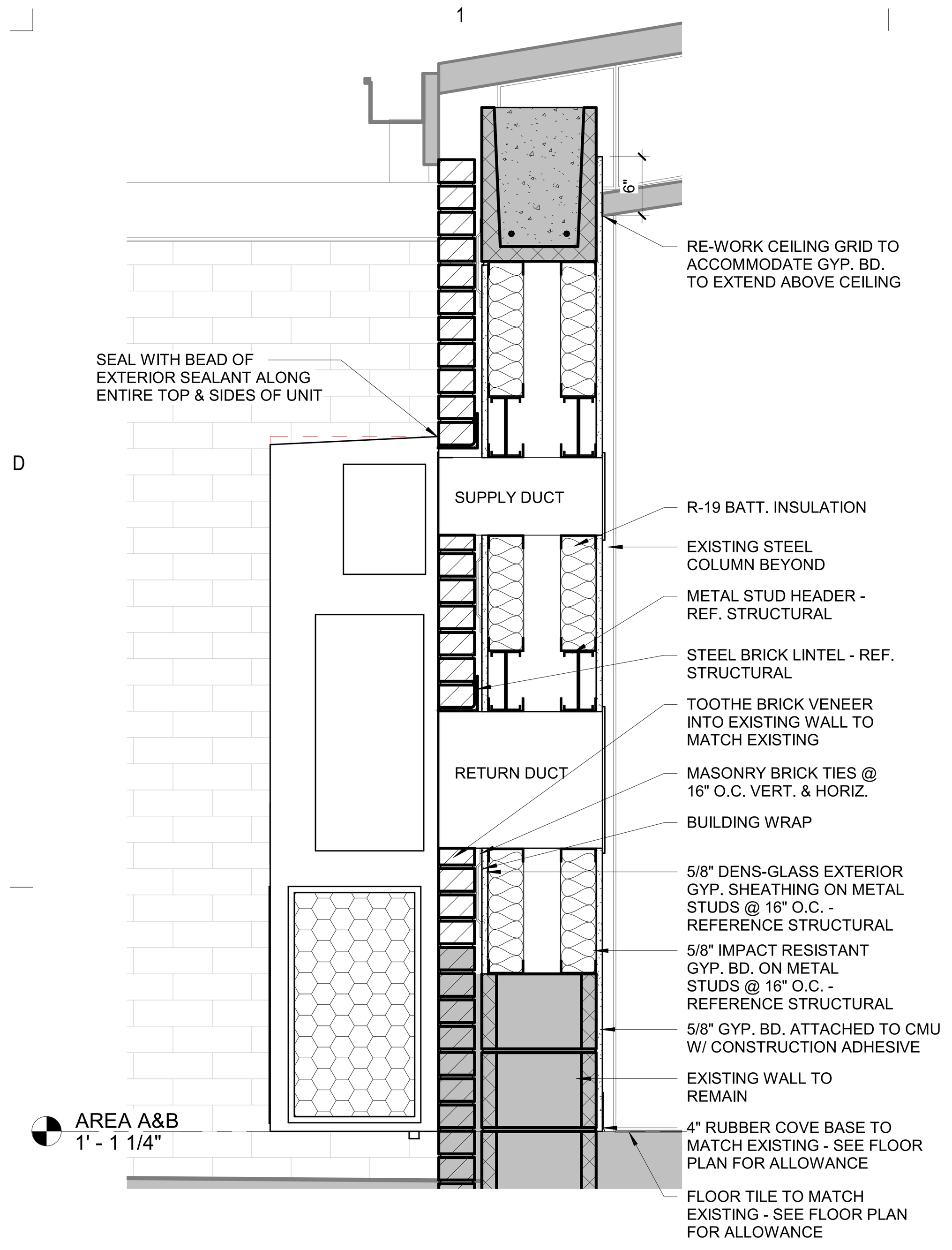
ADDENDUM #1 03/13/2020

PRINCIPAL IN CHARGE: DLL
PROJECT ARCHITECT: DLL
DRAWN BY: MSM

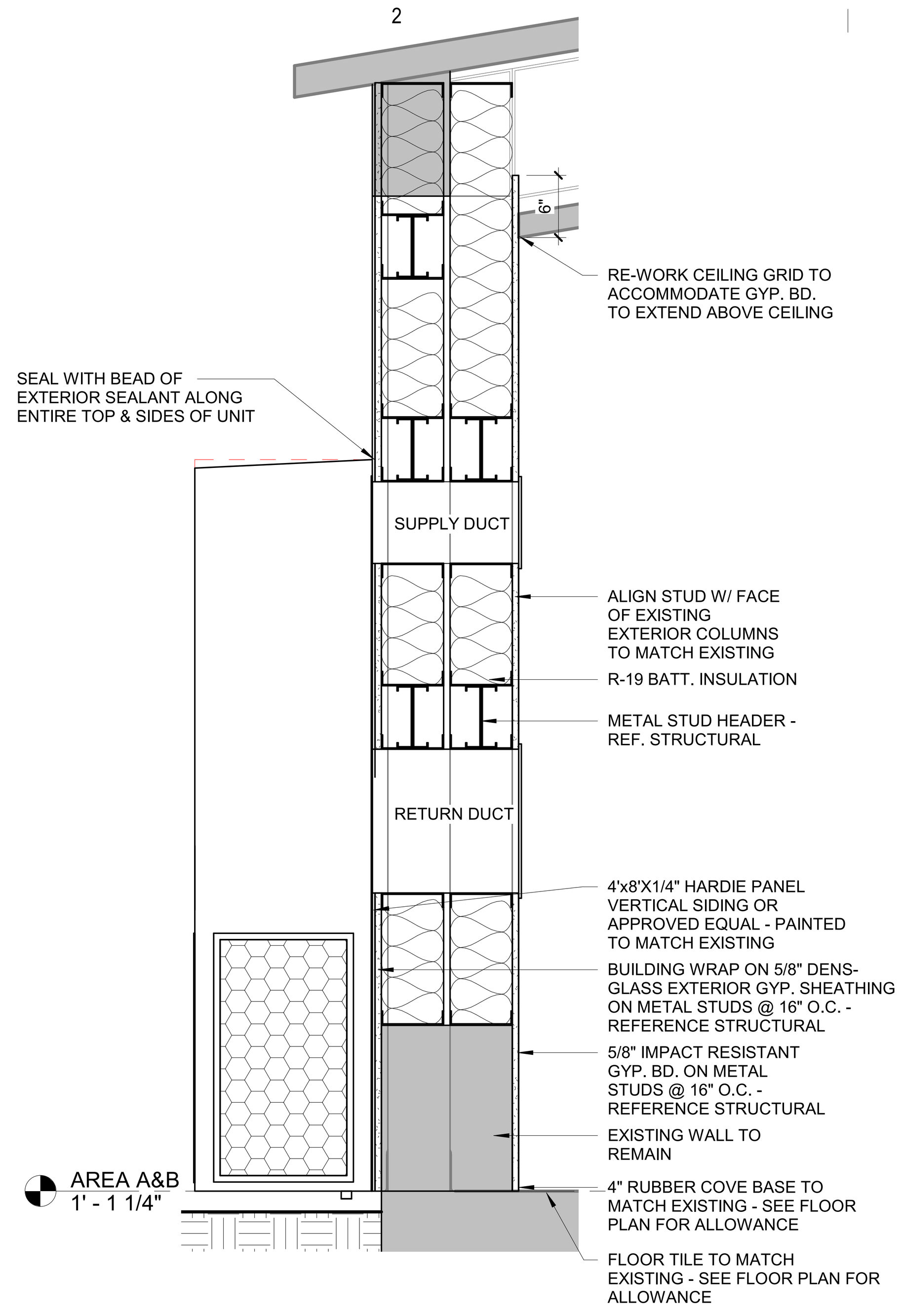
SHEET TITLE:
DEMOLITION PLAN

SHEET NO. A100

PROJ. NO. 019080.00



C1 A101 **WALL SECTION @ FRONT WALL**
1" = 1'-0"



