
SECTION 09 01 20
MAINTENANCE OF PLASTER ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes plaster repair, patching, restoration and cleaning; and as follows:
1. Repairing exterior gypsum and cement plaster, including the following:
 - a. Patching existing holes.
 - b. Evaluation of all plaster surfaces for unsound plaster and removal and replacement of all unsound plaster.
 2. Preliminary cleaning, including removing plant growth.
 3. Cleaning exposed plaster surfaces, including removal of Graffiti.
 4. Visit site prior to bidding to understand scope of work required.
 5. Restore and clean existing plaster panels to remain.
 6. Intent is to have a uniform finish and appearance ready to receive finish paint or roofing specified elsewhere.
 7. On the bid form provide a unit cost for additional work as follows:
 - a. PLASTER PATCHING:
 - 1) Surface patch of a chip in plaster face in conformance with PLASTER PATCHING in PART 3.
 - 2) Patch a small area of deep deterioration in a plaster panel in conformance with PLASTER PATCHING in PART 3.
 - 3) Patch a large area of full depth in a plaster panel in conformance with PLASTER PATCHING in PART 3
 - b. PLASTER REMOVAL AND REPLACEMENT: Remove and Replace a typical size plaster panel in conformance with PLASTER REMOVAL AND REPLACEMENT in PART 3.
- B. Related Sections:
1. Work under WP-9A:
 - a. Holes in dome for reinforcing masonry walls.
 - b. Asbestos encapsulation of dome roofing/covering.
 2. Division 07 Section "Fluid Applied Roofing".

1.2 REFERENCE STANDARDS (Latest edition unless otherwise noted)

- A. American Society for Testing and Materials (ASTM):
1. C 28 Gypsum Plasters
 2. C 91 Masonry Cement.
 3. C 150 Specification for Portland Cement
 4. C 206 Finishing Hydrated Lime
 5. C 842 Application of Interior Gypsum Plaster.

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6. C 847 Metal Lath
 7. C 897 Aggregate for Job-Mixed Portland Cement-Based Plasters.
 8. C 926 Application of Portland Cement-Based Plaster.
 9. C 1063 Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster

1.3 DESIGN AND PERFORMANCE REQUIREMENTS

- A. **Cleaning:** Existing plaster cladding system shall not be damaged or marred in the process of cleaning. . Open joints shall be temporarily caulked or otherwise protected to prevent water and cleaner intrusion into the interior of the structure from pressure spraying. Non-masonry materials and severely deteriorated plaster shall be protected by approved methods prior to initiation of cleaning operations. Plaster cleaning shall remove all organic and inorganic contaminants from the surface. Cleaned plaster shall have a neutral pH. Methods used for cleaning plaster cladding system shall be the gentlest possible to achieve the desired results. Test patches shall be made to determine a satisfactory cleaning result. Cleaning shall proceed in an orderly manner, working from top to bottom of each scaffold width and from one end of each elevation to the other. Following an initial inspection and evaluation of the plaster surfaces, the plaster shall be given a surface cleaning. The surface cleaning shall be completed prior to start of repair work. The cleaning shall provide for the complete cleaning of all exterior plaster surfaces of the structures, removing all traces of moss, dirt, and other contaminants. Following completion of the surface cleaning of the structure the plaster shall be dried prior to the start of any repair work.
- B. **Paint Removal:** Paint and other coatings shall be removed from plaster prior to general cleaning. Plaster shall not be damaged or marred in the process of paint removal. Areas where paint is to be removed shall first be cleaned with water and detergent solution to remove surface dirt, rinsed, and allowed to dry. Chemical paint removers shall be applied in accordance with manufacturer's instructions. Surrounding surfaces to remain intact shall be protected from exposure to chemical paint removers to avoid damage.
- C. **Plaster Repair:** Repaired surfaces shall match adjacent existing surfaces in all respects. Plaster repair shall proceed only after the area to be repaired has been cleaned. The materials, methods and equipment proposed for use in the repair work shall be demonstrated in test panels. The location, number, size and completed test panels shall be subject to approval. Products shall be used in accordance with the manufacturer's instructions.
- D. **Plaster Finishes and Color:** The exposed surfaces of plaster repair shall match the finish, color, texture, and surface of the original surface except surfaces receiving additional coatings, color match is not required. The finishing and texturing shall conceal bond lines between the repaired area and adjacent surfaces.

1.4 SUBMITTALS

- A. **Product Data:** For each type of product indicated. Include recommendations for application and use. Include test data substantiating that products comply with requirements.
- B. **Qualification Data:** For restoration specialists including field supervisors and restoration workers chemical-cleaner manufacturer and testing service.
- C. **Cleaning Program.**

1.5 QUALITY ASSURANCE

- A. Restoration Specialist Qualifications: Engage an experienced plaster restoration and cleaning firm to perform work of this Section. Firm shall have completed work similar in material, design, and extent to that indicated for this Project with a record of successful in-service performance.
1. At Contractor's option, work may be divided between two specialist firms: one for cleaning work and one for repair work.
 2. Field Supervision: Restoration specialist firms shall maintain experienced full-time supervisors on Project site during times that plaster restoration and cleaning work is in progress. Supervisors shall not be changed during Project except for causes beyond control of restoration specialist firm.
 3. Restoration Worker Qualifications: Persons who are experienced and specialize in restoration work of types they will be performing.
- B. Chemical-Cleaner Manufacturer Qualifications: A firm regularly engaged in producing plaster cleaners that have been used for similar applications with successful results, and with factory-trained representatives who are available for consultation and Project-site inspection and assistance at no additional cost.
- C. Cleaning Program: Prepare a written cleaning program that describes cleaning process in detail, including materials, methods, and equipment to be used, protection of surrounding materials, and control of runoff during operations.
1. If materials and methods other than those indicated are proposed for any phase of restoration work, add to the Quality-Control Program a written description of such materials and methods, including evidence of successful use on comparable projects, and demonstrations to show their effectiveness for this Project and worker's ability to use such materials and methods properly.
- D. Cleaning and Repair Appearance Standard: Cleaned and repaired surfaces are to have a uniform appearance as viewed by Architect from five feet away for surfaces from at grade to 20 feet above grade and from 20 feet away for surfaces more than 20 feet above grade. Perform additional paint and stain removal, general cleaning, and spot cleaning of small areas that are noticeably different, so that surface blends smoothly into surrounding areas.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver other materials to Project site in manufacturer's original and unopened containers, labeled with manufacturer's name and type of products.

1.7 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit plaster restoration and cleaning work to be performed according to manufacturers' written instructions and specified requirements.
- B. Cold-Weather Requirements: Comply with the following procedures for plaster repair otherwise indicated:
1. When air temperature is below 40 deg F, repair materials and existing plaster to produce temperatures between 40 and 120 deg F.

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2. When mean daily air temperature is below 40 deg F, provide enclosure and heat to maintain temperatures above 32 deg F within the enclosure for 7 days after repair.
 - C. Hot-Weather Requirements: Protect plaster repair when temperature and humidity conditions produce excessive evaporation of water from patching materials. Provide artificial shade and wind breaks and use cooled materials as required to minimize evaporation.
 - D. For manufactured repair materials, perform work within the environmental limits set by each manufacturer.
 - E. Clean plaster surfaces only when air temperature is 40 deg F and above and is predicted to remain so for at least 7 days after completion of cleaning.

PART 2 - PRODUCTS

2.1 MATERIALS GENERAL

- A. Materials, physical and chemical properties, and composition of plaster masonry and mortar used in renovation work shall match that of original existing plaster to be repaired, unless samples and testing determine that existing mixtures and materials are faulty or non-performing

2.2 PLASTER MATERIALS/MIXES

- A. General: Match existing plaster in type and materials as close as possible.
- B. Gypsum Plaster: ASTM C 28.
- C. Cement (Stucco) Plaster:
 1. Portland Cement: ASTM C 150, Type I.
 2. Masonry Cement: ASTM C 91.
 3. Aggregates: ASTM C 897.
- D. Lime: ASTM C 206, Type N or S.
- E. Water: Potable.
- F. Mixes:
 1. Gypsum Plaster: ASTM C 842 and manufacturer's instructions.
 2. Cement Plaster: ASTM C 926, Tables 1 through 3.

2.3 LATH MATERIALS

- A. Gypsum Plaster: ASTM C 847.
- B. Cement Plaster:
 1. Vertical Surfaces: ASTM C 1032.

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2. Horizontal Surfaces: ASTM C 847.
 - C. Framing: Cold-rolled steel; channels minimum 16 gage; size suitable for conditions.
 - D. Metal: Galvanized.

2.4 PAINT REMOVERS

- A. Alkaline Paste Paint Remover: Manufacturer's standard alkaline paste formulation for removing paint coatings from plaster masonry. Alkaline formula with organic solvents, removes multiple layers of paint and graffiti from plaster surfaces. Paint remover remains active for 24 hours. Following paint removal, the plaster must be neutralized with product recommended by the manufacturer. Contains no methanol or methylene chloride, and can be rinsed with water.
 1. Chemical paint removers shall be effective for removal of paint on plaster without altering, damaging, or discoloring the plaster surface.
 2. Gel consistency to adhere to vertical surfaces.
 3. Dwell Time: Remains Active and can be rinsed successfully with water after 24 hours or more.
 4. Do not use on wood.
 5. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. PROSOCO; Sure Klean Heavy-Duty Paint Stripper D.
 - b. ABR Products, Inc.; 800 Brush Grade.
 - c. Diedrich Technologies Inc.; 606 Multi-Layer Paint Remover or 606X Extra Thick Multi-Layer Paint Remover.

2.5 CLEANING MATERIALS

- A. Water: Potable.
- B. Hot Water: Water heated to a temperature of 140 to 160 deg F.
- C. Job-Mixed Mold, Mildew, and Algae Remover: Solution prepared by mixing 2 cups of tetrasodium polyphosphate, 5 quarts of 5 percent sodium hypochlorite (bleach), and 15 quarts of hot water for every 5 gallons of solution required.
- D. Mild Acidic Cleaner: Manufacturer's standard mildly acidic cleaner containing no muriatic (hydrochloric), hydrofluoric, or sulfuric acid; or ammonium bifluoride or chlorine bleaches.
- E. Acidic Cleaner: Manufacturer's standard acidic plaster masonry cleaner composed of hydrofluoric acid or ammonium bifluoride blended with other acids, detergents, wetting agents, and inhibitors.

2.6 CHEMICAL CLEANING SOLUTIONS

- A. Dilute chemical cleaners with water to produce solutions not exceeding concentration recommended by chemical-cleaner manufacturer.

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- B. Acidic Cleaner Solution for Plaster: Dilute with water to produce hydrofluoric acid content of 3 percent or less, but not greater than that recommended by chemical-cleaner manufacturer.

PART 3 - EXECUTION

3.1 PROTECTION

- A. Protect persons, motor vehicles, surrounding surfaces of building being restored, building site, plants, and surrounding buildings from harm resulting from plaster restoration work.
- B. Comply with chemical-cleaner manufacturer's written instructions for protecting building and other surfaces against damage from exposure to its products. Prevent chemical cleaning solutions from coming into contact with people, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.
1. Cover adjacent surfaces with materials that are proven to resist chemical cleaners used unless chemical cleaners being used will not damage adjacent surfaces. Use materials that contain only waterproof, UV-resistant adhesives. Apply masking agents to comply with manufacturer's written instructions. Do not apply liquid masking agent to painted or porous surfaces. When no longer needed, promptly remove masking to prevent adhesive staining.
 2. Keep wall wet below area being cleaned to prevent streaking from runoff.
 3. Do not clean plaster during winds of sufficient force to spread cleaning solutions to unprotected surfaces.
 4. Neutralize and collect alkaline and acid wastes for disposal off Owner's property.
 5. Dispose of runoff from cleaning operations by legal means and in a manner that prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.
- C. Prevent mortar from staining face of surrounding plaster and other surfaces.
1. Cover sills, ledges, and projections to protect from mortar droppings.
 2. Keep wall area wet below rebuilding and pointing work to discourage mortar from adhering.
 3. Immediately remove mortar in contact with exposed plaster and other surfaces.

3.2 PLASTER PATCHING

- A. Patch the following plaster areas unless another type of replacement or repair is indicated:
1. Areas indicated to be patched.
 2. Areas with holes.
 3. Areas with chipped edges or corners.
 4. Areas with small areas of deep deterioration.
- B. Remove and replace existing patches unless otherwise indicated or approved by Architect.

- C. Remove deteriorated material and remove adjacent material that has begun to deteriorate. Carefully remove additional material so patch will not have feathered edges but will have square or slightly undercut edges on area to be patched and will be at least 1/4 inch thick, but not less than recommended by patching compound manufacturer.
- D. Place patching material in layers for deep repairs. Roughen surface of each layer to provide a key for next layer.
- E. Keep each layer damp for 72 hours or until patching compound has set.
- F. Remove and replace patches with hairline cracks or that show separation from plaster at edges, and those that do not match adjoining plaster in color or texture.

3.3 PLASTER REMOVAL AND REPLACEMENT

- A. Remove plaster that has deteriorated or is damaged beyond repair.
- B. Support and protect remaining plasterwork that surrounds removal area. Maintain adjoining construction in an undamaged condition.
- C. Notify Architect of unforeseen detrimental conditions including voids, cracks, bulges, and loose units in existing masonry backup, rotted wood, rusted metal, and other deteriorated items.
- D. Clean plaster surrounding removal areas by removing dust, and loose particles in preparation for replacement.
- E. Lath: Install galvanized lath and framing as needed and in accordance with ASTM C 841 or C1063 as applicable.

3.4 CLEANING PLASTER, GENERAL

- A. Proceed with cleaning in an orderly manner and with one of the specified methods as recommended by restoration specialist. Ensure that dirty residues and rinse water will not wash over cleaned, dry surfaces.
- B. Use only those cleaning methods indicated for each plaster material and location.
 - 1. Do not use wire brushes or brushes that are not resistant to chemical cleaner being used. Do not use plastic-bristle brushes if natural-fiber brushes will resist chemical cleaner being used.
 - 2. Use spray equipment that provides controlled application at volume and pressure indicated, measured at spray tip. Adjust pressure and volume to ensure that cleaning methods do not damage plaster.
 - a. Equip units with pressure gages.
 - 3. For chemical-cleaner spray application, use low-pressure tank or chemical pump suitable for chemical cleaner indicated, equipped with cone-shaped spray tip.
 - 4. For water-spray application, use fan-shaped spray tip that disperses water at an angle of 25 to 50 degrees.
 - 5. For high-pressure water-spray application, use fan-shaped spray tip that disperses water at an angle of at least 40 degrees.

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6. For heated water-spray application, use equipment capable of maintaining temperature between 140 and 160 deg F at flow rates indicated.
 7. For steam application, use steam generator capable of delivering live steam at nozzle.
- C. Perform each cleaning method indicated in a manner that results in uniform coverage of all surfaces, including corners, moldings, and interstices, and that produces an even effect without streaking or damaging plaster surfaces.
- D. Water Application Methods:
1. Water-Soak Application: Soak plaster surfaces by applying water continuously and uniformly to limited area for time indicated. Apply water at low pressures and low volumes in multiple fine sprays using perforated hoses or multiple spray nozzles. Erect a protective enclosure constructed of polyethylene sheeting to cover area being sprayed.
 2. Water-Spray Applications: Unless otherwise indicated, hold spray nozzle at least 6 inches from surface of plaster and apply water in horizontal back and forth sweeping motion, overlapping previous strokes to produce uniform coverage.
- E. Steam Cleaning: Apply steam to plaster surfaces at the very low pressures, not exceeding 30 psi plaster. Hold nozzle at least 6 inches from surface of plaster and apply steam in horizontal back and forth sweeping motion, overlapping previous strokes to produce uniform coverage.
- F. Chemical-Cleaner Application Methods: Apply chemical cleaners to plaster surfaces to comply with chemical-cleaner manufacturer's written instructions; use brush or spray application. Do not spray apply at pressures exceeding 50 psi. Do not allow chemicals to remain on surface for periods longer than those indicated or recommended by manufacturer.
- G. Rinse off chemical residue and soil by working upward from bottom to top of each treated area at each stage or scaffold setting. Periodically during each rinse, test pH of rinse water running off of cleaned area to determine that chemical cleaner is completely removed.
- H. After cleaning is complete, remove protection no longer required. Remove tape and adhesive marks.