C2 A101 **WALL SECTION @ REAR WALL**
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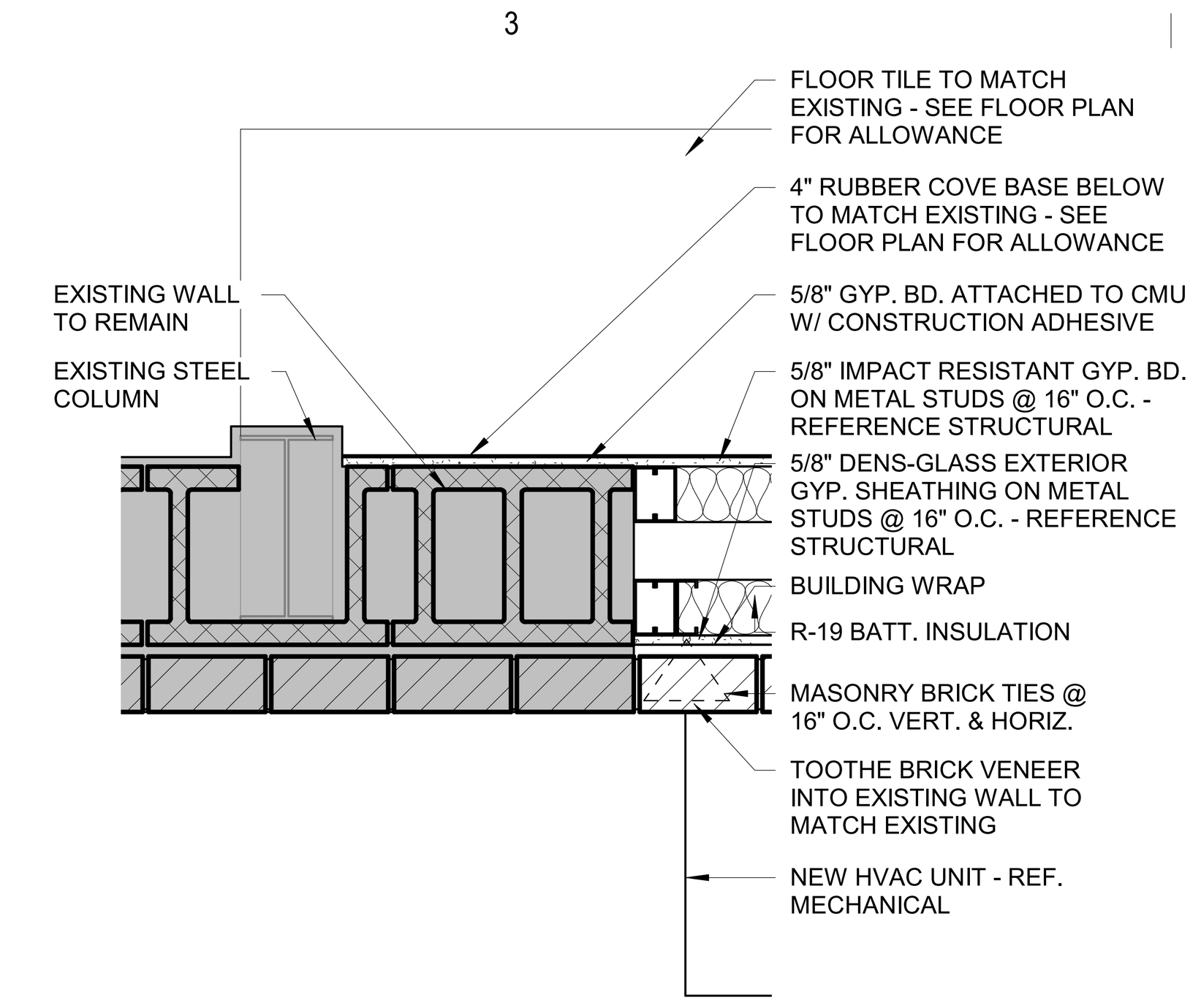
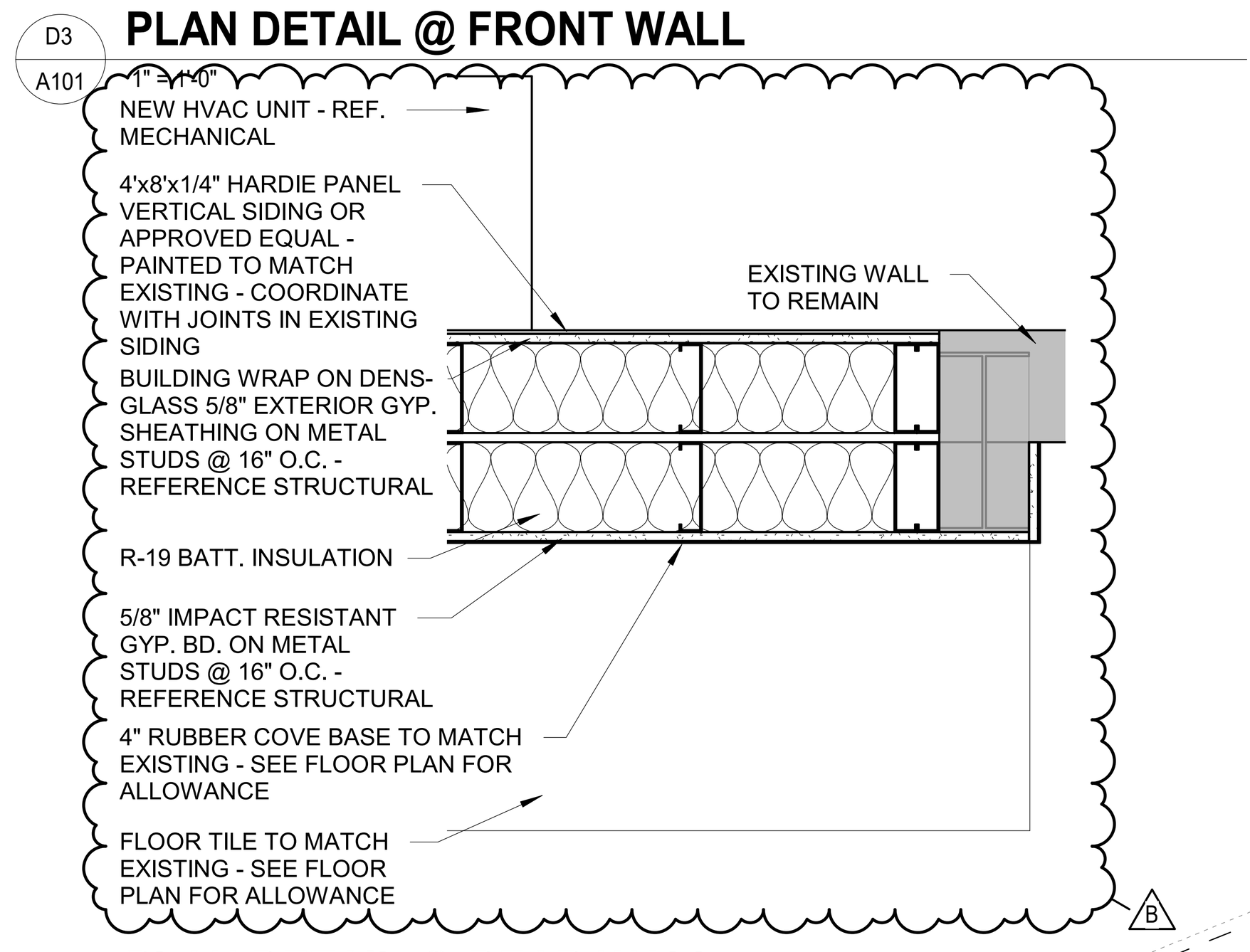


D3 A101 **PLAN DETAIL @ FRONT WALL**
1" = 1'-0"