3.5 PRELIMINARY CLEANING

- A. Removing Plant Growth: Completely remove visible plant, moss, and shrub growth from plaster surfaces. Carefully remove plants, creepers, and vegetation by cutting at roots and allowing to dry as long as possible before removal. Remove loose soil or debris from open joints to whatever depth they occur.
- B. Preliminary Cleaning: Before beginning general cleaning, remove extraneous substances that are resistant to cleaning methods being used. Extraneous substances include paint, calking, asphalt, and tar.
1. Carefully remove heavy accumulations of material from surface of plaster with sharp chisel. Do not scratch or chip plaster surface.
 2. Remove paint and calking with alkaline paint remover.
 - a. Comply with requirements in "Paint Removal" Article.
 - b. Repeat application up to two times if needed.

3.6 PAINT REMOVAL

A. Paint Removal with Alkaline Paste Paint Remover:

1. Remove loose and peeling paint using stiff brushes. Let surface dry thoroughly.
2. Apply paint remover to dry, painted plaster with brushes.
3. Allow paint remover to remain on surface for period recommended by manufacturer.
4. Rinse with water in accordance with manufacturer's instructions.
5. Repeat process if necessary to remove all paint.
6. Apply acidic cleaner or manufacturer's recommended afterwash to plaster, while surface is still wet, using low-pressure spray equipment or soft-fiber brush. Let cleaner or afterwash remain on surface as a neutralizing agent for period recommended by chemical-cleaner or afterwash manufacturer.
7. Rinse with water in accordance with manufacturer's instructions.

END OF SECTION

SECTION 09 06 00
SCHEDULE FOR FINISHES

VAMC: SLVHCS MEDICAL CENTER Location: New Orleans, LA Project no. and Name: 629-HS2-401 - SLVHCS REPLACEMENT MEDICAL CENTER PROJECT Submission: Construction Documents Date: June 15, 2012

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section contains a coordinated system in which requirements for materials specified in other sections shown are identified by abbreviated material names and finish codes in the room finish schedule or shown for other locations.

1.2 MANUFACTURERS

- A. Manufacturer's trade names and numbers used herein are only to identify colors, finishes, textures and patterns. Products of other manufacturer's equivalent to colors, finishes, textures and patterns of manufacturers listed that meet requirements of technical specifications will be acceptable upon approval in writing by contracting officer for finish requirements.

1.3 SUBMITALS

- A. Submit in accordance with SECTION 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES; provide quadruplicate samples for color approval of materials and finishes specified in this section.

1.4 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in text by basic designation only.

B. MASTER PAINTING INSTITUTE (MPI):

- 1. Architectural Painting Specification Manual, 2001

PART 2 - PRODUCTS

2.1 GENERAL

- A. See the Specifications and Drawings, including 0AF600 Series drawings, Room Finish Legend and Schedule, and for additional requirements.

2.2 DIVISION 03 - CONCRETE

B. SECTION 03 45 00, PRECAST ARCHITECTURAL CONCRETE

1. TYPE: PC-1 (FLUTED)				
Finish Color	Texture	Finish	Manufacturer	Manufacturer Color Name/No.
Limestone	Smooth	Light acid etch	Gate Precast Co., Hillsboro, TX.	Gate precast #30911A-1
Sealant in conformance with Section 07 92 00	PC-1 Sealant Color	Manufacturer Name - Model Number		Custom Color
Exposed Sealant	Custom color to match adjacent surface	Dow Corning - 790 Silicone Building Sealant		Match Sherwin-Williams paint color #6071, "Popular Gray".

A. SECTION 03 45 05 - PRECAST ARCHITECTURAL SITE CONCRETE

Component	Source	Appearance
Precast Architectural Concrete Bench Type SPC-1	Gate Precast Company, Alpharetta, GA, FL	Color to match precast concrete panels PC-1. (buff color with medium sandblast textures)

2.3 DIVISION 04 – MASONRY

A. SECTION 04 05 13 - MASONRY MORTORING

Finish Code	Application	Manufacturer	Manufacturer Color Name
BMC-1	Base Bid Running Bond Brick Masonry	N/A/	Custom color to match Benjamin Moore paint color #2098.30, "Dark Nut Brown".
BMC-2	Alternate Stack Bond Brick Masonry	N/A	Medium gray color

B. SECTION 04 20 00 – UNIT MASONRY

Component	Size	Manufacturer	Contact	Texture	Color
Face Brick FB-1	Modular	Endicott	Columbus Coal & Lime Phone 614-224-9241 Elvin Henson, ehenson@columbuscoal.com	Velour	Medium Ironspot, #46

SEE RFI 04010: FB-1 IS EQUAL TO BR-1 SHOWN ON THE ARCHITECTURAL EXTERIOR DRAWINGS.

2.4 DIVISION 05 - METALS

A. SECTION 05 05 13, SHOP APPLIED COATINGS FOR METAL

Finish Code	Appearance	Manufacturer	Coating Series	Exterior Coating (EXTC) Color - Manufacturer's Designation
EXTC-1	Pearlescent	PPG	Duranar Sunstorm	Satin Nickel, # UC106684F
EXTC-2	Pearlescent	PPG	Duranar Sunstorm	Silverstorm, # UC106685F
EXTC-3	Pearlescent	PPG	Duranar Sunstorm	Cosmic Gray Mica, # UC106686F
Aluminum Trim		N/A	N/A	Clear

B. SECTION 05 70 50, ARCHITECTURAL METAL FABRICATIONS

Component	Material	Mfg./Model	Finish
Stainless steel wall base	Stainless steel, type 304.	N/A	#4 satin Finish
Trim	Stainless steel, type 302/304	N/A	#4 satin Finish
Trim	Aluminum	N/A	Clear anodized
Column Covers	Aluminum.	Series 1500 "Snap-Form" by Pittcon Industries	Clear anodized

C. SECTION 05 73 00, DECORATIVE METAL GATE

1. As specified in Section 05 73 00, DECORATIVE METAL GATE.

D. SECTION 05 73 16 – WIRE ROPE DECORATIVE METAL RAILING

Component	Material	Appearance
Posts & Top Rail	Steel tube	Galvanized
Wire Rope	Galvanized	Galvanized
Wire Rope Fittings	Galvanized	Galvanized

E. SECTION 05 73 17 – INTERIOR WIRE ROPE DECORATIVE METAL RAILING

Component	Material	Appearance
Posts & Top Rail	Aluminum tube	
Handrail	Stainless steel	#4 satin
Wire Rope	Stainless steel	Mill
Wire Rope Fittings	Stainless Steel	Mill

2.5 DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES

A. SECTION 06 40 00 - ARCHITECTURAL WOODWORK

Code	Component	Material	Source	Appearance
PLAM-1-6	Where indicated on Drawings	Plastic Laminate	See FINISH LEGEND	See FINISH LEGEND.
NA	Door and Drawer Edges	PVC	na	Color to match Door and Drawer Faces
	Pulls	Stainless steel	Epcoc	See FINISH LEGEND.

B. SECTION 06 61 16 - SOLID SURFACING

1. See Section 06 64 00 above.

Component	Finish Legend Code	Manufacturer	Appearance	Color and Product
Solid Polymer	S1, S3	See Finish Legend	Smooth, exposed faces.	See FINISH LEGEND
Simulated Stone	ST-1	See Finish Legend	Smooth, exposed faces.	See FINISH LEGEND

2.6 DIVISION 07 - THERMAL AND MOISTURE PROTECTION

A. SECTION 07 18 15 – PEDESTRIAN TRAFFIC COATINGS

Component	Product	Source	Appearance
Wearing Course	Auto-Gard FC	Neogard	Selected by Architect from Manufacturer's full range including gray and tan

B. SECTION 07 24 00, EXTERIOR INSULATION AND FINISH SYSTEMS

Finish Code	Finish Coat Manufacturer	Finish Coat Texture/Mfg's. Designation	Finish Coat Color
DIFS 1	Sto	1.0 / Fine	Match Benjamin Moore paint color EXTP-5 Chantilly Lace

Sealant in conformance with Section 07 92 00	Sealant Color for Exterior Insulation and Finish Systems	Manufacturer Name - Model Number	Manufacturer Color
Exposed Sealant	Custom color to match adjacent surface	Dow Corning - 790 Silicone Building Sealant	DEFS-1: Match Benjamin Moore paint color EXTP-5 Chantilly Lace.

C. SECTION 07 42 43, COMPOSITE PANELS

Type	Texture	Ext. Finish	Int. Finish	Fabricator	Manufacturer Color Name/No.
Rain Screen	Smooth	Fluoropolymer Finish Coat specified in Section 05 05 13	Mill	SL-100 by Sobotec.	EXTC-3

D. SECTION 07 46 15, MANUFACTURED METAL SIDING

Type	Metal	Profile	Ext. Finish**	Int. Finish	Manufacturer	Color
MP-1	Steel with Galvalume coating	BR5-36 Siding 1-1/2 inches deep, 7.2" pitch	PVDF see Section 05 05 13	*	Centria	EXTC-1 EXTC-2 Per RFI 4801
MP-1a	Steel with Galvalume coating	Same as MP-1 except panel is reversed			Centria	EXTC-2
*Paint coating for "Concealed Surface" in conformance with Section 05 05 13, Shop-Applied Coatings for Metal. Manufacturer's standard color.						
MP-2 RFI 05995					Centria	EXTC-1 RFI 05995

E. SECTION 07 52 16 - SBS MODIFIED BITUMINOUS MEMBRANE ROOFING

Item	Manufacturer	Appearance
Membrane Top Ply	Soprema	White

F. SECTION 07 56 00 – FLUID-APPLIED ROOFING

Item	Manufacturer	Product	Color
Membrane Top Ply	Sika	Sikalstic 621 TC	Pearl Gray

G. SECTION 07 60 00, FLASHING AND SHEET METAL

Item	Material	Finish	Color
Sheet Metal Flashing concealed from public view	Zinc-Tin Alloy-Coated Stainless-Steel Sheet	Field Paint	Exposed portions, if any, custom color to match adjacent wall cladding.
Sheet Metal Flashing exposed to public view	Aluminum	*PVDF	Custom "EXTC" color to match adjacent wall cladding/curtain wall.

*PVDF: Fluoropolymer Finish Coat as specified in Section 05 05 13

H. SECTIONS 07 71 00 / 07 72 00, ROOF SPECIALITIES AND ACCESSORIES

Item	Material	Finish	Manufacturer	Color
Roof Hatch	Aluminum	Anodized	Bilco	Clear
Coping	Aluminum	*PVDF	Hickman	Match precast panel PC-1.
Coping at Dixie Building	Aluminum	*PVDF	Metal Era-	Cast Stone Premium or Limestone Premium
Roof Expansion Joint Covers	Extruded Aluminum	Anodized	MM	Clear

*PVDF: Fluoropolymer Finish Coat as specified in Section 05 05 13

I. SECTION 07 81 23 – INTUMESCENT FIREPROOFING

Item	Manufacturer	Color
Columns and exposed framing	Carboline	Match Benjamin Moore paint color #OC-65, "Chantilly Lace". P-1 on Finish Legend.

J. SECTION 07 92 00 – JOINT SEALANTS

Location	Color	Manufacturer	Manufacturer Color
Brick Control Joints	Dark brown	Dow Corning - 790 Silicone	Approximate brick color.
CMU Control Joints	Gray	Dow Corning - 790 Silicone	Approximate CMU color
Architectural Precast Concrete Joints	See Section 03 45 00, Precast Architectural Concrete		
Metal Panel Joints MP-1, MP-2	See Section 07 46 15, Manufactured Metal Siding		
General for other joints	Selected by Architect from Manufacturer's full range to match adjacent surfaces unless otherwise indicated		
See sealants specified under other Sections			

K. SECTION 07 92 05 – SITE SEALANTS

Item	Type	Color
Sealant	Silicone	Selected by Architect from Manufacturer's full range to match adjacent surfaces unless otherwise indicated

L. SECTION 07 95 13, EXPANSION JOINT COVER ASSEMBLIES – Exterior Devices

	Material	Finish	Manufacturer	Manufacturer Color Name/No.
Exterior Wall with Extruded Aluminum Cover Plate	Aluminum	Fluoropolymer Finish Coat as specified in Section 05 05 13	MM Systems Corporation	Match color of adjacent material Match MP-1a = EXTC-2
Interior Wall	Aluminum	Powder coat	MM Systems Corporation	Match color of adjacent material
Floor	Aluminum	Mill	MM Systems Corporation	Mill
Ceiling	Membrane	-	MM Systems Corporation	White

2.7 DIVISION 08 - OPENINGS

A. SECTION 08 11 13 - HOLLOW METAL DOORS AND FRAMES

Paint both sides of door and frames including ferrous metal louvers, and unfinished hardware attached to door. Color for hollow metal doors and frame shall match color of adjacent wall surface. Where colors on opposite sides of doors are different, the color shall change at inside corner of door stop on door frame; and the darker color paint shall be applied on door edges.

Component	MPI Gloss Level
Door	Gloss Level 5 (Semi-Gloss)
Frame	Gloss Level 5 (Semi-Gloss)

B. SECTION 08 14 00 – INTERIOR WOOD DOORS

Component	Stain	Type Finish	Gloss	Finish
Door		Transparent	Satin	AWI System 11, Polyurethane, Catalyzed or System 10 Water Based.

Paint color and gloss to match adjacent surface.

C. SECTION 08 33 23 – OVERHEAD COILING DOORS

Material	Manufacturer	Finish	Color
Galvanized - Interior	Cookson	Powder coat	Approximate adjacent surfaces.
Galvanized - Exterior	Cookson	Powder coat	Match EXTC-1

D. SECTION 08 41 13 –INTERIOR ALUMINUM-FRAMED STOREFRONTS

Component	Type Finish	Gloss	Finish
Aluminum	Thermal-Set Acrylic	Satin	Match Benjamin Moore paint color #OC-65, "Chantilly Lace". P-1 on Finish Legend..

E. SECTION 08 44 13, GLAZED ALUMINUM CURTAIN WALLS

Component	Material	Finish PVDF / Acrylic	Manufacturer	**Color
Frame	Aluminum	**	Harmon	EXTC-3
Flashing	Aluminum	**	Harmon	EXTC-3
Standard Panel	Aluminum	**	Harmon	EXTC-3
Trim	Aluminum	**	Harmon	EXTC-3
Glazing	See Section 08 88 53, Security Glazing			
<p>** See Section 05 05 13, Shop-Applied Coatings for Metal, above for color of each "EXTC": Exterior: Fluoropolymer (PVDF). Interior: Thermal-Set Acrylic.</p>				

F. SECTION 08 44 13.3, GLAZED ALUMINUM CURTAIN WALLS for DIXIE

Component	Material	Finish PVDF / Acrylic	Manufacturer	**Color
Frame	Aluminum	**	Harmon based on 5600 Series by EfcO	Bone White
Cap 2-1/2"	Aluminum	**	EfcO 13B5	Bone White
Cap 4"	Aluminum	**	EfcO 6721 CRV	Bone White
Applied Grid	Aluminum	**	EfcO	Bone White
Glazing	See Section 08 88 53, Security Glazing			
<p>** See Section 05 05 13, Shop-Applied Coatings for Metal, above for color of each "EXTC": Exterior: Fluoropolymer (PVDF). Interior: Thermal-Set Acrylic.</p>				

"BONE WHITE PPG UC43350" PER RFI 03157.

G. SECTION 08 71 00 - BUILDERS HARDWARE

Item	Material	ANSI A156.18 Finish
Exterior Hinges	Stainless Steel	630
Interior Hinges	Steel	652
Door Closers	Any	689
Exterior Pivot Sets	Stainless Steel	630
Closer/ Holder	Any	689
Floor Stops	Cast metal	626
Wall Stops	Cast metal	626
Exterior Lock/ Latches	Stainless Steel	630
Interior Lock/ Latches	Stainless Steel	630
Key Cabinet	Steel	Manufacturer's standard paint finish.
Kick Mop Plates	Stainless Steel	630

Item	Material	ANSI A156.18 Finish
Door Edging	Stainless Steel	630
Exit Device	Stainless Steel	630
Flush Bolts	Brass	626
Door Pulls	Stainless Steel	630
Push Plates	Stainless Steel	630
Combination Push Pull Plate	Stainless Steel	630
Weather Strip	Aluminum	628
Threshold	Aluminum	Mill finish

H. SECTION 08 41 26 -INTERIOR ALL-GLASS STOREFRONT

Component	Material	Finish	Manufacturer
Trim	Stainless steel	#4 satin	Dorma
Glazing	See Section 08 80 10, Interior Glazing		

I. SECTION 08 71 13.11 – LOW ENERGY POWER ASSIST DOOR OPERATORS

Component	Material	Finish	Manufacturer
Enclosure	Aluminum	Match finish of door frame.	Besam
Switch Plate	Stainless Steel	#4 Satin	Besam

J. SECTION 08 80 10 - INTERIOR GLAZING

Glazing Type	Manufacturer	Manufacturer Color Name/No.
LAM GL-1 – LAM GL-10	Viracon/ Forms + Surfaces	See FINISH LEGEND
FR-1	SAFTIfirst	Superlite X-90

K. SECTION 08 88 53, SECURITY GLAZING

Glazing Type	Manufacturer	Monolithic	Insulating	(*) 2 x 2 Sample #	Manufacturer Color Name/No.
General	Viracon	X			All glass is Clear, laminated, varying thicknesses. Appearance distinguishing characteristics noted below. Basis of Design where noted "BoD"
SLG-3	Viracon	X			
SLG-4	Viracon	X			
LGS-1	Viracon	X			Ceramic Frit, Custom color selected by Architect.
LG-01HS	Viracon	X			
IG-01	Viracon		X	869351-8	BoD: Viracon VRE 1-46
IG-01T	Viracon		X		
IG-01 D	Viracon		X		VNE1-63. Provide at Dixie Bldg. only
IG-01 TD	Viracon		X		VNE1-63. Provide at Dixie Bldg. only
SG-01 D	Viracon		X		Ceramic Frit, Custom color selected by Architect. Provide at Dixie Bldg. only
SG-01	Viracon		X	869348-9	Full opaque Ceramic Frit, Custom color.
SG-01T	Viracon				Full opaque Ceramic Frit, Custom color.
IG-04	Viracon		X		BoD: Viracon VRE 4-46
IG-04T	Viracon		X		BoD: Viracon VRE 4-46

(*) 2' x 2' samples refer to Viracon's Work Order Nos. for samples available for inspection at the Architect's office. Duplicate samples may be available at Construction Manager's office; however, WO Nos. may not match. If so, the numbers will be cross-referenced to this Schedule.

L. SECTION 08 90 00, LOUVERS AND VENTS

Item	Material	Finish	Manufacturer	Color.
Louvers in Metal Panels	Aluminum	**	Greenheck	Match "EXTC" color of metal panel MP-1.
Louver at 5 th Floor Mech.	Aluminum	**	Greenheck	Match metal siding panel MP-1
Sill Flashing	Aluminum	**	Greenheck	Match louver color.
Trim and Accessories	Aluminum	**	Greenheck	Match louver color
Blank Off Panel	Aluminum	**	Greenheck	Flat Black
**Fluoropolymer (PVDF) paint coating in conformance with Section 05 05 13, Shop-Applied Coatings for Metal				

Sealant in conformance with Section 07 92 00	Sealant Color for LOUVERS AND VENTS	Manufacturer Name - Model Number	
Exposed Sealant at Louvers	Custom color to match louver/vent color	Dow Corning - 790 Silicone Building Sealant	

2.8 DIVISION 09 - FINISHES

- A. General- See FINSH LEGEND on Drawings 0AF602 – 0AF605 for codes, materials, manufacturers, models, and colors for the following Sections
1. SECTION 09 30 13 – CERAMIC/PORCELAINE TILING
 2. SECTION 09 51 00 - ACOUSTICAL CEILINGS
 3. SECTION 09 53 14 - CEILING ACCESSORIES
 4. SECTION 09 54 23 – METAL CEILINGS & WALLS
 5. SECTION 09 65 16 – RESILIENT SHEET FLOORING
 6. SECTION 09 65 19 – RESILIENT TILE FLOORING
 7. SECTION 09 65 66 – RESILIENT ATHLETIC FLOORING
 8. SECTION 09 66 16 – TERRAZZO FLOOR TILE
 9. SECTION 09 67 25 – RESINOUS FLOOR & WALL COVERING
 10. SECTION 09 68 00 – CARPETING
 11. SECTION 09 84 33 - SOUND-ABSORBING WALL UNITS
 12. SECTION 09 91 00 - PAINT AND COATINGS
 13. SECTION 09 97 37 – DRY-ERASE COATINGS

2.9 DIVISION 10 - SPECALTIES

A. SECTION 10 11 00 - VISUAL DISPLAY UNITS

Item	Manufacturer	Material / Finish	Color
Tackboards	Claridge	Cork	White
Markerboards	Clairidge	Porcelain enamel on steel	White.
Metal Trim	Clairidge	Anodized aluminum.	Clear; Class II Architectural, 0.4 mils thick (AA-M12C22A32)

B. SECTION 10 21 13 - TOILET COMPARTMENTS

Item	Material	Manufacturer	Finish	Color
Toilet Compartments	Steel	General Partitions	Baked synthetic enamel	As selected by Architect from manufacturer's full line.
Sreens	Steel	General Partitions	Baked synthetic enamel	As selected by Architect from manufacturer's full line.

C. SECTION 10 26 00 – WALL AND DOOR PROTECTION

1. See FINISH LEGEND on drawings.

D. SECTION 10 28 00 – TOILET, BATH, AND LAUNDRY ACCESSORIES

1. See TOILET ACCESSORY LEGEND on Drawings !

E. SECTION 10 44 13 - FIRE EXTINGUISHER CABINETS

Material	Finish	Manufacturer/Model
Carbon Steel	Factory prime coat. Paint color selected by Architect to match adjacent surfaces by Section 09 91 00 - Painting	JL Industries -Embassy Model 5614V10: 10 Pound type ABC Fire Extinguisher Locations. JL Industries -Embassy Model 5714V10: 10 pound type BC Fire Extinguishers Locations.

F. SECTION 10 51 13 - METAL LOCKERS

Component	Material	Manufacturer	Color/Texture/Pattern/Finish
Typical Locker Surfaces	Steel	Republic	Selected by Architect from Manufacturer's full range

2.10 DIVISION 11 - EQUIPMENT

- A. As specified.
- B. Paint colors for manufactured equipment to be manufacturer's standard color.

2.11 DIVISION 12 – FURNISHINGS

A. SECTION 12 31 00 – MANUFACTURED METAL CASEWORK

Component	Material	Manufacturer	Color/Texture/Pattern/Finish
Cabinets	Stainless Steel	Thermo Scientific.	#4 Satin
Pulls	Stainless Steel	Epcoc	See Finish Legend

B. SECTION 12 32 00 – MANUFACTURED WOOD CASEWORK

Component	Material	Manufacturer	Color/Texture/Pattern/Finish
Cabinets	Plastic laminate	Thermo Scientific.	As referenced to FINISH LEGEND
Pulls	Stainless Steel	EpcO	See Finish Legend
Grommet for Glove Box Dispenser	Plastic	Doug Mockett model "King Kong".	White

C. SECTION 12 35 53 – MANUFACTURED LABORATORY CASEWORK

Component	Material	Manufacturer	Color/Texture/Pattern/Finish
Support Frames	Steel	Thermo Scientific.	Baked enamel color as selected from mfg.'s full range.
Vertical Wall Strips	Steel or Aluminum	Thermo Scientific	Baked enamel color as selected from mfg.'s full range.
Horizontal Support Rails	Steel or Aluminum	Thermo Scientific	Baked enamel color as selected from mfg.'s full range.
Panel Support System	Steel	Thermo Scientific	Baked enamel color as selected from mfg.'s full range.
Process Tables	Plastic laminate	Thermo Scientific	Color as selected from mfg.'s full range.
Modular Storage Units	Molded ABS	Thermo Scientific	Color as selected from mfg.'s full range.
Shelves	Molded ABS	Thermo Scientific	Color as selected from mfg.'s full range.
Pulls	Stainless steel	EpcO	See Finish Legend

D. SECTION 12 36 00 – COUNTERTOPS

Component	Material	Manufacturer	Color/Texture/Pattern/Finish
Surface	Plastic laminate	See FINISH LEGEND.	See FINISH LEGEND
Surface	Molded Resin	Thermo Scientific	See FINISH LEGEND
Surface	Stainless Steel	N/A	#4 satin
Surface	Solid Polymer (Surface)	See FINISH LEGEND	See FINISH LEGEND
Surface	Stone	N/A	See FINISH LEGEND
Integral Sinks	Match countertop	See FINISH LEGEND	See FINISH LEGEND

E. SECTION 12 48 16 –INTERIOR FOOT GRILLES

Component	Material	Manufacturer	Model	Finish
Grille	Aluminum	Construction Specialties.	Pedigrd-SA G8	Clear anodized
Frame	Aluminum	Construction Specialties.	-	Clear anodized

2.12 DIVISIONS 15 - 21

- A. Not used.

2.13 DIVISION 21 through 28 – FACILITY SERVICES SUBGROUP

- A. Finishes as specified. Otherwise, generally as follows:
1. Porcelain Fixtures: White.
 2. Stainless Steel: #4 satin.
 3. Paint: Match adjacent surfaces or as selected by Architect from mfg.'s full range.

2.14 DIVISION 31 – EARTHWORK

- A. Not applicable for finishes.

2.15 DIVISION 32 - EXTERIOR IMPROVEMENTS

- A. EXTERIOR IMPROVEMENTS - See NOTES and LEGENDS on Landscape Drawings L001 – L003 for codes, materials, manufacturers, models, and colors for the following Sections
1. SECTION 32 12 00 – STABILIZED FLEXIBLE AGGREGATE PAVING
 2. SECTION 32 13 15 – ARCHTECTURAL SITE CONCRETE
 3. SECTION 32 14 19 – STONE WIERS
 4. SECTION 32 30 00 – SITE IMIPROVEMENTS
 5. SECTION 32 39 50 – SITE SECURITY EQUIPMENT

PART 3 - EXECUTION

3.1 ABBREVIATIONS, FINISH LEGENDS, & FINISH SCHEDULES

- A. Finish Schedules & Miscellaneous Abbreviations:
1. Architectural Abbreviations: See sheet 8AI001.
 2. Interior Finish Schedule Abbreviations: See sheet 8AF601.
 3. Interior Finish Legend: See sheets 8AF602 - 8AF605.

--- E N D ---

SECTION 09 22 16
NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies nonbearing steel studs wall systems, shaft wall systems, wall furring, fasteners, and accessories for the screw attachment of gypsum board, plaster bases or other building boards.
 - 1. Stud framing for partitions with lead shielding not exceeding 1/8-inch thick.
- B. Coordinate with concealed countertop bracket trade for special stud locations.
- C. Delegated Design.
- D. Work Specified Elsewhere, but provided under This Section:
 - 1. GYPSUM BOARD: Section 09 29 00.

1.2 RELATED WORK

- A. Elevator Shafts: Section 03 30 09, Cast-In-Place Concrete.
- B. Support for wall mounted items:
 - 1. Folding shower seats: Section 10 28 00, Toilet, Bath, and Laundry Accessories.
- C. Pull down tabs in steel decking: Section 05 36 00, COMPOSITE METAL DECKING.
- D. Countertop support brackets:
 - 1. Shop Fabricated: Section 05 50 00 - METAL FABRICATIONS.
 - 2. Manufactured: Section 12 36 00, COUNTERTOPS
- E. Closure of joints in or between fire-resistance-rated head-of-wall framing assemblies and adjacent substrates and required framing of openings in partitions: 07 84 00 - Fire-Resistive Joint Systems.
- F. Hollow Metal Doors and Frames: Section 08 11 13.
- G. Metal framing to support coiling doors: Section 08 33 23 – Overhead Coiling Doors.

1.3 TERMINOLOGY

- A. Description of terms shall be in accordance with ASTM C754, ASTM C11, ASTM C841 and as specified.
- B. Underside of Structure Overhead: In spaces where steel trusses or bar joists are shown, the underside of structure overhead shall be the underside of the floor or roof construction supported by beams, trusses, or bar joists.
- C. Thickness of steel specified is the minimum bare (uncoated) steel thickness.

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- D. Gages are defined as thicknesses listed by SSMA, Product Technical Information, 2011 edition.

1.4 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data: Submit for approval manufacturer's product literature for each system specified. Product data to fully describe system and all components including finishes, including but not limited to:
1. Studs, runners and accessories.
 2. Channels (Rolled steel).
 3. Furring channels.
 4. Screws, clips and other fasteners.
- C. Shop Drawings:
1. Typical ceiling suspension system.
 2. Typical metal stud and furring construction system including details around openings and corner details.
 3. Typical shaft wall assembly
 4. Typical fire rated assembly and column fireproofing showing details of construction same as that used in fire rating test.
- D. Metal Thickness Identification: Provide chart indicating the distinct color used to identify each thickness of metal. See QUALITY ASSURANCE below.
- E. Samples: Submit for approval, samples of each system specified. Minimum length to be 8".
- F. Test Results: Fire rating test designation, each fire rating required for each assembly.
- G. Letters of Acceptance: Where manufacturers of framing and wallboard are different, submit Letters of Acceptance as described in "Suitability of Components" under QUALITY ASSURANCE below.

1.5 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 119 by an independent testing agency.
1. Framing: Provide framing for hourly fire-resistive ratings as shown or specified.
 2. Wall/Partition Terminations: Provide approved fire-rated designs for head-of-wall and other terminations for metal stud framing assemblies. See Firestopping specified elsewhere.
 - a. Head of Wall Connections: Comply with UL 2079 for cyclic movement.
- 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.
- C. Partition Framing Manufacturer: Must be a member of SSMA (Steel Stud Manufacturer's Association).