C3 A101 **PLAN DETAIL @ REAR WALL**
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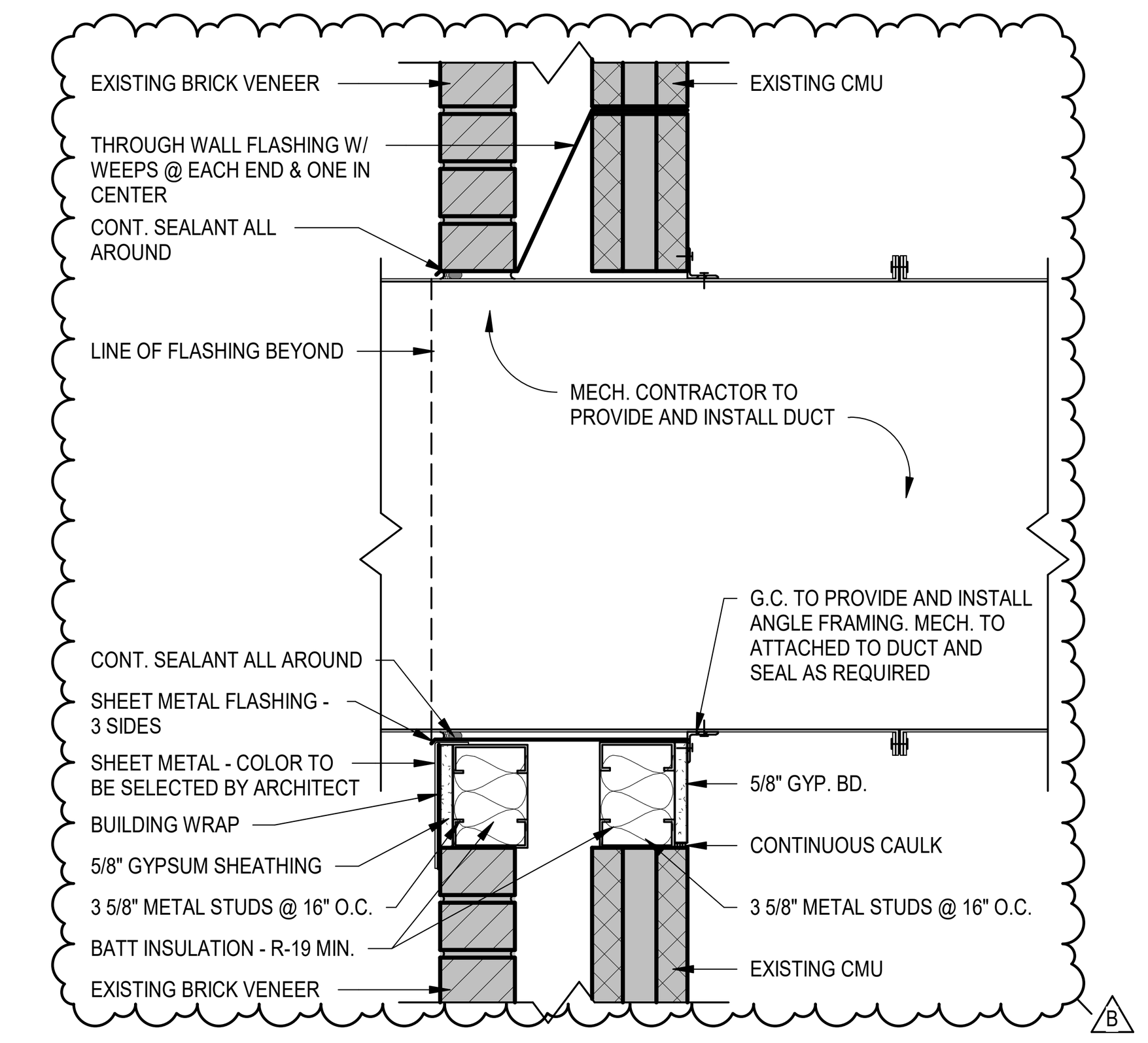
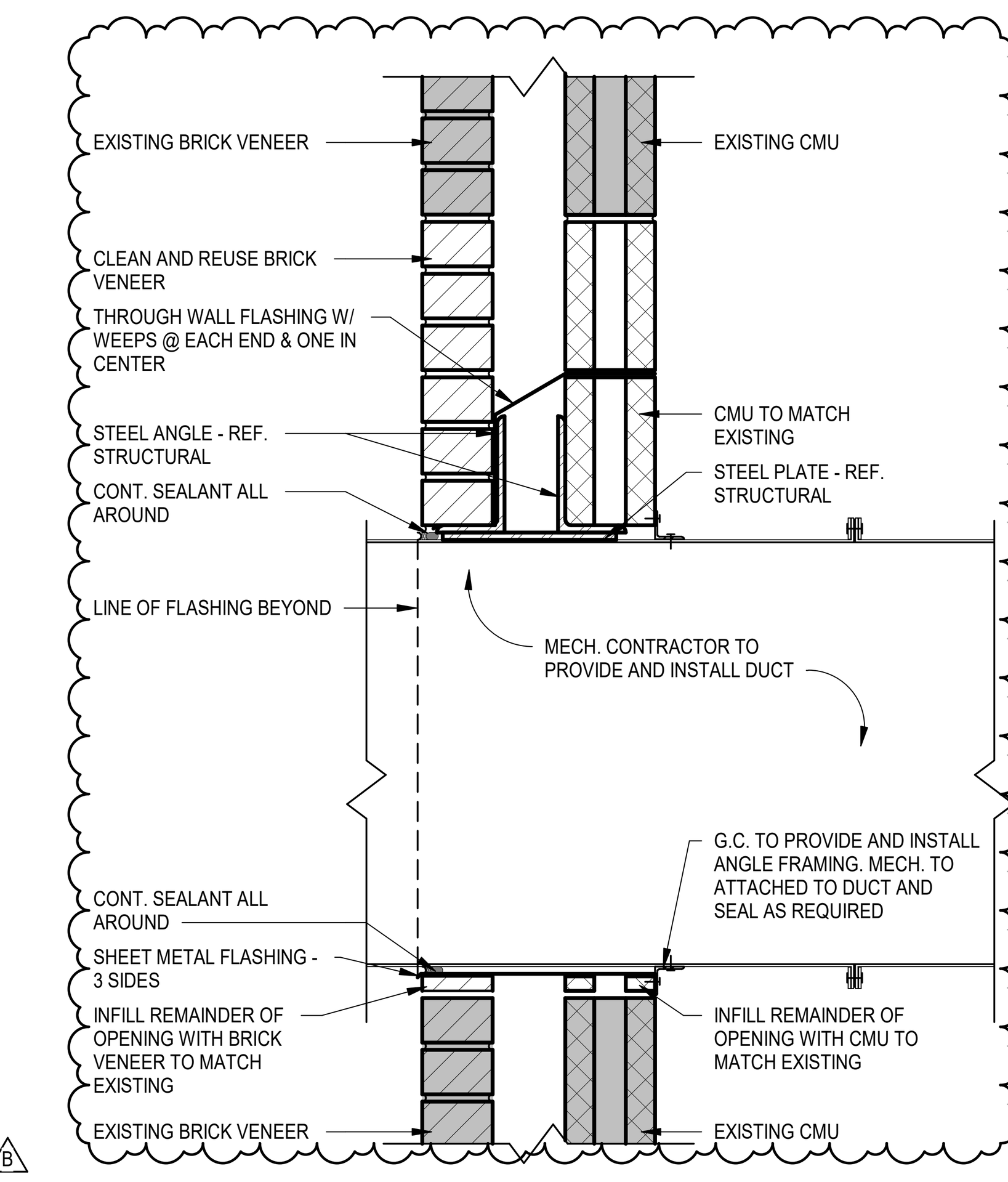
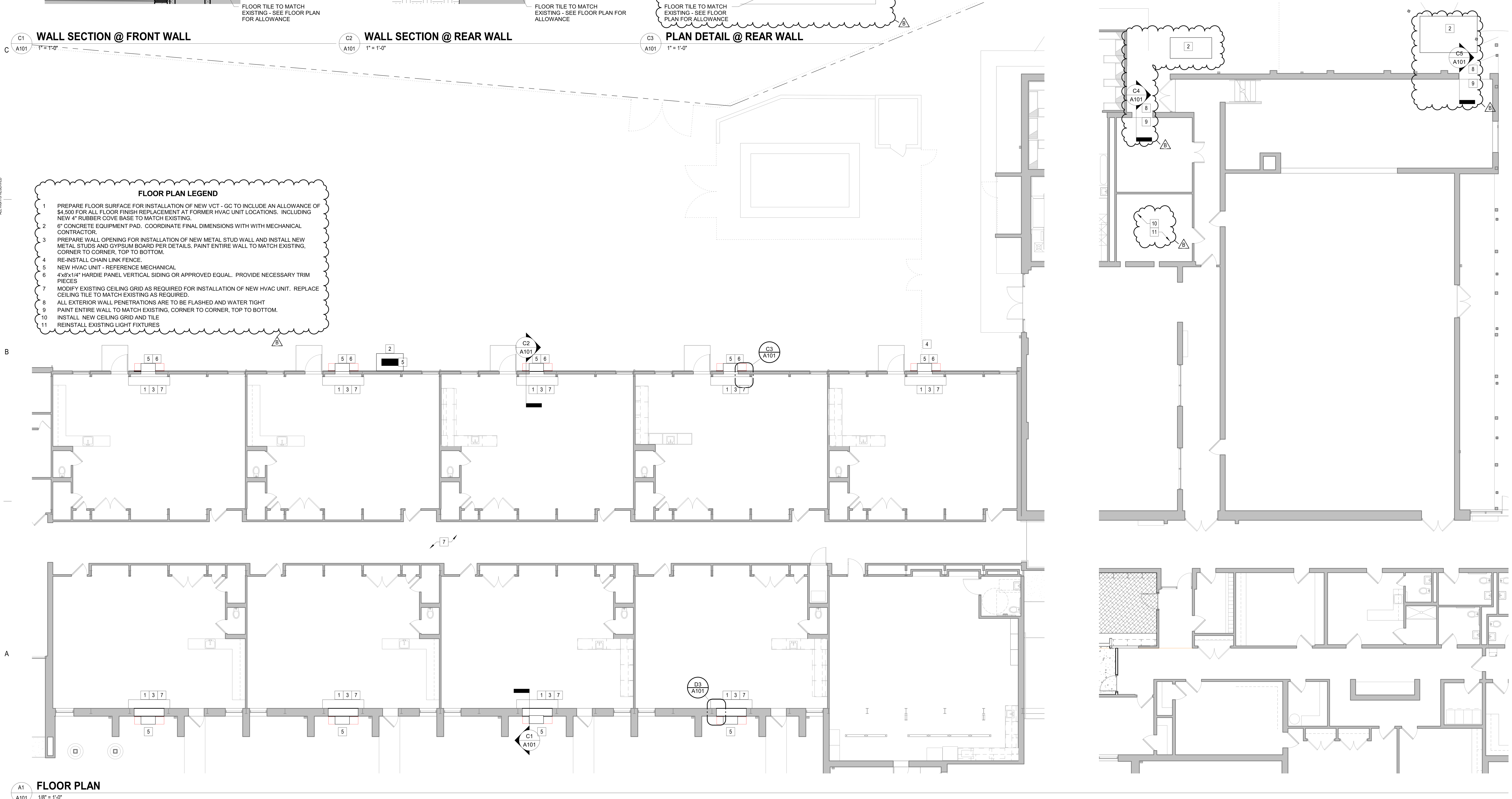


C4 A101 **FLASHING DETAIL @ LOUVER**
1 1/2" = 1'-0"



C5 A101 **FLASHING DETAIL @ NEW OPENING**
1 1/2" = 1'-0"



FLOOR PLAN LEGEND

1. PREPARE FLOOR SURFACE FOR INSTALLATION OF NEW VCT - GC TO INCLUDE AN ALLOWANCE OF $4,500 FOR ALL FLOOR FINISH REPLACEMENT AT FORMER HVAC UNIT LOCATIONS. INCLUDING NEW 4" RUBBER COVE BASE TO MATCH EXISTING.
2. 6" CONCRETE EQUIPMENT PAD. COORDINATE FINAL DIMENSIONS WITH WITH MECHANICAL CONTRACTOR.
3. PREPARE WALL OPENING FOR INSTALLATION OF NEW METAL STUD WALL AND INSTALL NEW METAL STUDS AND GYPSUM BOARD PER DETAILS. PAINT ENTIRE WALL TO MATCH EXISTING, CORNER TO CORNER, TOP TO BOTTOM.
4. RE-INSTALL CHAIN LINK FENCE.
5. NEW HVAC UNIT - REFERENCE MECHANICAL
6. 4'x8'x1/4" HARDIE PANEL VERTICAL SIDING OR APPROVED EQUAL. PROVIDE NECESSARY TRIM PIECES
7. MODIFY EXISTING CEILING GRID AS REQUIRED FOR INSTALLATION OF NEW HVAC UNIT. REPLACE CEILING TILE TO MATCH EXISTING AS REQUIRED.
8. ALL EXTERIOR WALL PENETRATIONS ARE TO BE FLASHED AND WATER TIGHT
9. PAINT ENTIRE WALL TO MATCH EXISTING, CORNER TO CORNER, TOP TO BOTTOM.
10. INSTALL NEW CEILING GRID AND TILE
11. REINSTALL EXISTING LIGHT FIXTURES

A1 A101 **FLOOR PLAN**
1/8" = 1'-0"

mcmillan pazdan smith ARCHITECTURE

Spartanburg Co. School District 7
IFB #19-20-10

HVAC REPLACEMENT FOR DISTRICT 7 EARLY LEARNING CENTER

301 CRECENT AVENUE
SPARTANBURG, SC 29306

SHEET ISSUE:

NO.	DATE	DESCRIPTION	BY
A	03/02/2020	ISSUED FOR BIDS	DLL
B	03/13/2020	ADDENDUM #1	DLL

ADDENDUM #1 03/13/2020

PRINCIPAL IN CHARGE: DLL
PROJECT ARCHITECT: DLL
DRAWN BY: MSM

SHEET TITLE:

FLOOR PLAN WALL SECTIONS & DETAILS

SHEET NO. PROJ. NO. 019080.00

A101

GENERAL NOTES - STRUCTURAL

1. THE CONTRACTOR SHALL NOTIFY THE ENGINEER AND/OR ARCHITECT OF ANY DISCREPANCIES, OMISSIONS OR CONFLICTS BETWEEN THE VARIOUS ELEMENTS OF THE WORKING DRAWINGS AND/OR THESE GENERAL NOTES BEFORE PROCEEDING WITH ANY WORK INVOLVED. IN ALL CASES, UNLESS OTHERWISE DIRECTED, THE MORE STRINGENT REQUIREMENTS SHALL GOVERN AND BE PERFORMED.
2. THE ENGINEER IS NOT RESPONSIBLE FOR MEANS OR METHODS OR PROCEDURES OF CONSTRUCTION SELECTED BY THE CONTRACTOR.
3. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS AND CONDITIONS ON THE DRAWINGS. COORDINATE LOCATIONS OF OPENINGS THROUGH FLOORS, ROOFS AND WALLS WITH ARCHITECTURAL, MECHANICAL, PLUMBING AND ELECTRICAL DRAWINGS. NOTIFY ENGINEER OF ANY DISCREPANCIES.
4. VISITS TO THE JOB SITE BY THE ENGINEER OR HIS REPRESENTATIVE DO NOT CONSTITUTE APPROVAL OF THE WORK PERFORMED BY THE CONTRACTOR OR HIS SUNCONTRACTORS.
5. SHOP DRAWINGS FOR ANY FABRICATED COMPONENTS OR COMPONENTS DESIGNED-BY-MANUFACTURER SHALL BE REVIEWED FOR COMPLIANCE BY THE CONTRACTOR PRIOR TO SUBMISSION TO THE ARCHITECT OR ENGINEER FOR APPROVAL. APPROVAL BY THE ARCHITECT OR ENGINEER MUST BE GIVEN PRIOR TO FABRICATION OR ERECTION OF ANY SUCH COMPONENTS. SHOP DRAWINGS SHALL BE STAMPED AND SIGNED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF THE PROJECT LOCATION.
6. DURING AND AFTER CONSTRUCTION, THE CONTRACTOR AND OWNER SHALL KEEP LOADS ON THE STRUCTURE WITHIN THE LIMITS OF THE DESIGN LIVE LOADS FOR THE OCCUPANCY. SEE "STRUCTURAL DESIGN CRITERIA".

STRUCTURAL STEEL:

1. ALL STRUCTURAL STEEL, UNLESS NOTED, SHALL CONFORM TO THE REQUIREMENTS OF ASTM A992, GRADE 50. STRUCTURAL STEEL TUBE TO BE ASTM A500, GRADE B, 46 KSI.
2. ALL DETAILING, FABRICATION AND ERECTION OF STRUCTURAL STEEL, UNLESS OTHERWISE NOTED, SHALL CONFORM TO THE REQUIREMENTS OF THE AISC SPECIFICATIONS FOR STRUCTURAL STEEL BUILDINGS, LATEST EDITION.
3. UNLESS OTHERWISE NOTED, ALL SHOP CONNECTIONS SHALL BE MADE BY WELDING OR HIGH STRENGTH BOLTING. (A325 OR A490 BOLTS.)
4. WELDS SHALL BE MADE IN ACCORDANCE WITH AWS STANDARDS BY A CERTIFIED WELDER USING E-70 ELECTRODES.
5. UNLESS OTHERWISE NOTED, ALL FIELD CONNECTIONS SHALL BE MADE WITH 3/4" DIA. HIGH STRENGTH BOLTS (ASTM A325-N). CONNECTIONS SHALL BE DESIGNED AS BEARING TYPE WITH THREADS IN SHEAR PLANE.
6. UNLESS OTHERWISE SHOWN, ALL BEAM CONNECTIONS SHALL BE STANDARD FRAMED OR SEATED CONNECTIONS AS SHOWN IN PART 4 OF THE AISC MANUAL OF STEEL CONSTRUCTION. UNLESS GREATER REACTIONS ARE
7. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS OF EXISTING CONSTRUCTION WHICH AFFECTS NEW CONSTRUCTION PRIOR TO SUBMISSION OF SHOP DRAWINGS.
8. STRUCTURAL STEEL SURFACES TO BE PREPARED ACCORDING TO SSPC-SP3 "POWER TOOL CLEANING". EXCEPT FOR GALVANIZED FINISHED AND SURFACES TO BE EMBEDDED IN CONCRETE, SPRAYED-ON FIREPROOFING OR MASONRY, APPLY SHOP PRIMER TO UNCOATED SURFACES TO A DRY FILM THICKNESS OF 3.0 MILS MINIMUM.

LIGHT GAGE METAL FRAMING:

1. ALL MEMBERS TO BE DESIGNED IN ACCORDANCE WITH THE AMERICAN IRON AND STEEL INSTITUTE (AISI) AISI-S100 "NORTH AMERICAN SPECIFICATION FOR THE DESIGN OF COLD-FORMED STEEL STRUCTURAL MEMBERS", 2012 EDITION AND AISI S-200 "NORTH AMERICAN STANDARD FOR COLD-FORMED STEEL FRAMING", 2012 EDITION
2. ALL FRAMING MEMBERS TO BE FORMED FROM CORROSION-RESISTANT STEEL CORRESPONDING TO THE REQUIREMENTS OF ASTM A653 AND ASTM A1003 WITH A MINIMUM YIELD STRENGTH AS SPECIFIED.
3. DESIGN OF MEMBERS INDICATED IN THE STRUCTURAL DRAWINGS IS BASED ON MINIMUM PROPERTIES GIVEN IN THE STEEL STUD MANUFACTURER'S ASSOCIATION (SSMA) "PRODUCT TECHNICAL GUIDE" 2014. NO SUBSTITUTION OF MATERIALS IS ACCEPTABLE FOR USE WITHOUT PRIOR APPROVAL OF THE STRUCTURAL EOR.
4. MANUFACTURER'S SUBMITTAL FOR REVIEW BY STRUCTURAL EOR TO INDICATE TYPE AND MATERIAL/MEMBER PROPERTIES FOR ALL LIGHT GAGE STEEL FRAMING INDICATED IN THE STRUCTURAL DRAWINGS.
5. FASTENING OF MEMBERS TO BE EITHER WITH SELF-DRILLING SCREWS OR BY WELDING UNLESS NOTED OTHERWISE IN THE STRUCTURAL DRAWINGS.
6. CUTTING OF STEEL FRAMING MEMBERS TO BE DONE WITH SAW OR SHEARS. TORCH CUTTING OF LOAD-BEARING MEMBERS IS NOT PERMITTED.
7. COMPLETE, UNIFORM AND LEVEL BEARING SUPPORT TO BE PROVIDED FOR BOTTOM TRACK. AT SPLICES WHERE SUPPORT IS NOT COMMON TO BOTH SECTIONS OF TRACK, EITHER BUTT WELD TRACK SECTIONS OR USE A STUD SECTION INSERTED IN THE TRACK AS A SPLICING MEMBER ATTACHED PER MANUFACTURER'S RECOMMENDATIONS. TRACK INTERSECTIONS SHALL BUTT EVENLY.
8. SPACING OF STUDS TO BE WITHIN A TOLERANCE OF ± 1/8" FROM THAT SHOWN IN THE STRUCTURAL DRAWINGS, PROVIDED THAT THE CUMULATIVE ERROR DOES NOT EXCEED THE REQUIREMENTS OF OTHER CONSTRUCTION OR MATERIALS.
9. STUDS TO BE SECURELY FASTENED AT BOTH TOP AND BOTTOM TRACKS. SPLICES IN STUDS ARE NOT PERMITTED.
10. TEMPORARY BRACING, WHERE REQUIRED, SHALL BE PROVIDED UNTIL ERECTION IS COMPLETE.
11. WHERE MANUFACTURER'S RECOMMENDATIONS FOR ERECTION, ATTACHMENT, ASSEMBLY, BRACING, ALIGNMENT OR OTHER INSTALLATION OR ASSEMBLY REQUIREMENTS ARE MORE STRINGENT THAN INDICATED IN THESE DRAWINGS OR THE PROJECT SPECIFICATIONS, THE THE MANUFACTURER'S RECOMMENDATIONS ARE TO APPLY.

1 General Notes
no scale

STRUCTURAL DESIGN CRITERIA

CODES

2015 INTERNATIONAL BUILDING CODE
2015 INTERNATIONAL EXISTING BUILDING CODE
ANSI/ASCE 7-10

DESIGN LOADS:

RISK CATEGORY (per IBC Table 1604.5) III

ROOF

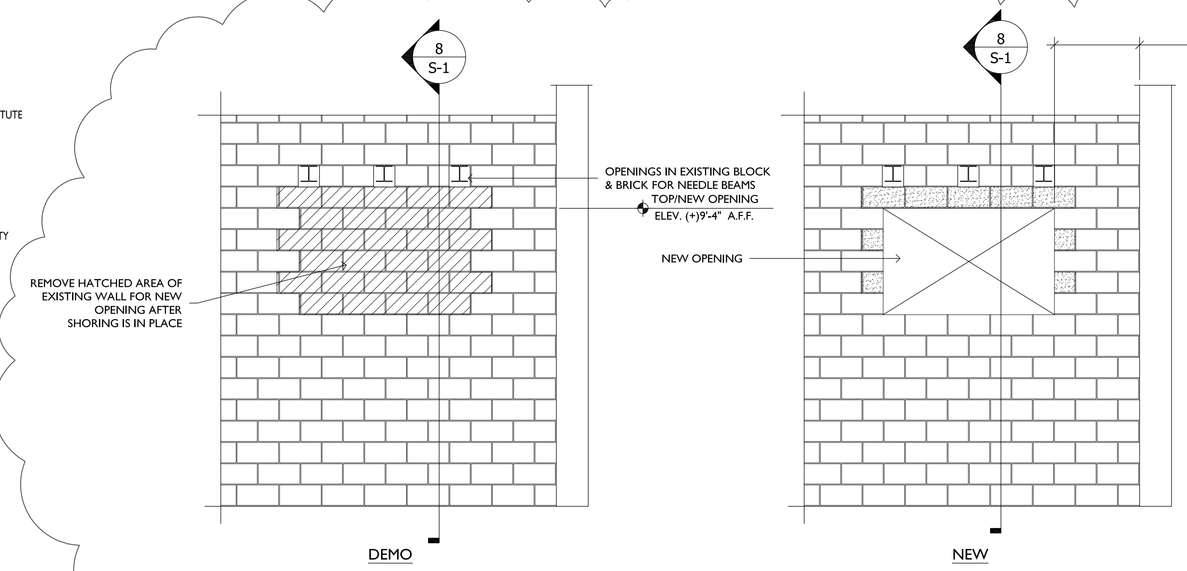
LIVE LOAD = 20 PSF
GROUND SNOW LOAD = 10 PSF