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- D. Metal Stud framing shall be certified by an independent testing agency to document that metal stud framing products meet or exceed building code requirements.
- E. Suitable Components: To ensure compatibility, continuity of tested assemblies and eliminate claims of unsuitable components, provide either of the following options:
1. Single Manufacturer: Metal framing and gypsum board materials to be by the same manufacturer.
 2. Letters of Acceptance: Submit letters from both metal framing and wall board manufacturer's stating they accept the other manufacturer's product as a suitable component in the assemblies. Acceptance shall be defined as:
 - a. The performance of one manufacturer's products will not be adversely affected by the other's products, if installation of both products is proper.
 - b. Required assembly tests can be substantiated using the combined products.

1.6 DELIVERY, IDENTIFICATION, HANDLING AND STORAGE

- A. In accordance with the requirements of ASTM C754. Deliver materials to project site with manufacturer's labels intact and legible. Fire-rated materials shall bear testing agency label and fire classification numbers intact and legible. Handle materials with care to prevent damage.
- B. Store materials off floor, stacked flat, and under cover. Do not overload floor system.

1.7 SEQUENCE/SCHEDULING

- A. Sprayed Fireproofing: All attachments to structural steel framing receiving sprayed fireproofing, specified elsewhere, to be installed prior to installation of sprayed fireproofing to preclude removal of fireproofing. Include clips, tracks, hangers, and other devices required for subsequent installation of metal framing specified under this section.

1.8 APPLICABLE PUBLICATIONS (Latest edition unless otherwise noted.)

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. American Society For Testing And Materials (ASTM)
1. A123 Zinc (Hot-dip Galvanized) Coatings on Iron and Steel Products
 2. A653/A653M Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process
 3. C11 Terminology Relating to Gypsum and Related Building Materials and Systems
 4. C645 Non-Structural Steel Framing Members
 5. C754 Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products
 6. C841 Installation of Interior Lathing and Furring
 7. C954 Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness
 8. C1002 Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs

- C. Steel Stud Manufacturers Association (SSMA):
Product Technical Information.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design non-structural metal framing systems, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Performance: Provide non-structural metal framing capable of withstanding design loads within limits and under the following conditions after installation of all finish materials and equipment:
1. Typical Design Load: 5 psf uniform air-pressure differential acting perpendicular to covering material supported by metal framing.
 2. Deflection Limits: Design framing systems to withstand design loads, with all finishes and equipment installed, without horizontal deflection greater than:
 - a. Typical Partition: Not to exceed 1/240 of the wall height.
 - b. Partition with Ceramic Tile Veneer: Not to exceed 1/360 of the height of wall.
 - c. Partition with Stone Veneer: Not to exceed 1/720 of the height of wall.
 - d. Partition, soffits, and ceilings with Plaster Finish: Not to exceed 1/360 of the height of wall.
 - e. Partition with Masonry Veneer: Not to exceed L/600 of the height of wall.
 - f. Ceilings: Level within 1/8" in 10' and erected so that deflection of any component does not exceed 1/360 of its span after installation of all finish materials and equipment.
 3. Partial Height Partitions: Provide bracing or framing as needed to maintain top of partition in compliance with specified loading and deflection not to exceed L/360.
 - a. Partitions at or above ceilings, but not to structure above. Provide bracing to top track.
 - b. Partitions less than ceiling height: If not shown, provide cantilevered framing from slab in accordance with Section 05 50 00 including attachment to slab. Include loads transferred from other partition components such as vision glass.
 4. Support Wires: Certified by load test data for five (5) times design load; but in no case less than 12 gage.
 5. Height limitations shall not exceed recommendations of SSMA and manufacturer.

2.2 PROTECTIVE COATING

- A. Galvanize steel studs, runners (track), rigid (hat section) furring channels, and "Z" shaped furring channels, with coating designation of G-60 minimum, per ASTM 123, unless indicated otherwise.

2.3 STEEL STUDS AND RUNNERS (TRACK)

- A. ASTM C645, modified for thickness specified and sizes and shown. Use ASTM A525 steel, minimum 0.0346-inch thick bare metal (20 gage) with yield strength not less than 33 ksi. Provide thicker steel members as required to meet PERFORMANCE REQUIREMENTS.
1. So-called "equivalent gage", "effective metal thickness", or similar products which are less than specified thicknesses are not acceptable.

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- B. Runners same thickness as studs.
- C. Provide not less than two cutouts in web of each stud, approximately 300 mm (12 inches) from each end, and intermediate cutouts on approximately 600 mm (24-inch) centers.
- D. Doubled studs for openings.
- E. Studs 3600 mm (12 feet) or less in length shall be in one piece.
- F. Shaft Wall Framing:
1. Conform to rated wall construction.
 2. C-H Studs.
 3. E Studs.
 4. J Runners.
 5. Steel Jamb-Strut.
- G. Slip-Type Head Joints: Where indicated, provide the following in thickness not less than indicated for studs and in width to accommodate depth of studs. The Slip type head joint shall meet requirements for firestopping top of metal stud partition as specified in Section 07 84 00 - Fire-Resistive Joint Systems.
1. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes due to deflection of structure above.
 2. Dimensional Capabilities: Plus or minus 3/4" in a vertical direction; to allow for a total structural deflection of 1-1/2 inches.
 3. Slip type head joints shall be manufactured fire-rated devices to accommodate vertical movement of structure including, but not limited to, the following:
 - a. "Fire Trak" by Fire Trak Corp.
 - b. "Slotted Slip Track" by Metal Lite, Inc.
 - c. "VertiTrack™ VTD" series by The Steel Network, Inc.
 - d. "Snap Trak" by Total Steel Solutions.
- H. Framing and Vertical Deflection Clips: Same as STEEL STUDS AND RUNNERS above with protective coating except as follows:
1. Framing Gage: 0.0566-inch thick bare metal (16 gage) with yield strength not less than 50 ksi.
 2. Sizes as indicated on drawings.
 3. Flange width of studs not less than 1-3/8 inch.

2.4 FURRING CHANNELS

- A. Rigid furring channels (hat shape): ASTM C645.
- B. "Z" Furring Channels:
1. Not less than 0.45 mm (0.0179-inch)-thick bare metal (25 gage), with 32 mm (1-1/4 inch) and 19 mm (3/4-inch) flanges.
 2. Web furring depth to suit thickness of insulation with slotted perforations.

2.5 FASTENERS, CLIPS, AND OTHER METAL ACCESSORIES

- A. ASTM C754, except as otherwise specified.
- B. For fire rated construction: Type and size same as used in fire rating test.

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- C. Fasteners for steel studs thicker than 0.84 mm (0.033-inch) thick. Use ASTM C954 steel drill screws of size and type recommended by the manufacturer of the material being fastened.
- D. Clips: ASTM C841 (paragraph 6.11), manufacturer's standard items. Clips used in lieu of tie wire shall have holding power equivalent to that provided by the tie wire for the specific application.
- E. Attachments for Wall Furring:
1. Manufacturers standard items fabricated from zinc-coated (galvanized) steel sheet.
 2. For concrete or masonry walls: Metal slots with adjustable inserts or adjustable wall furring brackets. Spacers may be fabricated from 1 mm (0.0396-inch) thick galvanized steel with corrugated edges.
- F. Power Actuated Fasteners: Type and size as recommended by the manufacturer of the material being fastened.
- G. **Blocking: Provide one of the following:**
1. **Metal Blocking: Provide metal blocking from notched steel stud track as detailed in framing for all wall-mounted equipment, cabinets, and finish hardware, including door stops. Products available in manufactured form; "Notch-Tite" by Metal Lite Inc., Anaheim, CA; 800 236-0302.**
 - a. **Light Loads: 4 inch x 20 gage track or strap. Hardware. Attachment screws: Minimum 2-#8.**
 - b. **Heavy Loads (Typical): 6 inch x 16 gage. Wall cabinets, shelving, handrails, grab bars, equipment. Attachment screws: Minimum 3-#10.**
 - 1) **Blocking shall meet or exceed backing requirements of the American Disability Act Accessibility Guidelines, Section 4.26.**
 2. **Manufactured Wood Blocking (Contractor's option): "Danback Wood Backing Plate" by Dietrich a manufactured device of plywood strips in lengths to match stud spacing and joined by flexible galvanized 25 gage metal plates. Plywood strips are 3/4" thick x 5-1/4" high and machined to fit around stud flange. Device produced in 48" lengths.**
 - a. **Furnish with fire treated plywood.**
 - b. **Attach with minimum 2 #10 x 3/4" long screws.**
 - c. **May be used in lieu of "Metal Blocking" above for either light or heavy loads.**
 3. **As detailed on drawings.**
- H. Special Corner Plates: 20 ga. galvanized angles or bent plates, 5" x 5" legs, full height, 1 piece. See "Special Corner Plates" under PARTITION FRAMING in Part 3 below for locations. "Metal Corner Bead Backer" specified under Section 09 29 00.

PART 3 - EXECUTION

3.1 INSTALLATION CRITERIA

- A. Where fire rated construction is required for walls, partitions, columns, beams and floor-ceiling assemblies, the construction shall be same as that used in fire rating test.
- B. Construction requirements for fire rated assemblies and materials shall be as shown and specified, the provisions of the Scope paragraph (1.2) of ASTM C754 and ASTM C841 regarding details of construction shall not apply.
- C. Isolate dissimilar metals.

3.2 INSTALLING STUDS

- A. Install studs in accordance with ASTM C754, except as otherwise shown or specified.
- B. Spacing:
 - 1. Maximum: Space studs not more than 406 mm (16 inches) on center.
 - 2. Curved Walls: Provide closer spacing as needed in accordance with GA-226.
- C. Cut studs 19 mm (3/4-inch) less than floor to underside of structure overhead when extended to underside of structure overhead.
- D. Extend studs to underside of structure, unless noted otherwise.
- E. Where studs are shown to terminate above suspended ceilings, provide bracing as shown or extend studs to underside of structure overhead.
 - 1. Erect studs plumb; install additional studs as required for support at recessed or applied items. Attach studs to both sides of track
- F. Floor Tracks: Secure each stud to track.
 - 1. Ceiling Deflection Tracks: Use track manufacturer's approved attachment system of special clips or washers which do not restrict vertical movement between stud and track. No other type attachment permitted.
 - 2. Studs to run continuous full height without breaks or splices.
- G. Openings:
 - 1. Frame jambs of openings in stud partitions and furring with a minimum of two studs placed flange to flange.
 - 2. Studs fastened flange to flange shall have splice plates on both sides approximately 50 X 75 mm (2 by 3 inches) screwed to each stud with two screws in each stud. Locate splice plates at 600 mm (24 inches) on center between runner tracks.
- H. Corners:
 - 1. 90 Degree Corners: Provide 3-stud corners as approved by Resident Engineer.
 - 2. See "Special Corner Plates" under "Specialties" below.
 - 3. Fastening Studs:
 - 4. Fasten studs located adjacent to partition intersections, corners and studs at jambs of openings to flange of runner tracks with two screws through each end of each stud and flange of runner.
- I. Do not fasten studs to top runner track when studs extend to underside of structure overhead.
- J. Chase Wall Partitions:
 - 1. Locate cross braces for chase wall partitions to permit the installation of pipes, conduits, carriers and similar items.
 - 2. Use studs or runners as cross bracing not less than 63 mm (2-1/2 inches wide).
- K. Form building seismic or expansion joints with double studs back to back spaced 75 mm (three inches) apart plus the width of the seismic or expansion joint.
- L. Form control joint, with double studs spaced 13 mm (1/2-inch) apart.
- M. Specialties:

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1. Special Corner Plates: Provide positive connection of framing members at corner conditions at conditions listed below. Attach corner plates to adjacent studs at not less than 16 inch centers.
 - a. Where studs cannot fill corner; i.e. 45 and 60 degree corners.
 - 1) Outside Corners. Where outside corner receives wallboard.
 - 2) Inside Corners: Where outside corner does not receive wallboard or is not accessible. i.e. shaft or chase.
 - b. Locations requiring corner guards (specified under Division 10).
 2. Elevator Shaft Cants: Provide cants on ledges in shafts formed by beams and floor slabs to prevent hazard from mislaid tools or other loose objects. Construct cants not less than 75 degrees from horizontal from 25 gage sheet steel or metal stud framing and gypsum board.
 3. Extruded aluminum Trim: Provide concealed continuous 20 gage flat strap backer plate secured to face of metal studs. Backer plate is a minimum of 2 inches wider than trim and centered behind trim.
- N. Bracing for High Partitions: Provide bracing for partitions whose deflection would exceed that specified under PERFORMANCE REQUIREMENTS in Part 1 above. Provide diagonal bracing above ceiling with studs as needed. Attach track to partition after gypsum board is installed and secure bracing to track and overhead structure.

3.3 INSTALLING WALL FURRING FOR FINISH APPLIED TO ONE SIDE ONLY

- A. In accordance with ASTM C754, or ASTM C841 except as otherwise specified or shown.
- B. Wall furring-Stud System:
 1. Framed with 63 mm (2-1/2 inch) or narrower studs, 600 mm (24 inches) on center.
 2. Brace as specified in ASTM C754 for Wall Furring-Stud System or brace with sections or runners or studs placed horizontally at not less than three foot vertical intervals on side without finish.
 3. Securely fasten braces to each stud with two Type S pan head screws at each bearing.
- C. Direct attachment to masonry or concrete; rigid channels or "Z" channels:
 1. Install rigid (hat section) furring channels at 600 mm (24 inches) on center, horizontally or vertically.
 2. Install "Z" furring channels vertically spaced not more than 600 mm (24 inches) on center.
 3. At corners where rigid furring channels are positioned horizontally, provide mitered joints in furring channels.
 4. Ends of spliced furring channels shall be nested not less than 200 mm (8 inches).
 5. Fasten furring channels to walls with power-actuated drive pins or hardened steel concrete nails. Where channels are spliced, provide two fasteners in each flange.
 6. Locate furring channels at interior and exterior corners in accordance with wall finish material manufacturers printed erection instructions. Locate "Z" channels within 100 mm (4 inches) of corner.
- D. Installing Wall Furring-Bracket System: Space furring channels not more than 400 mm (16 inches) on center.

3.4 INSTALLING SUPPORTS REQUIRED BY OTHER TRADES

- A. Provide for attachment and support of electrical outlets, plumbing, laboratory equipment, medical equipment, or heating fixtures, recessed type plumbing fixture accessories, access panel frames, wall bumpers, wood seats, toilet stall partitions, dressing booth partitions, urinal screens, chalkboards, tackboards, wall-hung casework, handrail brackets, recessed fire extinguisher cabinets and other items like auto door buttons and auto door operators supported by stud construction. Provide blocking appropriate for loads as follows:
1. Metal Blocking: As specified herein for appropriate loads.
 2. Wood Blocking Support: Provide support of wood blocking where shown or required. Minimum 2" x 2" x 16 gage angle x full height of blocking or 16 gage studs.
 3. Exception: Blocking for Architectural Woodwork is provided by Section 06 40 00 - ARCHITECTURAL WOODWORK.
 4. Special Loads: As directed by Architect or Resident Engineer. May be required for equipment not shown or specified.
- B. Provide additional studs where required. Install metal backing plates, or special metal shapes as required, securely fastened to metal studs.