3 Structural Design Criteria
no scale

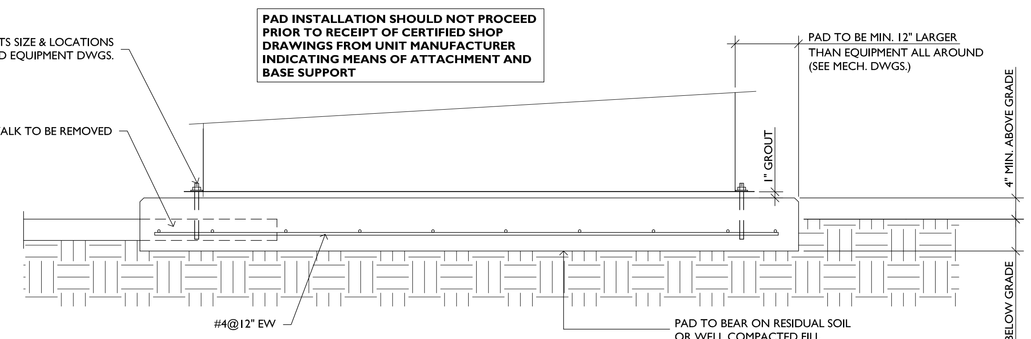
ABBREVIATIONS

@	AT
A.B.	ANCHOR BOLT
ACI	AMERICAN CONCRETE INSTITUTE
ADD'L.	ADDITIONAL
A.F.F.	ABOVE FINISHED FLOOR
AISC	AMERICAN INSTITUTE OF STEEL CONSTRUCTION
ALT.	ALTERNATE
ARCH.	ARCHITECTURAL
ASTM	AMERICAN STANDARD FOR TESTING AND MATERIALS
AWS	AMERICAN WELDING SOCIETY
BLDG.	BUILDING
CHEM.	CHEMICAL
CIP	CAST-IN-PLACE (CONCRETE)
cl	CENTERLINE
CLG.	CEILING
CLR.	CLEAR
CMU	CONCRETE MASONRY UNIT
COL.	COLUMN
CONC.	CONCRETE
CONT.	CONTINUOUS
d,	BAR DIAMETER
DBL.	DOUBLE
DF	DOUGLAS FIR
DIA., Ø	DIAMETER
DIM.	DIMENSION
DL	DEAD LOAD
DN.	DOWN
DP.	DEEP
DTL	DETAIL
DWG.	DRAWING
EA.	EACH
EF	EACH FACE
ELEV., EL.	ELEVATION
EMBED.	EMBEDMENT
EQ.	EQUAL, EQUALLY
ES	EACH SIDE
EW	EACH WAY
E/W	EAST/WEST
EXIST., (E)	EXISTING
FDN.	FOUNDATION
F.F.	FINISH FLOOR
F.G.	FINISH GRADE
F.G.	AMERICAN CONCRETE INSTITUTE
FLR.	FLOOR
FTG.	FOOTING
F.V.	FIELD VERIFY
GA	GAGE
GALV.	GALVANIZED
G.C.	GENERAL CONTRACTOR
GEN.	GENERAL
HDR.	HEADER
HORIZ.	HORIZONTAL
H.S.	HIGH STRENGTH
HSS	HOLLOW STRUCTURAL STEEL (TUBE)
IN.	INCHES)
IBC	INTERNATIONAL BUILDING CODE
IEBC	INTERNATIONAL EXISTING BUILDING CODE
IF	INSIDE FACE
JST.	JOIST
JT.	JOINT
k	KIP(S)
k/ft.	KIPS PER FOOT
LL	LIVE LOAD
LLV	LONG LEG VERTICAL
M.B.	MACHINE BOLT
MAX.	MAXIMUM
MFR.	MANUFACTURER
MIN.	MINIMUM
MISC.	MISCELLANEOUS
(N)	NEW
NOM.	NOMINAL
NO., #	NUMBER
N/S	NORTH/SOUTH
N.T.S.	NOT TO SCLAE
o.c.	ON CENTER
OF	OUTSIDE FACE
PL	PLATE
PSF	POUNDS-PER-SQUARE-FOOT
PCF	POUNDS-PER-CUBIC-FOOT
R	RADIUS
REINF.	REINFORCE(D)/REINFORCING
REQ'D.	REQUIRED
SCHED.	SCHEDULE
SIM.	SIMILAR
SHT.	SHEET
SDS	SELF-DRILLING SCREWS
SJ	SAWED JOINT
SLV	SHORT LEG VERTICAL
SOG	SLAB-ON-GRADE
SQ.	SQUARE
STD.	STANDARD
STL.	STEEL
T&B	TOP & BOTTOM
T.M.E.	TO MATCH EXISTING
TYP.	TYPICAL
T/	TOP OF
U.N.O., UNO	UNLESS NOTED OTHERWISE
VERT.	VERTICAL
W/	WITH
WF	WIDE-FLANGE
W.P.	WORK POINT
WWF	WELDED WIRE FABRIC
WWM	WELDED WIRE MESH

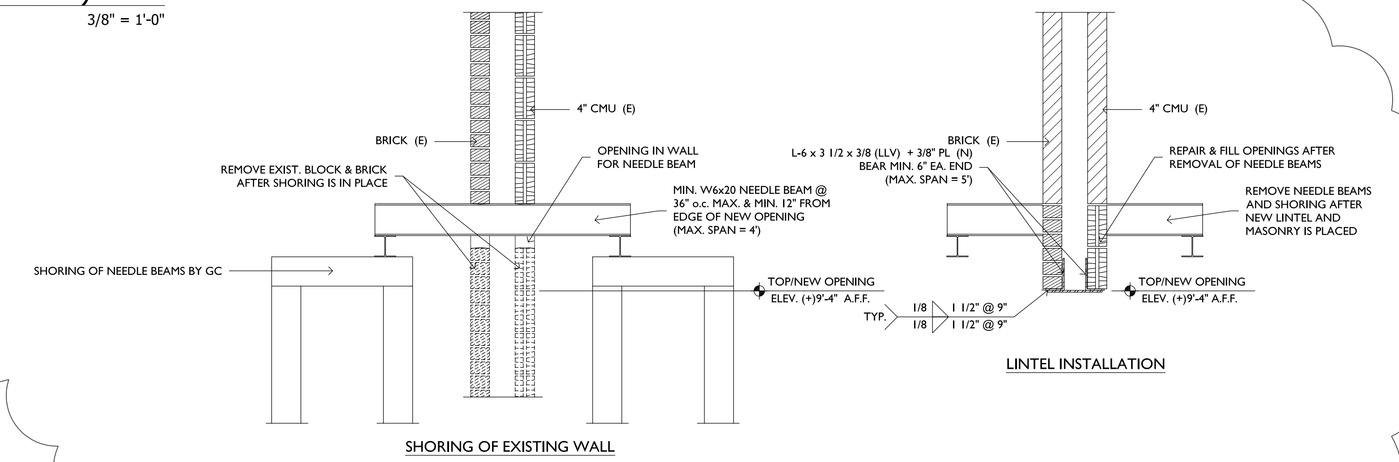
2 Abbreviations
no scale



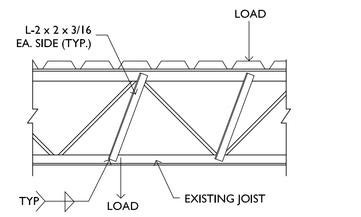
7 Elevation - New Opening In Exterior Wall @ PAC-2 (see Mech.)
(looking from inside)
3/8" = 1'-0"



6 Detail - New Equipment Pad
3/4" = 1'-0"



8 Detail - New Opening In Exterior Wall @ PAC-2 (see Mech.)
3/4" = 1'-0"

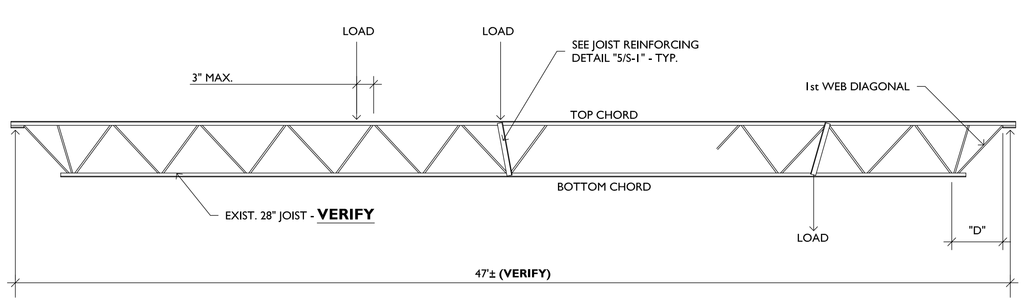


5 Section - Joist Reinforcing
no scale

NOTE: PRIOR TO PLACING ROOF-TOP EQUIPMENT CONTRACTOR TO FIELD VERIFY THE FOLLOWING JOIST INFORMATION AND PROVIDE ANY DISCREPANCIES TO STRUCTURAL ENGINEER.