3.5 INSTALLING SHAFT WALL SYSTEM

- A. Conform to UL Design No. U438 for two-hour fire rating.
- B. Conform to UL Design No. U499 for one-hour fire rating where only one side of partition is exposed to view, with 5/8" gypsum board to the side exposed to view.
- C. Conform to UL Design No. U498 for one-hour fire rating where only both side of partition is exposed to view, with 5/8" gypsum board to the side exposed to view.
- D. Position J runners at floor and ceiling with the short leg toward finish side of wall. Securely attach runners to structural supports with power driven fasteners at both ends and 600 mm (24 inches) on center.
- E. After liner panels have been erected, cut C-H studs and E studs, from 9 mm (3/8-inch) to not more than 13 mm (1/2-inch) less than floor-to-ceiling height. Install C-H studs between liner panels with liner panels inserted in the groove.
- F. Install full-length steel E studs over shaft wall line at intersections, corners, hinged door jambs, columns, and both sides of closure panels.
- G. Suitably frame all openings to maintain structural support for wall:
1. Provide necessary liner fillers and shims to conform to label frame requirements.
 2. Frame openings cut within a liner panel with E studs around perimeter.
 3. Frame openings with vertical E studs at jambs, horizontal J runner at head and sill.

3.6 TOLERANCES

- A. Allowable Tolerances: Provide framing fabricated and erected to conform with the following allowable tolerances:
1. Fastening surface for application of subsequent materials shall not vary more than 3 mm (1/8-inch) from the layout line.

2. Partition Framing: Plumb and align vertical members 3 mm (1/8-inch).
3. Ceiling Framing: Level within 1/8" in 10' and erected so that deflection of any component does not exceed 1/360 of its span after installation of all finish materials and equipment.

--- E N D ---

SECTION 09 29 00
GYPSUM BOARD

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies installation and finishing of gypsum board, which may also be called gypsum wall board.
- B. Interior gypsum board.
- C. Aluminum partition closers.
- D. All acoustical aids associated with gypsum board partitions.
- E. Suspension system for ceilings and soffits receiving gypsum board.
- F. GWB-1 ceilings.
- G. Trim and accessories.
- H. Spackling transition trim specified under Section 09 53 14, Ceiling Accessories.

1.2 RELATED WORK

- A. Installation of steel framing members for walls, partitions, furring, soffits, and ceilings: Section 09 22 16, Non-Structural Metal Framing.
- B. Exterior Cementitious Sheathing: Division 6.
- C. Acoustical Sealants: Section 07 92 00, Joint Sealants.
- D. Expansion joint covers: Section 07 95 13, Expansion Joint Cover Assemblies.
- E. Abuse Resistant Wallboard: Section 09 29 02.
- F. Ceramic/Porcelain Tiling: Section 09 30 13.
- G. Lay in gypsum board ceiling panels: Section 09 51 00, Acoustical Ceilings.
- H. Extruded aluminum transition trim and perimeter gasket: Section 09 53 14, Ceiling Accessories.
- I. Painting: Section 09 91 00 for primers applied to gypsum board surfaces.

1.3 TERMINOLOGY

- A. Definitions and description of terms shall be in accordance with ASTM C11, C840, and as specified.
- B. Underside of Structure Overhead: In spaces where steel trusses or bar joists are shown, the underside of structure overhead shall be the underside of the floor or roof construction supported by the trusses or bar joists.

C. Open To Public View: All spaces except rooms such as mechanical room, closet, storage room, clean room, and trash room.

D. "Yoked": Gypsum board cut out for opening with no joint at the opening (along door jamb).

1.4 SUBMITTALS

RFI 8305.1 - Redefinition of public space

A. Submit in accordance with Section 01 33 23, Shop Drawings, Product Data, And Samples.

B. Manufacturer's Literature and Data:

1. Cornerbead and edge trim.
2. Finishing materials.
3. Gypsum board, each type.

C. Shop Drawings:

1. Typical gypsum board installation, showing corner details, edge trim details and the like.
2. Typical sound rated assembly, showing treatment at perimeter of partitions and penetrations at gypsum board.
3. Typical shaft wall assembly.
4. Typical fire rated assembly and column fireproofing, indicating details of construction same as that used in fire rating test.

D. Samples:

1. Cornerbead.
2. Edge trim.
3. Control joints.
4. Trim Accessories: Full-size Sample in 12-inch- (300-mm-) long length for each trim accessory indicated.

E. Test Results:

1. Fire rating test, each fire rating required for each assembly.
2. Sound rating test.

F. LEED Submittals:

1. Product Data for Credit MR 4.1 and MR 4.2: For products having recycled content, documentation indicating the following:
 - a. Indicate recycled content; indicate percentage of pre-consumer and post-consumer recycled content per unit of product.
 - b. Indicate relative dollar value of recycled content product to total dollar value of product included in project.
 - c. If recycled content product is part of an assembly, indicate the percentage of recycled content product in the assembly by weight.
 - d. If recycled content product is part of an assembly, indicate relative dollar value of recycled content product to total dollar value of assembly.
2. Product Data for Credit IEQ 4.1: For adhesives, documentation including printed statement of VOC content.

1.5 QUALITY ASSURANCE

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
- 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.
- C. Mockups: Provide mockups of not less than 100 sq. ft. each showing Level 4 and Level 5 finishes. Accepted mockups to remain as an acceptable standard of workmanship and can be part of completed Work.. Install at a location acceptable to Architect.
- D. Allowable Tolerances: In accordance with Section 09 22 16 - Non-Structural Metal Framing.
- E. Assembly Responsibility: Contractor to ensure rated assemblies can be substantiated by applicable tests using the proposed products. Where assembly rating cannot be substantiated by applicable tests, provide approved products which fulfill rating requirements at no additional cost to Owner.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against damage from weather, condensation, direct sunlight, construction traffic, and other causes. Stack panels flat to prevent sagging.

1.7 DELIVERY, IDENTIFICATION, HANDLING AND STORAGE

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.
- B. Do not install interior products until installation areas are weather tight and space is conditioned.
- C. Do not store panels near materials that may off-gas or emit harmful fumes, such as kerosene heaters, fresh paint, or adhesives.
- D. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

1.8 ENVIRONMENTAL CONDITIONS

- A. In accordance with the requirements of ASTM C840, including maintenance of a uniform temperature of not less than 50 degrees in the building at least 48 hours prior to, during, and following the application of gypsum board and joint treatment materials.

1.9 SEQUENCE/SCHEDULING

- A. Gypsum Board: See GENERAL SEQUENCING in Section 01 11 10, Summary of Work – General.
1. Paperless- Gypsum Board: Only this board may, at contractor's risk, be installed above ceiling level in weather-protected areas before 100% building enclosure. See FIELD TESTING in Part 3 below.
 - a. All products used for taping and spackling shall have a mold resistance rating of 10 per ASTM D 3273.
 - b. Bottom edge of board shall be at 4" above finished ceiling level.
- B. Sprayed Fireproofing: Spray fireproofing specified elsewhere; see SUMMARY in Part 1 above.
1. All attachments to structural steel framing receiving sprayed fireproofing, to be installed prior to installation of sprayed fireproofing, if possible, to preclude removal of fireproofing.
 2. Include clips, tracks, hangers, and other devices required for subsequent installation of metal framing specified under this Section.
 3. Repair: Where necessary to remove fireproofing and where fireproofing becomes damaged:
 - a. Provide for restoration in accordance with original Fireproofing Specifications at no additional cost to Owner.
 - b. Engage original fireproofing applicator for repair work for undivided responsibility.
- C. Perimeter Gasketing at Curtain Wall: See Section 09 53 14, Ceiling Accessories for gasket to be installed before work gypsum board.

1.10 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only. Latest editions unless otherwise noted.
- B. American Society for Testing And Materials (ASTM):
1. B 221 Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wires, Shapes, and Tubes
 2. C11 Terminology Relating to Gypsum and Related Building Materials and Systems
 3. C475 Joint Compound and Joint Tape for Finishing Gypsum Board
 4. C 834 Standard Specification for Latex Sealants
 5. C840 Application and Finishing of Gypsum Board
 6. C919 Sealants in Acoustical Applications
 7. C954 Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases to Steel Stud from 0.033 in. (0.84mm) to 0.112 in. in thickness
 8. C1002 Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs
 9. C1047 Accessories for Gypsum Wallboard and Gypsum Veneer Base
 10. C1396 Standard Specifications for Gypsum Board.
 11. C1178 Coated Glass Mat Water-Resistant Gypsum Backing Panel
 12. C 1278 Fiber-Reinforced Gypsum Panel.
 13. C1396 Gypsum Board
 14. C1658 Glass Mat Gypsum Panels.
 15. D3273 Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.

16. E84 Surface Burning Characteristics of Building Materials

C. Underwriters Laboratories Inc. (UL):

1. Fire Resistance Directory

D. Inchcape Testing Services (ITS):

1. Certification Listings

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency. Provide UL assemblies that do not require adhesives.
- 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.
- C. Low Emitting Materials: For ceiling and wall assemblies, provide materials and construction identical to those tested in assembly and complying with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- D. Gypsum Board products shall be mold and mildew resistant; 10 rating per ASTM D 3273 and contain no paper, pulp, starches or sugars.

2.2 GYPSUM BOARD GENERAL

- A. Paper-faced products not permitted.
- B. Gypsum cores shall contain a minimum of 20 percent preconsumer recycled content by weight or 10 percent post-industrial recycled gypsum content by weight.

2.3 GYPSUM BOARD (PAPERLESS)

- A. Gypsum Board and Water Resistant Gypsum Board (W/R): ASTM C1658, Type X, 16 mm (5/8 inch) thick unless shown otherwise.
 - 1. Long Edges: Tapered.
- B. Abuse-Resistant: Specified elsewhere.
- C. Coreboard or Shaft Wall Liner Panels.
 - 1. ASTM C1396, Type X fire-resistive liner panels with moisture- and mold-resistant core and surfaced with water-resistant glass mat on front, back, and long edges.
 - 2. Coreboard for shaft walls 300, 400, 600 mm (12, 16, or 24 inches) wide by required lengths 25 mm (one inch) thick.

2.4 ACOUSTIC AIDS:

A. Acoustical Insulation:

1. Mineral Fiber Batt or Blankets: ASTM C665, Type 1. Formaldehyde free, unfaced glass or mineral fiber batt, full depth of stud cavity width to fit stud spacing and fit tight against framing
 - a. Burning Characteristics for Non-Fire Rated Partitions:
 - 1) Flame Spread: 25 or less, ASTM E84
 - 2) Smoke Developed: 450 or less, ASTM E84.
 - b. Surface Burning Characteristics for Fire Rated Partitions:
 - 1) Flame Spread: 0 (Zero), ASTM E84
 - 2) Smoke Developed: 0 (Zero), ASTM E84.

B. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

1. Acoustical joint sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Sealant must have a flame spread of 25 or less and a smoke developed rating of 50 or less when tested in accordance with ASTM E 84.

2.5 ACCESSORIES

A. Interior Trim:

1. ASTM C1047, except form of 0.39 mm (0.015 inch) thick zinc coated steel sheet unless otherwise indicated and provide rigid PVC plastic where indicated.
2. Flanges not less than 22 mm (7/8 inch) wide with punchouts or deformations as required to provide compound bond.

B. Extruded Aluminum Trim: Extruded accessories of profiles and dimensions indicated.

1. Transition Trim: See Section 09 53 14 – Ceiling Accessories.
2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Fry Reglet Corporation.
 - b. Gordon.
 - c. MM Systems Corp.
 - d. Pittcon Industries.
3. Profiles:
 - a. Single Wing Channel (GBT-3): 1" wide x 5/8" deep with single 7/8" long taping flange. Basis of Design: #410-5/8 by Gordon.
 - b. Double Wing Channel (GBT-4): 1" wide x 5/8" deep with double 7/8" long taping flanges. Basis of Design: #510-5/8 by Gordon.
 - c. Round Column Trim: 1/2" x 1/2" shadow with 7/8 long taping flange. Basis of Design #DRWT 50.50 by Fry Reglet.
 - d. Others: As indicated on drawings.
4. Material:

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- a. Extruded aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B 221 (ASTM B 221M), Alloy 6063-T5.
 - b. Finish: Class II clear anodic finish, unless noted otherwise.
5. Fabrication:
- a. Form components to dimensions and diameters indicated.
 - b. Form radii to achieve true and smooth curves.
 - c. Fin common to face of gypsum board shall have a continuous perforated tape fin to allow for tape and spackle joints and seamless appearance, except as otherwise specified or indicated.
 - d. Intersections: At intersection of trim, "T", "L", "+" shapes, provide factory fabricated shapes with 6" (minimum) legs, measured from center line of intersection; and with mitered joints that are heliarc-welded together. Welds shall not be visible.
- C. Adjustable Partition Closer: Preassembled, spring loaded nesting extruded aluminum channels with acoustic insulation. Tested STC rating of 38. Subject to compliance with the requirements, manufacturers offering Adjustable Partition Closer products include, but are not necessarily limited to, the basis of design manufacturer.
1. Basis of Design: "Mullion Mate" by Gordon, Inc., Bossier City, LA, 800 747-8954, www.gordonceilings.com.
 2. Sizes:
 - a. Mullion-Mate I: 2-7/8" minimum to 5-1/4" maximum opening; 1-3/4 x 1-7/8" wide.
 - b. Mullion-Mate II: 4-11/16" minimum to 7-1/8" maximum opening; 1-7/8" x 2-3/32" wide.
 3. Finish: Pre-finished paint to match wall paint color. Single color as selected by Architect.
- D. Perimeter Gasket at Curtain Wall: Provide as specified under Section 09 53 14, Ceiling Accessories.
- E. Miscellaneous Materials: Provide all incidental and accessory materials, tools, equipment, and methods required for satisfactory completion of gypsum board construction, including the following:
1. Adhesives: Types made, or recommended, by board manufacturer for lamination or adhesion of materials. Do not use adhesive containing benzene, carbon tetrachloride, or trichloroethylene. Adhesive shall contain a maximum VOC content of 50 grams per liter. Adhesive must meet the requirements of LEED low emitting materials credit. Adhesive for Fastening Gypsum Board to Metal Framing not permitted. Adhesive attachment is not permitted for multi-layer gypsum boards.
 2. W/R Sealant: Manufacturer's standard for nail holes and cut edges of W/R board.
 3. Metal Corner Bead Backer: 25 ga. galvanized angles or bent sheet steel, 3" x 3" legs, full height, 1 piece.
- 2.6 FASTENERS
- A. ASTM C1002 and ASTM C840, except as otherwise specified.
 - B. ASTM C954, for steel studs thicker than 0.04 mm (0.33 inch).
 - C. Select screws of size and type recommended by the manufacturer of the material being fastened.
 - D. For fire rated construction, type and size same as used in fire rating test.

- E. Unless otherwise indicated, provide Type "S" bugle head screws for attachment of board to metal framing, and Type "S" pan head screws for attachment of framing to door frames.
- F. Clips: Zinc-coated (galvanized) steel; gypsum board manufacturer's standard items.
- G. No exposed fasteners permitted, unless approved by Architect.
- H. Staples: Not permitted unless approved by Architect.

2.7 FINISHING MATERIALS

- A. ASTM C475 and ASTM C840. Free of antifreeze, vinyl adhesives, preservatives, biocides and other VOC.
- B. Joint Tape:
 - 1. Interior Gypsum Wallboard: 10-by-10 glass mesh or paper.
 - 2. Exterior Gypsum Soffit Board: 10-by-10 glass mesh.
 - 3. Tile Backing Panels: As recommended by panel manufacturer.
- C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
 - 1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
 - 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use chemically activated setting-type joint compound. Product shall be specifically formulated and manufactured for use with fiber glass mesh tape.
 - 3. Fill Coat: For second coat, use setting-type, sandable topping or drying-type, all-purpose compound.
 - 4. Finish Coat: For third coat, use setting-type, sandable topping or drying-type, all-purpose compound.
 - 5. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound or drying-type, all-purpose compound. Toxicity/IEQ: Lime compound. All purpose joint and texturing compound containing inert fillers and natural binders. Pre-mixed compounds shall be free of antifreeze, vinyl adhesives, preservatives, biocides and other slow releasing compounds.
- D. Water: Provide clean, fresh, and potable water.

PART 3 - EXECUTION

3.1 GYPSUM BOARD HEIGHTS

- A. Extend all layers of gypsum board from floor to underside of structure overhead, unless otherwise noted on drawings.
 - 1. Extend all layers of gypsum board construction used for fireproofing of columns from floor to underside of structure overhead, unless shown otherwise.

3.2 INSTALLING GYPSUM BOARD

- A. Coordinate installation of gypsum board with other trades and related work.

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- B. Examine areas and substrates, with Installer present, and including welded hollow-metal frames and framing, for compliance with requirements and other conditions affecting performance.
 - C. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
 - D. Proceed with installation only after unsatisfactory conditions have been corrected.
 - E. Install gypsum board in accordance with ASTM C840, except as otherwise specified.
 - F. Use gypsum boards in maximum practical lengths to minimize number of end joints.
 - G. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.
 - H. Do not place tapered edges against cut edges or ends.
 - I. Form control and expansion joints with space between edges of adjoining gypsum panels.
 - J. Provide yoke shaped gypsum board to span over upper corners of cased openings and hollow metal door frame openings: unless detailed otherwise. Edge of yoked gypsum board above opening, shall be a minimum of 12 inches from corner formed by intersection of head and jambs.
 - K. Hollow Metal Frames: Unless otherwise indicated; spot grout welded frames with joint compound at each anchor prior to inserting board into frame; install board while grout is still plastic.
 - L. Ceilings: Unless otherwise indicated or required by fire-resistance-rated assembly comply with the following:
 - 1. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels, not less than one framing member.
 - 2. For single-ply construction, use perpendicular application.
 - 3. For two-ply assemblies:
 - a. Use perpendicular application.
 - b. Apply face ply of gypsum board so that joints of face ply do not occur at joints of base ply with joints over framing members.
 - M. Walls (Except Shaft Walls): Unless otherwise indicated or required by fire-resistance-rated assembly comply with the following:
 - 1. Install gypsum board parallel to framing members, space fasteners 300 mm (12 inches) on center in field of the board at each stud, and 200 mm (8 inches) on center along edges.
 - 2. Gypsum board may be installed perpendicular to framing members, only for conditions deemed acceptable to Architect, Space fasteners 300 mm (12 inches) on center in field and along edges at each stud.
 - 3. Stagger vertical joints on opposite sides of partitions. Stagger horizontal butt joints exposed to view. Do not make joints other than control joints at corners of framed openings.
 - 4. Stagger screws on abutting edges or ends.
 - 5. For single-ply construction, apply gypsum board with long dimension parallel to framing members as required to minimize number of joints. . Gypsum board shall be applied vertically over "Z" furring channels.

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6. For two-ply gypsum board assemblies, apply base ply of gypsum board to assure minimum number of joints in face layer. Apply face ply of wallboard to base ply so that joints of face ply do not occur at joints of base ply with joints over framing members.
 - a. Outside Corners: Install "Metal Corner Bead Backer" over first layer at corners receiving metal corner bead. Provide temporary attachment with adhesive; do not screw between layers where finished corner is exposed to view. Screw attach top layer of board through corner plate and into stud framing. Corner bead backer provides positive substrate for screw attachment of corner beads.
 7. For three-ply gypsum board assemblies, apply plies in same manner as for two-ply assemblies, except that heads of fasteners need only be driven flush with surface for first and second plies. Apply third ply of wallboard in same manner as second ply of two-ply assembly, except use fasteners of sufficient length enough to have the same penetration into framing members as required for two-ply assemblies.
 8. No offset in exposed face of walls and partitions will be permitted because of single-ply and two-ply or three-ply application requirements.
 - a. Installing Two Layer Assembly Over Sound Deadening Board:
 - b. Apply face layer of wallboard vertically with joints staggered from joints in sound deadening board over framing members.
 - c. Fasten face layer with screw, of sufficient length to secure to framing, spaced 300 mm (12 inches) on center around perimeter, and 400 mm (16 inches) on center in the field.
 9. Non-Fire Rated Acoustical or Sound Rated Partitions:
 - a. Cut gypsum board for a space approximately 3 mm to 6 mm (1/8 to 1/4 inch) wide around partition perimeter.
 - b. Coordinate for application of caulking or sealants to space prior to taping and finishing.
 - c. For sound rated partitions, use sealing compound (ASTM C919) to fill the annular spaces between all receptacle boxes and the partition finish material through which the boxes protrude to seal all holes and/or openings on the back and sides of the boxes. STC minimum values as shown.
 10. Fire, Smoke Barrier, Smoke Partitions; and Fire Rated Acoustical or Sound Rated Partitions:
 - a. Penetrations in partitions shall be firestopped as specified in Section 07 84 00 – Firestopping.
- N. Accessories:
1. Set accessories plumb, level and true to line, neatly mitered at corners and intersections, and securely attach to supporting surfaces as specified.
 2. Install in one piece, without the limits of the longest commercially available lengths.
 3. Corner Beads:
 - a. Install at all vertical and horizontal external corners and where shown.
 - b. Use screws only. Do not use crimping tool.
 4. Edge Trim (casings Beads):
 - a. At both sides of expansion and control joints unless shown otherwise.
 - b. Where gypsum board terminates against dissimilar materials and at perimeter of openings, except where covered by flanges, casings or permanently built-in equipment.
 - c. Where gypsum board surfaces of non-load bearing assemblies abut load bearing members.
 - d. Where shown.

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- e. In multiple layer work, joint in base layers must occur at same location as joint in top layer.
- O. Extruded Aluminum Trim: Install in locations indicated on Drawings. Install and finish in accordance with manufacturer's written instructions and approved shop drawings.
- 1. Partition End Cap: Provide at window mullion termination detail. Attach to metal stud before installation of end stud. Do not attach to window mullion.
 - a. See "Adjustable Partition Closer" under ACCESSORIES above and "Partition Terminations at Window Mullions" below.
 - b. Coordinate with framing specified elsewhere.
 - 2. Partition Terminations at Window Mullions: Install in accordance with manufacturer's instructions. Provide in size suitable for gap which maintains spring pressure between mullion and partition.
 - 3. Fasteners: Use anchors with sufficient holding strength to provide solid installation. Use only galvanized or stainless steel screws. Secure fins of trim to metal blocking at 8" on center and not more than 4" from end of trim member. Fasteners shall be concealed from view unless approved by Architect.
 - 4. Joints:
 - a. Typical: Butt ends tightly together.
 - b. Control Joints: Provide butt joint between two trim members at intersections with control joints; and install joint in trim at center line of control joint.
 - 5. Transition Trim: Trim installed by acoustic ceiling trade. Coordinate with adjacent ceiling system framing. Spackle completed gypsum board.
- P. Infection Control: See Section 01 73 00 – EXECUTION.

3.3 CONTROL JOINTS

- A. Control Joints ASTM C840 and as follows: **REFER TO RFI 6981 FOR LOCATION OF LEVEL 1 CONTROL JOINTS AND RFI 7361 FOR LOCATION OF LEVEL 2, 3 and 4 CONTROL JOINTS**
- 1. At locations indicated on Drawings and as described below.
 - 2. Do not locate control joints at edge of door frame or above door frames.
 - 3. Not required for wall lengths less than 30 feet.
 - a. Locate at least 24 inches from nearest door jamb and not over head of door frame.
 - 4. Extend control joints the full height of the wall or length of soffit/ceiling membrane.
- B. Provide control joints or other means to isolate gypsum panel surfaces at the following conditions:
- 1. Partition, furring or column fireproofing abuts a structural element (except floor) or dissimilar wall or ceiling.
 - 2. Ceiling abuts a structural element, dissimilar wall or partition or other vertical penetration.
 - 3. Construction changes within the plane of the partition or ceiling.
 - 4. Partition or furring run exceeds 30'.
 - 5. Ceiling dimensions exceed 50' in either direction with perimeter relief, 30' without relief.
 - 6. Exterior soffits exceed 20' in either direction; align with window mullions.
 - 7. Wings of "L", "U", and "T"-shaped ceiling areas are joined.
 - 8. Expansion or control joints occur in the base exterior wall.
 - 9. Differential Deflection Conditions: All locations where partitions are supported by two or more structural members and subject to differential deflection by live or dead loading:
 - a. Typical Framing Floor to Structure: Provide "Ceiling Deflection Track."

- b. Framing over One Floor (stairs, shafts, etc.): Provide control joints where studs are interrupted by structure.

3.4 CAVITY SHAFT WALL

- A. Coordinate assembly with Section 09 22 16, NON-STRUCTURAL METAL FRAMING, for erection of framing and gypsum board.
- B. Conform to UL Design No. U438 or FM WALL CONSTRUCTION 12-2/HR (Nonbearing partition for two-hour fire rating.(Conform to FM WALL CONSTRUCTION 25- 1/HR (Non-load bearing partition) for one-hour fire rating where shown.). Conform to UL K502 for two hour fire rated soffit or ceiling.
 - 1. Provide all special detailing and materials required to maintain fire rating of wall assembly at elevator entrances, spandrel conditions, doorways, or similar penetrations.
 - 2. Provide all special detailing and materials required to maintain fire rating of wall assembly at elevator entrances, spandrel conditions, doorways, or similar penetrations.
 - 3. Shaft Wall Not at Mechanical Shafts: Provide a minimum of one layer of 5/8" gypsum board on both sides of metal framing where exposed to view and maintain hourly fire rating of shaft wall system.
 - a. If additional layer of board is provided that is not required for fire rating, it may terminate at 4 inches above finished ceiling.
- C. Cut coreboard (liner) panels 25 mm (one inch) less than floor-to-ceiling height, and erect vertically between J-runners on shaft side.
 - 1. Where shaft walls exceed 4300 mm (14 feet) in height, position panel end joints within upper and lower third points of wall.
 - 2. Stagger joints top and bottom in adjacent panels.
 - 3. After erection of J-struts of opening frames, fasten panels to J-struts with screws of sufficient length to secure to framing staggered from those in base, spaced 300 mm (12 inches) on center.
- D. Gypsum Board:
 - 1. Two hour wall:
 - a. Erect base layer (backing board) vertically on finish side of wall with end joints staggered. Fasten base layer panels to studs with 25 mm (one inch) long screws, spaced 600 mm (24 inches) on center.
 - b. Apply face layer of gypsum board required by fire test vertically over base layer with joints staggered and attach with screws of sufficient length to secure to framing staggered from those in base, spaced 300 mm (12 inches) on center.
 - 2. One hour wall with one layer on finish side of wall: Apply face layer of gypsum board vertically. Attach to studs with screws of sufficient length to secure to framing, spaced 300 mm (12 inches) on center in field and along edges.
 - 3. Where coreboard is covered with face layer of gypsum board, stagger joints of face layer from those in the coreboard base.
 - 4. Exposed Surfaces: Unless specifically detailed otherwise, cover walls with exposed metal shaftwall framing with additional layer of gypsum board, minimum 1/2 inch thick, for finished appearance. Exposed surfaces include stairwells and other spaces open to view; elevator shafts and similar mechanical spaces not included.

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- a. This additional layer may be used as a component of the fire rated assembly if substantiated by suitable test data.
 - b. Finish exposed joints as specified under APPLICATION OF BOARD below.
5. Provide 20 gage J-runner with 3" leg at elevator entrances.
- E. Treat joints, corners, and fasteners in face layer as specified for finishing of gypsum board.

3.5 ACOUSTICAL CONSTRUCTION

- A. Acoustic Insulation: Install single layer of acoustic batt insulation in designated partitions and ceilings.
- 1. Walls: Install after one side of board is installed, filling depth, width, and height of partition completely.
 - a. Partitions Greater Than 6" Deep: Either fill cavity completely or provide approved positive mechanical methods to maintain insulation in place without sagging over time. Minimum insulation thickness nominal 4 inches. Acceptable mechanical methods include (1) stick-clips at 8" centers horizontally and 12" centers vertically, or (2) continuous wire or strapping at 12" centers vertically.
- B. Standard Acoustic Sealant: Install acoustical caulking at perimeter of designated standard acoustic partitions as follows:
- 1. Install in accordance with ASTM C 919. Minimum two beads; one under each base layer of gypsum board.
 - 2. Install between edge of base layer of board and abutting surface. Install board with 1/8" relief for sealant.
 - 3. Provide caulking at junctions of acoustic partitions and walls of different construction such as masonry; such caulking is to be contained within the depth of board, not as a "fillet".
 - 4. Apply continuous bead of sealant at all penetrations of board including around electrical outlets, framed openings and other protrusions through board.
- C. Acoustic Partitions:
- 1. General:
 - a. Install in accordance with ASTM C 919. Minimum two beads; one under each base layer of gypsum board.
 - b. At Floor: Leave nominal 3/8" gap. Seal after board is installed.
 - c. In Field: Apply acoustic sealant to joints and around electric boxes before installing so sealant is squeezed between them. Remove excess.
 - d. At Overhead Structure: Leave nominal 5/8" gap to accommodate deflection.
 - 1) Cut board to configuration of deck.
 - 2) Seal after board is installed. Provide bond breaker tape at track to prevent 3-sided adhesion.
 - e. Provide caulking at junctions of acoustic partitions and walls of different construction such as masonry; such caulking is to be contained within the depth of board, not as a "fillet".
 - f. Boxes, Electric, Phone, etc: Wrap with putty pads before installing board. Trim to face of box.
 - g. Penetrations: Apply continuous bead of sealant at all penetrations of board including around electrical outlets, pipe, conduit, framed openings and other protrusions through board.
- D. Fire-Rated Partitions: Provide additional construction as required for acoustic rated partitions which also are required to be fire-rated.

- E. Building Sealant: Exposed caulking and caulking at locations other than acoustic partitions specified under Division 7.

3.6 FINISHING OF GYPSUM BOARD

- A. Finish joints, edges, corners, and fastener heads in accordance with ASTM C840 except each coat shall be feathered not less than 2 inches beyond edge of previous coat.

- B. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:

1. Typical: Level 5. Use Level 5 finish for all finished areas open to public view. See TERMINOLOGY in Part 1 above for definition of "open to public view". Joints and interior angles to have tape embedded in joint compound and 3 separate coats of joint compound applied over all joints, angles, fastener heads and accessories. A thin skim coat of joint compound to be applied to entire surface. Paint type coatings not acceptable. Surface to be smooth and free of tool marks and ridges. Do not use fiber glass mesh tape with conventional drying type joint compounds; use setting or hardening type compounds only. Provide treatment for water-resistant gypsum board as recommended by the gypsum board manufacturer. Protect workers, building occupants, and HVAC systems from gypsum dust.
2. Mechanical Rooms, Electric and Data Rooms, and Equipment Closets: Level 3. Joints and interior angles to have tape embedded in joint compound and 2 separate coats of joint compound applied over all joints, angles, fastener heads and accessories. Joint compound to be smooth and free of tool marks and ridges.
3. Gypsum Board (not backer board) Receiving Ceramic Tile: Level 2. Joints and interior angles to have tape embedded in joint compound and 1 separate coat of joint compound applied over all joints, angles, fastener heads and accessories. Surface to be free of excess joint compound. Tool marks and ridges are acceptable. Above Finish Ceilings: Level 1. Joints and interior angles to have tape embedded in joint compound. Surface to be free of excess joint compound. Tool marks and ridges are acceptable. Additional finishing required only where required for fire resistance rating.
4. No Finish Required:
 - a. Shaft Cants.
 - b. Gypsum Tile Backer Board: Joint treatment specified elsewhere.