EXIST. ROOF JOIST DATA (must be field verified by Contractor)

JOIST MARK	JOIST DEPTH (inches)	TOP CHORD SIZE (see diagram)	BOTTOM CHORD SIZE (see diagram)	FIRST WEB DIAGONAL (see diagram)	DISTANCE "D" (approx. distance to 1st bottom chord panel point, in.)
EXIST. 28" JOIST	28	2L's - 2 x 2 x ¼	2L's -1 3/4 x 1 3/4 x 3/16	15/16"Ø ROUND	14



4 Existing Joist Loading Diagram @ Roof-Top Unit PAC-3 (see Mech. dwgs.)
no scale

Parks Engineering Associates, Inc.
Structural Engineering
314 S. Pine Street
PO Box 3281
Spartanburg, SC 29304
Phone (864)316-3776
e-mail swparks@charter.net

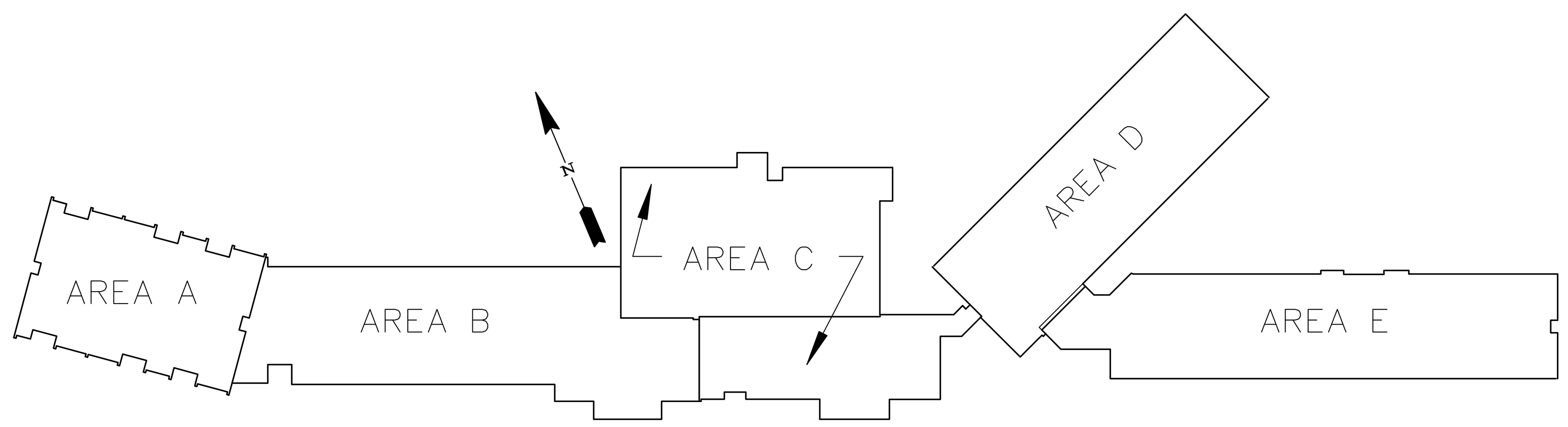
SOUTH CAROLINA PROFESSIONAL ENGINEER STEPHEN W. PARKS
PARKS, ENGINEERING & ASSOCIATES, INC. CERTIFICATE OF AUTHORIZATION No. C01312
THESE PLANS ARE NOT VALID UNLESS SIGNED BY ENGINEER OF RECORD

HVAC Replacement for District 7 Early Learning Center
Spartanburg, SC

DESCRIPTION	DATE
IFB #19-20-10	03/02/2020
ADDENDUM 1	03/03/2020

General Notes & Details

DRAWING NUMBER
S-1
March 2, 2020



KEYPLAN

DEMO NOTES

1. REMOVE EXISTING UNIT VENTILATOR AND ASSOCIATED LOUVER. CAP EXISTING PIPING. SEE STRUCTURAL/ARCHITECTURAL PLANS FOR INFILL OF EXISTING WALL OPENING.
2. ABANDON EXISTING FAN COIL.
3. REMOVE EXISTING CHILLER. CAP PIPING BELOW GRADE. REMOVE ALL ASSOCIATED PUMPS, PIPING, AND ACCESSORIES IN THE BOILER ROOM.
4. REMOVE EXISTING HYDRONIC BOILER, BURNER, AND FLUE.
5. REMOVE EXISTING ROOFTOP AIR HANDLER. PROTECT EXISTING ROOF CURB. CAP PIPE PORTAL SECTION WITH SLOPED, INSULATED, WEATHERPROOF COVER.
6. REMOVE EXISTING AIR HANDLER. REMOVE ALL ASSOCIATED HYDRONIC PIPING. REMOVE DUCTWORK AS REQUIRED TO RECONNECT TO NEW DUCT.
7. REMOVE FAN COIL. REMOVE ALL ASSOCIATED DUCTWORK, PIPING, AND THERMOSTAT. CAP PIPING ABOVE CEILING, BELOW FLOOR, OR IN WALL.
8. REMOVE LOUVER. REMOVE DUCT BRANCH ASSOCIATED WITH LOUVER (INCLUDING DAMPER). BLANK OFF EXISTING LOUVER WITH SHEET METAL AND 2" THICK, 6 PCF DUCTBOARD. SEAL AIR TIGHT. CAP AND INSULATE EXISTING DUCT MAIN THAT REMAINS IN SERVICE.
9. REMOVE EXISTING LOUVER. REUSE EXISTING WALL OPENING.
10. REMOVE ALL HOT WATER & CHILLED WATER PUMPS, PIPING AND ACCESSORIES IN THE BOILER ROOM. PROTECT EXISTING DOMESTIC HOT WATER EQUIPMENT.

SHEET TITLES (1)

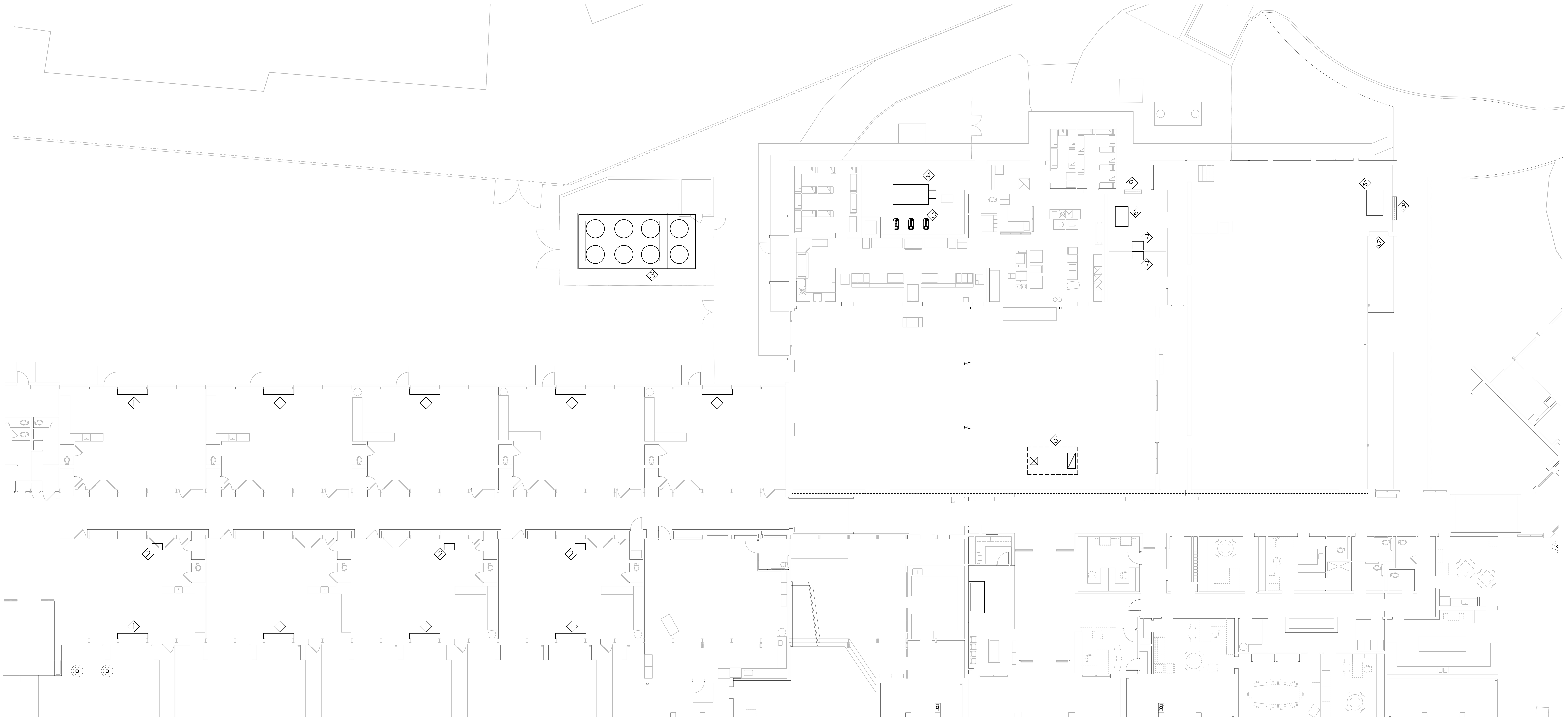
HVAC-1: HVAC DEMOLITION PLAN
HVAC-2: HVAC PLAN - AREA "B"
HVAC-3: HVAC PLAN - AREA "C"
HVAC-4: HVAC DETAILS

SYMBOLS

Symbol	Description
—D—	DRAIN
—G—	GAS
—||—	UNION
(T)	THERMOSTAT
(H)	HUMIDISTAT
(C)	CO_2 SENSOR
——►	SUPPLY AIR (S.A.)
—/—►	RETURN AIR (R.A.)
—R—	REFRIGERANT LINES
—▷◁—	PRESSURE REDUCING VALVE
—⊕—	BALL VALVE (2" AND SMALLER)
H&CW	HOT & CHILLED WATER PIPING
VD	VOLUME DAMPER
CO	CLEANOUT

GENERAL NOTES:

1) PROVIDE 27" MIN CLEARANCE AT FILTER HOUSINGS FOR FILTER REMOVAL
2) SEE ARCH. DWGS FOR EXACT LOUVER AND BRICK VENT LOCATIONS.
3) FIELD COORDINATE ROUTING OF DUCTWORK PRIOR TO DUCTWORK FABRICATION.
4) SLOPE ALL CONDENSATE LINES MIN. 1/8" PER FOOT.
5) MINIMUM BRANCH CONDENSATE LINE SIZE SHALL BE 1" UNLESS NOTED OTHERWISE ON PLANS.
6) BLANK OFF UNUSED LOUVER WITH SHEET METAL AND 1" THICK, 6 PCF FOIL-FACED DUCT BOARD.
7) MAXIMUM LENGTH OF FLEXIBLE DUCTWORK AT END OF BRANCH DUCTWORK SHALL BE 5'-0"
8) EQUIPMENT PADS SHALL BE BY OTHER DIVISIONS, SEE "A" DWGS.