RFI 8305.1 for locations of where Level 5 finish is to be used

- C. Before proceeding with installation of finishing materials, assure the following:

1. Gypsum board is fastened and held close to framing or furring.
2. Fastening heads in gypsum board are slightly below surface in dimple formed by driving tool.

- D. Finish joints, fasteners, and all openings, including openings around penetrations, on that part of the gypsum board extending above suspended ceilings to seal surface of non decorated smoke barrier, fire rated and sound rated gypsum board construction. After the installation of hanger rods, hanger wires, supports, equipment, conduits, piping and similar work, seal remaining openings and maintain the integrity of the smoke barrier, fire rated and sound rated construction. Sanding is not required of non decorated surfaces. Corridor walls shall be treated as smoke rated walls unless indicated otherwise.

3.7 REPAIRS

- A. After taping and finishing has been completed, and before decoration, repair all damaged and defective work, including nondecorated surfaces.
- B. Patch holes or openings 13 mm (1/2 inch) or less in diameter, or equivalent size, with a setting type finishing compound or patching plaster.
- C. Repair holes or openings over 13 mm (1/2 inch) diameter, or equivalent size, with 16 mm (5/8 thick gypsum board secured in such a manner as to provide solid substrate equivalent to undamaged surface.
- D. Close openings at pipe and conduit not otherwise sealed with firestopping. Close and seal to penetration as needed as specified above.
- E. Tape and refinish scratched, abraded or damaged finish surfaces including cracks and joints in non decorated surface to provide smoke tight construction fire protection equivalent to the fire rated construction and STC equivalent to the sound rated construction.

3.8 FIELD TESTING

- A. Gypsum board installed prior to 100% building enclosure is subject to inspection for fungi (mold and mildew) as specified under Section 01 45 29, Testing and Inspection Services. Partitions and walls designated by the Architect will be opened for visual inspection of the interior; cut a minimum of ten 16-inch square openings on each floor.
- B. Where inspection finds evidence of fungi, the gypsum board on affected portion of partition or wall shall be removed, the interior space treated with an appropriate fungicide as directed by an Industrial Hygienist, replaced with new conforming gypsum board and associated finish materials, and decorated, all at no additional cost to Owner.
 - 1. The minimum extent of gypsum board to be removed is 4 feet from the furthest point of mold/mildew contamination in all directions.
 - 2. Treatment with fungicide to include the entire void space between studs, floor to structure, to kill remaining spores which may have become dislodged during the investigation process.
 - 3. Where thermal or acoustic insulation is in the wall cavity, such insulation shall be removed to the same extent of gypsum board except all wet insulation shall be removed entirely. Replace with new, dry conforming insulation.
- C. Removal and disposal of gypsum board in compliance with authorities having jurisdiction.
- D. For each incidence of discovered fungi (mold or mildew), an additional ten inspection holes may, at Resident Engineer's direction, be opened on that floor.

--- E N D ---

SECTION 09 29 02
ABUSE RESISTANT WALLBOARD

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Special abuse resistant wallboard on metal wall and ceiling framing.
 2. Coordinate with hollow metal frame section for custom throat sizes as needed to accommodate special wallboard thickness specified herein.
 3. Structural Corner Trim System.
 4. Coordinate thickness of wallboard products with hollow metal frames for custom throat sizes; some board products have non-standard thickness
- B. Work of this Section installed under Section 09 22 00 - Gypsum Board.
- C. Alternate: See Section 01 23 00, Alternates for work affecting this Section. Verify Finish Level requirements with resinous wall covering manufacturer before beginning work.
- D. Related Sections:
1. Hollow Metal Frames: Section 08 11 13.
 2. Metal partition framing: Section 09 22 16.
 3. Gypsum Board: Section 09 29 00.
 4. Resinous Floor and Wall Covering: Section 09 67 25.
 5. Paint: Section 09 91 00.
 6. Wall Protection: Section 10 26 00.

1.2 REFERENCES (Latest edition unless otherwise noted)

- A. American Society for Testing and Materials (ASTM):
- | | |
|--------|--|
| C 473 | Physical Testing of Gypsum Panel Products |
| C 840 | Application and Finishing of Gypsum Board. |
| C 1177 | Glass Mat Gypsum Substrate for Use as Sheathing. |
| C 1186 | Flat Non-Asbestos Fiber-Cement Sheets. |
| C 1278 | Fiber-Reinforced Gypsum Panel |
| C 1186 | Flat Non-Asbestos Fiber-Cement Sheets. |
| C 1278 | Fiber-Reinforced Gypsum Panel |
| C 1396 | Gypsum Board |
| C 1629 | Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels |
| D 1037 | Evaluating the Properties of Wood-Base Fiber and Particle Panel Materials. |
| D 4977 | Test Method for Granule Adhesion to Mineral Surfaced Roofing by Abrasion |
| D 5420 | Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by Means of a Striker Impacted by a Falling Weight (Gardner Impact). |
| E 72 | Methods of Conducting Strength Tests of Panels for Building Construction. |

E 695 Test Method for Measuring Relative Resistance of Wall, Floor and Roof Construction to Impact Loading.

- B. National Association of Home Builders (NAHB) Research Center:
Performance Analysis of Drywall Corners; Task 2.0 Testing Program.
- C. Others: See Section 09 29 00.

1.3 PERFORMANCE REQUIREMENTS

- A. ASTM C 1629 Classifications and Performance Requirements:

Class	ASTM D 4977	ASTM D 5420	ASTM E 695	Annex A1 (C 1629)
	Surface Abrasion	Surface Indentation	Soft Body Impact	Hard Body Impact
	Abraded Depth Max.	Indentation Max.	Impact Min.	Impact Min.
1	0.126 inch	0.150 inch	90 ft.-lb.	50 ft.-lb.
2	0.059 inch	0.100 inch	195 ft.-lb.	100 ft.-lb.
3	0.010 inch	0.050 inch	300 ft.-lb.	150 ft.-lb.

- B. Structural Corner Trim System: Meet or exceed NAHB Research Center, task 2.0 Testing Program:
1. Impact Test: Drop height of initial failure: 96 inches; ASTM D 1037 (modified).
 2. Racking Test: Deflection at failure: No failure to maximum test deflection; ASTM E 72.
- C. Fire Resistance: As required under Section 09 29 00 – Gypsum Board.
- D. Mold Resistance: As required under Section 09 29 00 – Gypsum Board, and contain no paper, pulp, starches or sugars:
- E. Water Absorption: ASTM C 473.

1.4 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Product Data: Submit complete description of proposed product(s) including fire ratings, performance data for impact and abrasion resistance, and installation instructions.
- C. Samples: Submit 3 samples for each type of board required; make samples at least 12" square; obtain approval before proceeding.

1.5 QUALITY ASSURANCE

- A. See Section 09 29 00 – Gypsum Board.

1.6 DELIVERY, STORAGE AND HANDLING

- A. See Section 09 29 00 – Gypsum Board.

1.7 PROJECT CONDITIONS

- A. See Section 09 29 00 – Gypsum Board.

1.8 SEQUENCE/SCHEDULING

- A. See Section 09 29 00 – Gypsum Board.

PART 2 - PRODUCTS**2.1 MATERIALS**

- A. Gypsum Board: See Section 09 29 00 - Gypsum Board. Paper-faced products not permitted.
- B. Structural Corner Trim System: A copolymer tapered plastic trim with paper face and joint tape backing engineered for fully bonded adhesive application with joint compound and without mechanical fasteners.
1. Types: Inside and outside corners; types suitable for conditions. Non-radiused devices unless otherwise shown on drawings.
 2. Tests: See QUALITY ASSURANCE in Part 1 above.
 3. Bondable Area: Minimum 48 sq. inches per linear foot for corner trim.
 4. Basis of Design: No•Coat® Structural Drywall Corners by Drywall Systems International.
- C. Other Materials: As specified under Section 09 29 00 – Gypsum Board.

2.2 ABUSE RESISTANT / IMPACT-RESISTANT WALLBOARD

- A. Products must meet or exceed ASTM C 1629 for the Classes listed below; see PERFORMANCE REQUIREMENTS in Part 1 above:
1. Surface Abrasion: Class 3.
 2. Surface Indentation: Class 1.
 3. Soft Body Impact: Class 3.
 4. Hard Body Impact: Class 3

PART 3 - EXECUTION**3.1 FIREPROOFING**

- A. See Section 09 29 00 – Gypsum Board.

3.2 FRAMING

- A. See Section 09 22 16 – Non-Structural Metal Framing.

3.3 APPLICATION OF WALLBOARD

- A. In accordance with manufacturer's recommendations, ASTM C 840, and applicable portions of Section 09 29 00 – Gypsum Board.
- B. Impact- Resistant Board Locations: High-abuse areas indicated on drawings:
- C. Structural Corner Trim System: Install in accordance with manufacturer's instructions

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1. Locations:
 - a. Provide at all locations requiring "Abuse Resistant Board".
 - b. Additional locations shown on drawings.
 2. Install in full bed of all-purpose compound with out mechanical fasteners.
 3. Typical; Extend continuous, full height of wall.
 4. Concealed Corners Above Ceilings: Provide either standard corner trim as specified under Section 09 29 00 or structural corner trim at Contractor's option.
- D. Joint Treatment: See Section 09 29 00 – Gypsum Board except walls to receive resinous wall covering not to exceed Finish Level recommended by resinous wall covering manufacturer. Verify Finish Level requirements with wall covering manufacturer before beginning work.
- E. Finishing: See Section 09 29 00 – Gypsum Board.
- F. Metal Trim: See Section 09 29 00 – Gypsum Board.
- 3.4 ACOUSTICAL AIDS
- A. See Section 09 29 00 – Gypsum Board.
- 3.5 CONTROL JOINTS
- A. See Section 09 29 00 – Gypsum Board.
- 3.6 ADJUST AND CLEAN
- A. See Section 09 29 00 – Gypsum Board.
- END OF SECTION

SECTION 09 30 13
CERAMIC/PORCELAIN TILING

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies:

1. Interior tile, tile base, leveling beds, membranes, lath, setting materials, and grout.
2. Waterproofing under all ceramic and porcelain tile bathroom floors and showers located over occupied spaces
3. Interior tile backer board.
4. Accessories.
5. Ceramic/Porcelain Tiles indicated in FINISH LEGEND.

B. Metal edge strips installed as part of tile installations.

C. Crack isolation membranes under ceramic or porcelain tile supported on an elevated slab.

D. Waterproofing under tile at public bathroom/restroom floors.

E. Prior to installation of structural floor slab, advise Construction Manager, in writing, of all requirements of concrete substrate regarding finish, level tolerance, recess depths, and curing; see EXAMINATION in Part 3.

1. Verify slab recess depths, if indicated, are appropriate to depth required for tile assembly.

F. Locate all flexible joints required. See QUALITY ASSURANCE.

G. Products Installed But Not Supplied Under This Section:

1. Shower Soap Dish Shelf (SDS-1): Products and installation instructions supplied under Section 10 28 00, TOILET, BATH, AND LAUNDRY ACCESSORIES. Refer to Drawing 8AI200, for Toilet Accessories Legend and Groups.

H. Alternates: See Section 01 23 00, for description of work affected by alternates.

1.2 RELATED WORK

A. Execution Requirements: Section 01 73 00 – Execution.

B. Topical vapor retarders at slab on grade: Section 07 26 14 - Topical Vapor Retarders.

C. Sealing of joints where specified: Section 07 92 00, JOINT SEALANTS.

D. Color, texture, finish, and pattern of field tile, size of field tile, trim shapes and color of grout specified: Section 09 06 00, SCHEDULE FOR FINISHES and FINISH LEGEND in drawings.

E. Interior tile backer board: Section 09 29 00 - GYPSUM BOARD.

F. Other Flooring:

1. Section 09 65 19 - RESILIENT TILE FLOORING

2. Section 09 68 00 -CARPETING.

1.3 DEFINITIONS

A. The following terms are defined for this project as follows:

1. Wet Areas:
a. Showers.

B. Large Format Tile: 8" x 8" and larger.

C. Ceramic Tile: Unless specifically noted otherwise ceramic tile to include all tile in this Section including porcelain tile.

1.4 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Shop Drawings:

1. Flooring: Show flooring pattern and all flexible joint locations, including control and expansion joints. Show joints in concrete substrate. Identify areas of elevated and on-grade slabs. Identify transitions from "elevated" to "on grade" conditions, if any, and provide flexible joints at these locations. Dimension and draw detail drawings at a minimum scale of 6 mm = 300 mm (1/4 inch = 1 foot). Include drawings of pattern at inside corners, outside corners, termination points and location of all equipment items such as thermostats, switch plates, mirrors and toilet accessories mounted on surface.

C. Samples:

1. Base tile, each type, each color, each size.
2. Mosaic floor tile panels, 225 mm by 225 mm (9 inches by 9 inches), each type, color, size and pattern.
3. Ceramic floor tile, each size, type, color and pattern.
4. Porcelain tile, each type, color, patterns and size.
5. Wall (or wainscot) tile, each color, size and pattern.
6. Trim shapes, bullnose cap and cove including bullnose cap and base pieces at internal and external corners of vertical surfaces, each type, color, and size.
7. Exercise and Therapeutic pool tile, panels 300 mm (12 inches) square, each type, size, color, tile required, and special shapes.

D. Sample warranty: Provide as specified in Section 01 33 25 – Warranties.

E. Product Data:

1. Ceramic and porcelain tile, marked to show each type, size, and shape required.
2. Tile backer board.
3. Divider strip.
4. Elastomeric membrane and bond coat.
5. Reinforcing tape.
6. Leveling compound.

7. Latex-Portland cement mortar and grout.
8. Grout and Mortar for glass tile.
9. Slip resistant tile.
10. Waterproofing isolation membrane.
11. Crack suppression membrane.
12. Fasteners.
13. Fastener locations and spacing for tile backer board.

F. Certification:

1. Tile: Master grade, ANSI A137.1.
2. Manufacturer's certificates indicating that the following materials comply with specification requirements:
 - a. Chemical resistant mortar and grout (epoxy and furan).
 - b. Modified epoxy emulsion.
 - c. Tile backer board.
 - d. Elastomeric membrane and bond coat.
 - e. Reinforcing tape.
 - f. Latex-Portland cement mortar and grout.
 - g. Leveling compound.
 - h. Waterproof isolation membrane.
 - i. Factory mounted tile suitability for application in wet area specified under 2.1, A, 3 with list of successful in-service performance locations.
 - j. Provide manufacturer's BOND TEST certification in compliance with Section 01 73 00 – Execution.

G. Supervisor: Provide name and experience of proposed supervisor.

H. LEED Submittals:

1. Product Data for Credit IEQ 4.1: For interior adhesives and sealants, documentation including printed statement of VOC content.
2. Product Data for Credit IEQ 4.3: For interior tile floors, documentation from an independent testing agency indicating compliance with the FloorScore Standard.
3. USGBC addendum to LEED® IEQ Credit 4.3 issued April 14, 2010, states: "Mineral-based finished flooring products such as tile, masonry, terrazzo, and cut stone without integral organic-based coatings and sealants qualify for credit without any IAQ testing requirements."