DEMOLITION PLAN

SCALE: 3/32" = 1'-0"

DWG. NO. HVAC-1
1 OF 4
PROJ. NO. CBE# 1823
IFB# 19-20-10

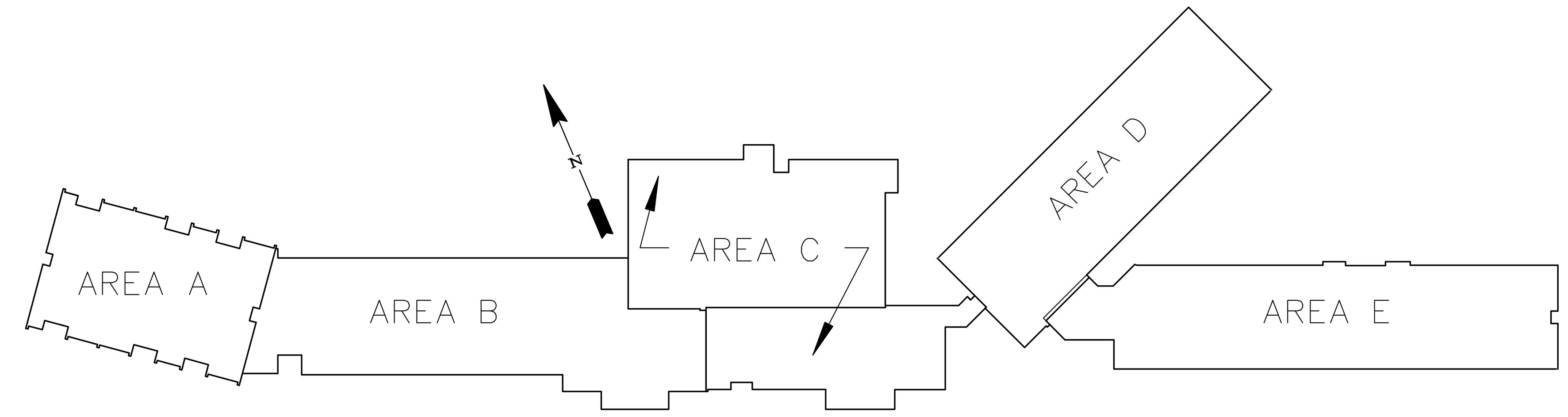
PROJECT
HVAC REPLACEMENT
FOR
DISTRICT 7 EARLY LEARNING CENTER
SPARTANBURG, SOUTH CAROLINA

DWG. TITLE
HVAC DEMOLITION PLAN

REVISIONS: NO.	DATE	DESCRIPTION	BY
0	03-02-20	ISSUED FOR BID	WHC
1	03-14-20	ADDENDUM #1	WHC

CROW AND BULMAN ENGINEERING, INC.
800 EAST MAIN STREET, SPARTANBURG, SC 29302
PHONE: 864-585-9003, WWW.CBENGR.COM

DATE:	MAR. 2, 2020
SCALE:	1/8" = 1'-0"
DESGN BY:	WHC
DWN. BY:	WHC
CKD. BY:	WCC
APPD. BY:	WCC



KEYPLAN

SHEET NOTES

- SEE GENERAL NOTES ON SHEET HVAC-1

WALL MOUNT SELF CONTAINED HEAT PUMP SCHEDULE

TAG	EVAPORATOR FAN					COOLING CAPACITY					HEATING		AUX. HEAT		ELECTRICAL			MFR. & MODEL	ION GENERATOR
	CFM	CFM O.A.	EXT. S. PRESS.	FAN HP	SPEED	EAT db/wb	AMBIENT	SENS MBH (NET)	TOTAL MBH (NET)	EER	MBH	COP	KW	MBH	VOLTAGE	MCA	MOP		
SCHP-7	900	195	0.1	1/3	VAR.	80/67	95°F	21.0	28.0	10.8	27.8	3.3	6.0	15.4	208/3	36	40	BARD T30S	GPS FC
SCHP-8	900	195	0.1	1/3	VAR.	80/67	95°F	21.0	28.0	10.8	27.8	3.3	6.0	15.4	208/3	36	40	BARD T30S	GPS FC
SCHP-9	900	195	0.1	1/3	VAR.	80/67	95°F	21.0	28.0	10.8	27.8	3.3	6.0	15.4	208/3	36	40	BARD T30S	GPS FC
SCHP-10	900	195	0.1	1/3	VAR.	80/67	95°F	21.0	28.0	10.8	27.8	3.3	6.0	15.4	208/3	36	40	BARD T30S	GPS FC
SCHP-11	900	195	0.1	1/3	VAR.	80/67	95°F	21.0	28.0	10.8	27.8	3.3	6.0	15.4	208/3	36	40	BARD T30S	GPS FC
SCHP-12	900	195	0.1	1/3	VAR.	80/67	95°F	21.0	28.0	10.8	27.8	3.3	6.0	15.4	208/3	36	40	BARD T30S	GPS FC
SCHP-13	900	195	0.1	1/3	VAR.	80/67	95°F	21.0	28.0	10.8	27.8	3.3	6.0	15.4	208/3	36	40	BARD T30S	GPS FC
SCHP-14	900	195	0.1	1/3	VAR.	80/67	95°F	21.0	28.0	10.8	27.8	3.3	6.0	15.4	208/3	36	40	BARD T30S	GPS FC
SCHP-15	900	195	0.1	1/3	VAR.	80/67	95°F	21.0	28.0	10.8	27.8	3.3	6.0	15.4	208/3	36	40	BARD T30S	GPS FC

ACCESSORIES FOR ALL UNITS:

1. FACTORY DISCONNECT
2. FURNISH WITH FACTORY SUPPLY & RETURN GRILLES
3. FURNISH WITH HOT GAS REHEAT AND HUMIDISTAT
4. EC BLOWER MOTOR
5. WALL-MOUNT FACTORY THERMOSTAT/HUMIDISTAT TO INTERFACE W/ OWNER'S BMS
6. SINGLE POINT WIRING
5. 2-STAGE COMPRESSOR
7. FACTORY FILTER RACK, 2" FILTER CAPABILITY
8. FACTORY WALL SLEEVE (FIELD VERIFY DIMENSIONS)

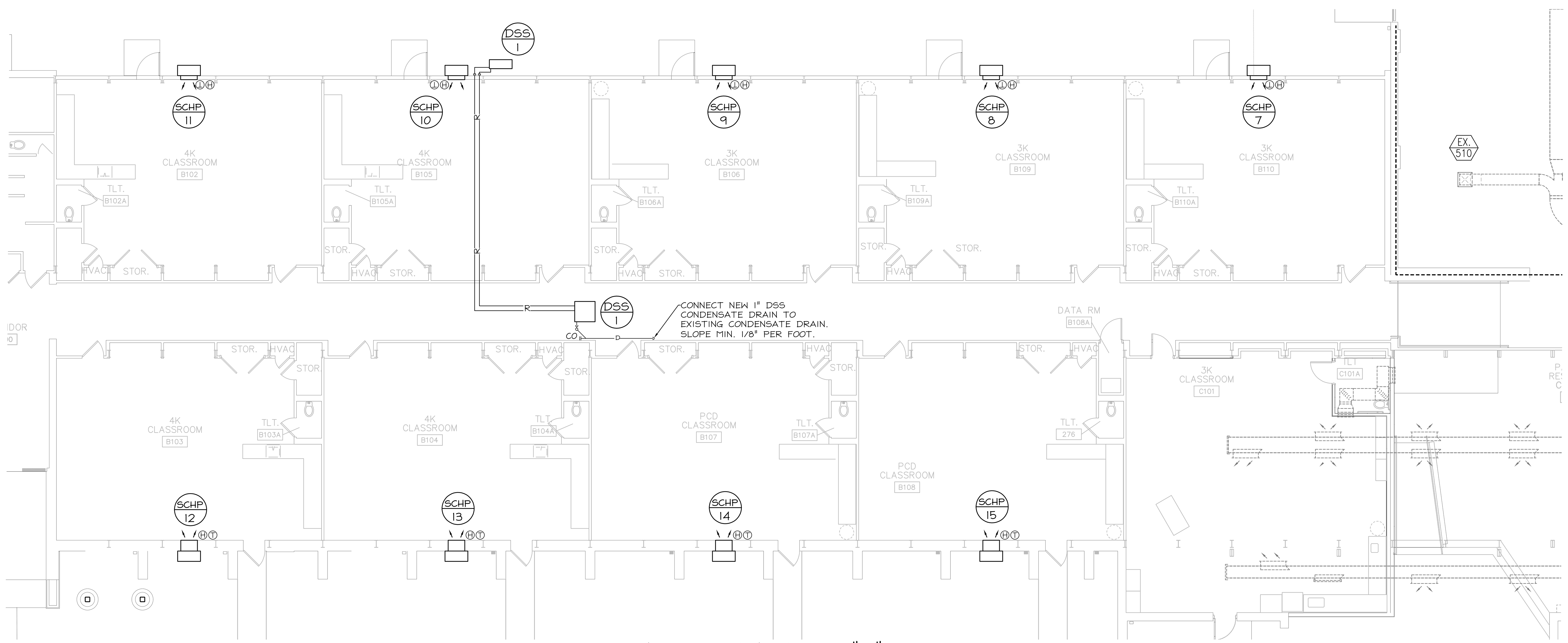
NOTE: SUBMIT COST DEDUCTION TO USE BARD MODEL W30H2 UNITS (11.0 EER; SINGLE STAGE COMPRESSOR), WITH OTHER SPECIFICATIONS AS NOTED ABOVE. △1

DUCTLESS SPLIT SYSTEM SCHEDULE

TAG	TYPE	AIR HANDLING UNIT			COOLING CAPACITY			HEATING CAPACITY		CONDENSING UNIT					REFRIG. LINES		REMARKS
		CFM	MFR. & MODEL	MOUNTING	EAT db/wb	AMBIENT	TC	MBH	HSPF	EER / SEER	VOLT	M.C.A.	CIR. PROTECT	MFR & MODEL	LIQ.	GAS	
DSS-1	HEAT PUMP	600	LG LCN247HV	CEILING, RECESSED	80/67	95	26.7	30	9.7	12.6 / 17	208/1	18.1	30	LG LUU247HV	3/8	5/8	1 2 △1

REMARKS:

1. FURNISH WITH WIRED, WALL MOUNTED THERMOSTAT
2. FURNISH WITH FACTORY CONDENSATE DRAIN PUMP AT AIR HANDLER



HVAC PLAN: AREA "B"

SCALE: 1/8" = 1'-0"

DATE: MAR. 2, 2020
SCALE: 1/8" = 1'-0"
DESGN BY: WHC
DWN. BY: WHC
CKD. BY: WCC
APPD. BY: WCC

CROW AND BULMAN ENGINEERING, INC.
800 EAST MAIN STREET, SPARTANBURG, SC 29302
PHONE: 864-585-9903, WWW.CBENGR.COM

REVISIONS:

NO.	DATE	DESCRIPTION	BY
0	03-02-20	ISSUED FOR BID	WHC
1	03-14-20	ADDENDUM #1	WHC

DWG. TITLE: HVAC PLAN - AREA "B"

PROJECT: HVAC REPLACEMENT FOR DISTRICT 7 EARLY LEARNING CENTER
SPARTANBURG, SOUTH CAROLINA

IFB# 19-20-10

DWG. NO. HVAC-2
2 OF 4
PROJ. NO. CBE# 1823

GAS FIRED PACKAGED A/C UNIT SCHEDULE

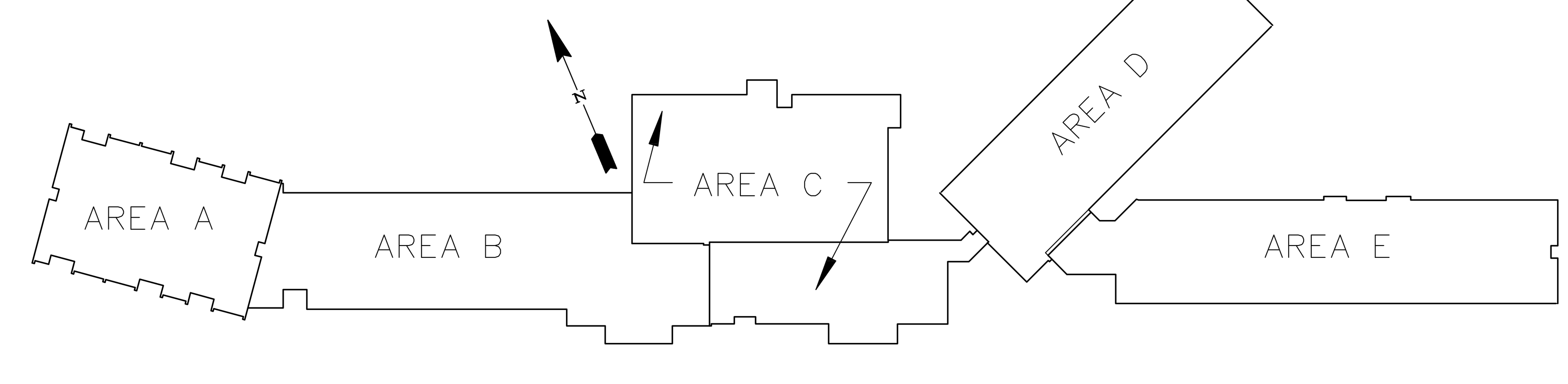
TAGS	LOCATION	CFM	CFM MIN O.A	FAN DRIVE	FAN RPM	FAN H.P.	EXT. STATIC PRESS	TOTAL STATIC PRESS	GROSS COOLING CAPACITY ENT.AIR db/wb	LV.AIR db/wb	COND. AIR	SENS MBH	TOTAL MBH	EER	COOL STAGES	HOT GAS REHEAT MBH	LAT db/DP/RH	HEATING (NAT. GAS) ENT.AIR	LV.AIR	MBH INPUT	MBH OUTPUT	HEAT STAGES	ELECTRICAL VOLTAGE	M.C.A.	CIRCUIT PROTECT	MFR. & MODEL	DIRTY FILTER ALLOWANCE	REMARKS
PAC-1	KITCHEN	3500	--	DIRECT	1330	2.75	1.00"	1.11"	74/62	57.4/53.8	95	68.5	87.5	12.6	2	118	83/58/40%	70	102	150 / 120	120	1	208/3	41.9	50	TRANE YHC092	0.25"	①②③④⑤⑧⑪⑫⑮
PAC-2	GYM Ⓐ	6000	1040	BELT	720	3.0	1.15"	1.67"	77.6/64.3	57.3/54.2	95	131.5	177.2	11.0	2	118.7	76/52/44%	61.5	92.2	250 / 175	200 / 140	2	208/3	73.0	90	TRANE YHD180	0.25"	①②③⑤⑦⑩⑫⑬⑭
PAC-3	CAFETERIA Ⓐ	4300	1610	BELT	676	3.0	1.15"	1.58"	81.7/86.2	57.1/54.9	95	114.2	174.9	11.0	2	116.0	82/53/37%	49.5	92.4	250 / 175	200 / 140	2	208/3	73.0	90	TRANE YHD180	0.25"	①②③④⑤⑥⑦⑨⑫⑭

NOTES:
- EXT. STATIC PRESS. INCLUDES ALL LOSSES EXTERNAL TO THE CABINET. TOTAL STATIC PRESS. INCLUDES E.S.P., INTERNAL LOSSES, AND DIRTY FILTER.
- FILTER HOUSING SHALL HAVE 4" FILTER CAPABILITY (SEE SPECIFICATIONS FOR SIZE/TYPE OF FILTERS REQUIRED.)

Ⓐ MINIMUM VENTILATION AIR CFM IS CONTROLED USING A CO2 BASED DEMAND CONTROL VENTILATION SEQUENCE. (SEE SPECIFICATIONS.)

REMARKS:

① FACTORY DISCONNECT
② SMOKE DETECTOR (PROVIDED BY ELECTRICAL). FAN SHUTDOWN WIRING BY HVAC CONTRACTOR.
③ SINGLE ZONE VAV CONTROLS
④ 0-100% LOW-LEAK ECONOMIZER, ENTHALPY BASED
⑤ VARIABLE SPEED DRIVE
⑥ NON-POWERED GFI RECEPTICAL (POWER BY ELEC.)
⑦ MODULATING HOT GAS REHEAT
⑧ HOT GAS REHEAT
⑨ SEISMIC, WIND RATED ROOF CURB ADAPTOR TO MATCH EXISTING CURB -VERTICAL SUPPLY AND RETURN. (MAXIMUM 24" HIGH. MAXIMUM 0.15" PRESSURE DROP.) FIELD VERIFY EXISTING DIMENSIONS.
⑩ PAD MOUNTED, SIDE DISCHARGE PLENUM CURB WITH SUPPLY SCOOP. (30" HIGH)
⑪ 8" HIGH CURB FOR PAD MOUNTING
⑫ CARBON MONOXIDE SENSOR MOUNTED IN SUPPLY DUCT BY ELECTRICAL.
⑬ 0-100% LOW-LEAK ECONOMIZER (ENTHALPY BASED) WITH POWER EXHAUST
⑭ FACTORY THERMOSTAT, HUMIDISTAT, & CO2 SENSOR
⑮ FACTORY THERMOSTAT & HUMIDISTAT



KEYPLAN

FAN FORCED ELECTRIC HEATER SCHEDULE

TAGS	CFM	FAN RPM	KW	VOLT	MOUNTING	MFR. & MODEL	REMARKS
EH-1	175	600	1.5	115/1	LAY-IN	MARKEL MODEL 3380	①②③
EH-2	175	600	1.5	115/1	LAY-IN	MARKEL MODEL 3380	①②③

NOTES: ① DISCONNECT
② NOT USED
③ BUILT-IN THERMOSTAT

SHEET NOTES

- SEE GENERAL NOTES ON SHEET HVAC-1

1. CONNECT NEW DUCTWORK TO EXISTING DUCTWORK
2. ROUTE NEW DUCT THROUGH EXISTING WALL OPENING. SEE WALL PENETRATION DETAIL.
3. PROVIDE COMPANION FLANGE JOINT AT THIS LOCATION ONLY
4. ENTIRE EXISTING SUPPLY DUCT SYSTEM SHALL BE CLEANED/ENCAPSULATED. SEE SPECS.
5. ENTIRE EXISTING DUCT SYSTEM SHALL BE CLEANED. SEE SPECS.

HVAC PLAN: AREA "C" & "D"

SCALE: 1/8" = 1'-0"

PROJECT: HVAC REPLACEMENT FOR DISTRICT 7 EARLY LEARNING CENTER SPARTANBURG, SOUTH CAROLINA

DWG. TITLE: HVAC PLAN - AREA "C"

DWG. NO. HVAC-3

3 OF 4

PROJ. NO. CBE# 1823

IFB# 19-20-10

REVISIONS: NO.	DATE	DESCRIPTION	BY
0	03-02-20	ISSUED FOR BID	WHC
1	03-14-20	ADDENDUM #1	WHC

CROW AND BULMAN ENGINEERING, INC.

DATE: MAR. 2, 2020
SCALE: 1/8" = 1'-0"
DESIGN BY: WHC
DWN. BY: WHC
CKD. BY: WCC
APPD. BY: WCC