1.5 QUALITY ASSURANCE

- A. Supervision: Tile trade to have a full time supervisor on jobsite at all times tile work is being installed. Supervisor must have a minimum of 10 years' experience of successful tile installations and be familiar with applicable requirements of TCNA and ANSI standards. Supervisor to ensure that all tile work conforms to the Contract Documents and applicable referenced standards.
- B. Source Limitations for Tile: Obtain tile of each type and color or finish from one source or producer.
1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.

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2. Glass Tile: Mortar and grout used with glass tile shall be acceptable to tile manufacturer.
 - C. Interior Work Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from one manufacturer and each aggregate from one source or producer.
 - D. Interior Work Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer for each product.
 1. Waterproof membrane.
 2. Crack isolation membrane.
 3. Joint sealants.
 4. Backer units.
 5. Metal edge strips.
 - E. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 1. Build mockup of each type of floor tile system.
 2. Build mockup of each type of wall tile system.
 - F. Flexible Joints: Installer to verify locations of all flexible tile joints required by the provisions of this Section, by the recommendations of TCNA, and by the recommendations of the related material manufacturers.
 1. Joint locations may or may not be shown on drawings.
 2. Coordinate locations of control joints at interior partitions with Section 09 22 16 - Non-Structural Metal Framing prior to start of work of this Section
 - G. Mounted Tile: For tile use in pools, or wet areas, manufacturers must furnish a suitable mounting system (face, back, or edge) or furnish unmounted products. See ANSI A137.1. Tile manufacturer responsible for all additional costs associated with installation problems related to back or edge mounted tile.
 - H. Crack Suppression Membrane: Installer to verify membrane system with membrane manufacturer for compatibility with tile setting system and suitability for application for condition of intended purpose.
 - I. Factory Edges: Bullnose edges shall be factory formed for uniformity.

1.6 DELIVERY AND STORAGE

- A. Deliver materials in containers with labels legible and intact and grade-seals unbroken.
- B. Store material to prevent damage or contamination.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.
- D. Store liquid materials in unopened containers and protected from freezing and in compliance with manufacturer's recommendations.

- E. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install interior tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

1.8 APPLICABLE PUBLICATIONS (Latest edition unless otherwise noted)

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in text by basic designation only.

B. American National Standards Institute (ANSI):

1. A10.20 Safety Requirements for Ceramic Tile, Terrazzo, and Marble Works
2. A108.1A Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar
3. A108.1B Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with dry-Set or latex-Portland Cement Mortar
4. A108.1C Contractors Option; Installation of Ceramic Tile in the Wet-Set method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar
5. A108.5 I Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar
6. A108.10 Installation of Grout in Timework
7. A108.11 Interior Installation of Cementitious Backer Units
8. A108.13 Installation of Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone
9. A118.1 Dry-Set Portland Cement Mortar
10. A118.4 Latex-Portland Cement Mortar
11. A118.6 Standard Cement Grouts for Tile Installation
12. A118.7 High Performance Polymer Modified Cement Grouts for Tile Installation
13. A118.9 Cementitious Backer Units
14. A118.10 Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation
15. 118.12 Crack Isolation Membranes for Thin-set Ceramic Tile and Dimensional Stone Installation
16. A137.1 Ceramic Tile

C. American National Standards Institute/National Spa and Pool Institute (ANSI/NSPI):

1. 1-2003 Standard for Public Swimming Pools.

D. American Society For Testing And Materials (ASTM):

1. A185 Steel Welded Wire Fabric, Plain, for Concrete Reinforcing
2. C109/C109M Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 inch. or (50-mm) Cube Specimens)
3. C241 Abrasion Resistance of Stone Subjected to Foot Traffic

4. C348 Standard Test Method for Flexural Strength of Hydraulic- Cement Mortars
 5. C627) Evaluating Ceramic Floor Tile Installation Systems Using the Robinson-Type Floor Tester
 6. C920 Elastomeric Joint Sealants.
 7. C954 Steel Drill Screws for the Application of Gypsum Board on Metal Plaster Base to Steel Studs from 0.033 in (0.84 mm) to 0.112 in (2.84 in thickness)
 8. C979 Pigments for Integrally Colored Concrete
 9. C1002 Steel Self-Piercing Tapping Screws for the Application of Panel Products
 10. C1026 Standard Test Method for Measuring the Resistance of Ceramic Tile to Freeze-Thaw Cycling
 11. C1027) Determining "Visible Abrasion Resistance on Glazed Ceramic Tile"
 12. C1028 Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull Meter Method
 13. C1127 Standard Guide for Use of High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane with an Integral Wearing Surface
 14. D751 Coated Fabrics
 15. D4397 Standard Specification for Polyethylene Sheeting for Construction, Industrial and Agricultural Applications
 16. E96-80 Water Vapor Transmission of Materials
- E. Marble Institute of America (MIA):
1. Design Manual III-2007
- F. Tile Council of North America, Inc. (TCNA):
1. 2011 Handbook for Ceramic, Glass, and Stone Tile Installation

PART 2 - PRODUCTS

2.1 TILE

- A. Comply with ANSI A137.1, Standard Grade, except as modified:
1. Inspection procedures listed under the Appendix of ANSI A137.1.
 2. Abrasion Resistance Classification:
 - a. Tested in accordance with values listed in Table 1, ASTM C 1027.
 - b. Class V, 12000 revolutions for floors in Corridors, Kitchens, Storage Rooms
 - c. Class IV, 6000 revolutions for remaining areas.
 3. Slip Resistant Tile for Floors:
 - a. Coefficient of friction, when tested in accordance with ASTM C1028, required for level of performance:
 - 1) Not less than 0.7 (wet condition) for bathing areas.
 - 2) Not less than 0.8 on ramps for wet and dry conditions.
 - 3) Not less than 0.8 on stair treads for wet and dry conditions.
 - 4) Not less than 0.6, except 0.8 on ramps as stated above, for wet and dry conditions for other areas.
 4. Variation in Width and Length: Not more than 1/3 the dimension of grout joint.

5. Mosaic tile may be mounted or joined together by a resinous bonding material along tile edges.
 6. Factory Blending: For tile with color variations, within the ranges selected during sample submittals blend tile in the factory and package so tile units taken from one package show the same range in colors as those taken from other packages and match approved samples.
 7. Factory-Applied Temporary Protective Coating:
 - a. Protect exposed face surfaces (top surface) of tile against adherence of mortar and grout by pre-coating with a continuous film of petroleum paraffin wax, applied hot.
 - b. Do not coat unexposed tile surfaces.
 - c. Pre-wax tiles set or grouted with latex modified mortars.
- B. Unglazed Ceramic Mosaic Tile: Nominal 6 mm (1/4 inch), minimum, thick with cushion edges.
- C. Glazed Wall Tile: Cushion edges, glazing, as listed on FINISH LEGEND.
- D. Porcelain Paver Tile: Porcelain tile produced by the dust pressed method shall be made of approximately 50% feldspar; the remaining 50% shall be made up of various high-quality light firing ball clays.
- E. Trim Shapes:
1. Conform to applicable requirements of adjoining floor and wall tile.
 2. Use slip resistant trim shapes for horizontal surfaces of showers, exercise and therapeutic pool overflow ledges, recessed steps, shower curbs, drying area curbs, wet areas, and seats.
 3. Use trim shapes sizes conforming to size of adjoining field wall tile unless detailed or specified otherwise. Except, use cove floor base shape conforming to size, color and finish of adjoining field floor tile where ceramic tile floor adjoins ceramic wall tile.
 4. Internal and External Corners:
 - a. Square internal and external corner joints are not acceptable.
 - b. External corners including edges: Use bullnose shapes.
 - c. Internal corners: Use cove shapes.
 - d. Base to floor internal corners: Use special shapes providing integral cove vertical and horizontal joint.
 - e. Base to floor external corners: Use special shapes providing bullnose vertical edge with integral cove horizontal joint. Use stop at bottom of openings having bullnose return to wall.
 - f. Wall top edge internal corners: Use special shapes providing integral cove vertical joint with bullnose top edge.
 - g. Wall top edge external corners: Use special shapes providing bullnose vertical and horizontal joint edge.
 - h. For unglazed ceramic mosaic and glazed wall tile installed in Portland cement mortar setting bed, use cove and bullnose shapes as applicable. When ceramic mosaic wall and base tile is required, use C Series cove and bullnose shapes.
 - i. For unglazed ceramic mosaic and glazed wall tile installed in dry-set Portland cement mortar or latex-Portland cement mortar, (thin set methods), use cove and surface bullnose shapes as applicable.
 - j. Provide cove and bullnose shapes where shown and required to complete tile work.

2.2 TILE BACKER BOARD

- A. Use in showers and wet areas.
- B. Tile Backer Board: Provide one of the following types with fire resistance rating of 1 hour when used in conjunction with 5/8" Type X gypsum wall board on opposite side of metal stud partition. Minimum thickness, nominal ½ inch.
 - 1. Cementitious: ANSI A118.9.
 - 2. Fiber Cement: ASTM C1288, Flexural Strength not less than 2,100 psi per ASTM C1185. Mold-resistance: 0 (best) per ASTM G21.

2.3 JOINT MATERIALS FOR TILE BACKER BOARDS

- A. Reinforcing Tape: Vinyl coated woven glass fiber mesh tape, open weave, 2 inches (minimum) wide. Tape with pressure sensitive adhesive backing will not be permitted.
- B. Tape Embedding Material: Latex-Portland cement mortar complying with ANSI A118.4.
- C. Joint material, including reinforcing tape, and tape embedding material, shall be as specifically recommended by the backer unit manufacturer. At fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

2.4 FASTENERS

- A. Screws for Tile Backer Board. Corrosion-resistant coated screws recommended by backer board manufacturer.
 - 1. Standard screws for gypsum board are not acceptable.
 - 2. Minimum 11 mm (7/16 inch) diameter head.
 - 3. ASTM C954 for steel 1 mm (0.033 inch) thick.
 - 4. ASTM C1002 for steel framing less than 0.0329 inch thick.
 - 5. For fire rated construction provide corrosion resistant coated screws, type and size same as used in fire rating test.

2.5 SETTING MATERIALS OR BOND COATS

- A. Conform to TCNA Handbook for specified Ceramic Tile installation designs.
- B. Conform to specified ANSI Standards for materials and installation methods.
- C. Portland Cement Mortar: ANSI A108.1.
- D. Latex-Portland Cement Mortar: ANSI A118.4 with the following minimum values:
 - 1. Shear Bond Strength @ 28 Days: Not less than 600 psi with porcelain tile.
 - 2. Compressive Strength @ 28 Days: Not less than compressive strength of tile being set.
 - 3. For wall applications, provide non-sagging, latex-Portland cement mortar complying with above.
 - 4. Prepackaged Dry-Mortar Mix: Factory-prepared mixture of Portland cement; dry, redispersible, ethylene vinyl acetate additive; and other ingredients to which only water needs to be added at Project site.

- E. Glass Tile Setting Mortar (Thin set): Factory mixed mortar of Portland cement/sand, field gauged with undiluted latex admixture. Mortar shall meet or exceed ANSI 118.4. Color shall be a bright white. Mortar shall be designed for use with glass tile.
1. Do not use organic adhesives.
 2. Do not use epoxy adhesives.
 3. Acceptable manufacturers include, but not limited to, one of the following:
 - a. Mapei; "Adesilex P10". Maximum size tile 6" x 6".
 - b. Custom Building Products.
 - c. North American Adhesives Co. (NAA).
 - d. TEC Inc. (Fuller).
 - e. Bostik (Hydroment).

F. Elastomeric Waterproofing Membrane and Bond Coat:

1. TCNA F122 for floors; B415 for shower walls.
2. ANSI A118.10.
3. One component elastomeric, liquid applied material having the following additional physical properties:
 - a. Hardness: Shore "A" between 40-60.
 - b. Elongation: Between 300-600 percent.
 - c. Tensile strength: Between 40-60 psig.
 - d. No volatile compounds.
4. Coal tar modified urethanes are not acceptable.

G. Waterproofing Isolation Membrane:

1. Sheet System TCNA F122.
2. Optional System to elastomeric waterproof membrane.
3. Composite sheet consisting of ASTM D5109, Type II, Grade I Chlorinated Polyethylene sheet reinforced on both sides with a non-woven polyester fiber.
4. Designed for use in wet areas as, an isolation and positive waterproofing membrane for thin-set bonding of sheet to substrate and thin-set bonding of ceramic and porcelain tile or marble to sheet. Suited for both horizontal and vertical applications.
5. Conform to the following additional physical properties:

Property	Units	Results	Test Method
Hardness Shore A	Points	70-80	ASTM D2240 (10 Second Reading)
Shrinkage	Percent	5 maximum	ASTM D1204
Brittleness		No crack remains flexible at temperature-37 degrees C (-25 degrees F)	ASTM D2497 13 mm (1/2- inch) Mandrel Bend

Sheet manufacturer's solvent welding liquid or xylene and edge sealant.

H. Crack Suppression Membrane:

1. Comply with requirements of ANSI A118.12.
2. See QUALITY ASSURANCE in Part 1 above.

2.6 GROUTING MATERIALS

- A. Latex-Portland Cement Grout: All grout to be prepackaged mix; field mixed grout not permitted. Color as specified.
 - 1. High Performance Grout: ANSI A118.7; typical for porcelain tile and all floor work.
 - 2. Standard Grout: ANSI A118.6; acceptable for non-porcelain tile and wall work.
 - 3. Unsanded grout mixture for joints 3.2 mm (1/8 inch) and narrower, and at glass tile applications.
 - 4. Sanded grout mixture for joints 3.2 mm (1/8 inch) and wider.
- B. Chemical-Resistant Grout:
 - 1. Epoxy grout, ANSI A118.3.

2.7 PATCHING AND LEVELING COMPOUND

- A. Portland cement base, polymer-modified, self-leveling compound, manufactured specifically for resurfacing and leveling concrete floors. Products containing gypsum are not acceptable.
- B. Shall have minimum following physical properties:
 - 1. Compressive strength - 25 MPa (3500 psig) per ASTM C109/C109M.
 - 2. Flexural strength - 7 MPa (1000 psig) per ASTM C348 (28 day value).
 - 3. Tensile strength - 600 psi per ANSI 118.7.
 - 4. Density – 1.9.
- C. Capable of being applied in layers up to 38 mm (1-1/2 inches) thick without fillers and up to 100 mm (four inches) thick with fillers, being brought to a feather edge, and being trowelled to a smooth finish.
- D. Primers, fillers, and reinforcement as required by manufacturer for application and substrate condition.
- E. Ready for use in 48 hours after application.

2.8 METAL DIVIDER AND EDGE STRIPS

- A. Metal Edge Strips: Angle or L-shape, height to match tile and setting-bed thickness:
 - 1. Flooring: Type 304 stainless steel, designed specifically for flooring applications, exposed-edge material.
 - 2. Wall: Satin anodized aluminum unless indicated otherwise.
 - a. Basis of Design Schluter-JOLLY.

2.9 WATER

- A. Clean, potable and free from salts and other injurious elements to mortar and grout materials.

2.10 CLEANING COMPOUNDS

- A. Specifically designed for cleaning masonry and concrete and which will not prevent bond of subsequent tile setting materials including patching and leveling compounds and elastomeric waterproofing membrane and coat.
- B. Materials containing acid or caustic material not acceptable.

2.11 FLOOR MORTAR BED REINFORCING

- A. ASTM A185 welded wire fabric without backing, 2 x 2-16/16.

2.12 POLYETHYLENE SHEET

- A. Polyethylene sheet conforming to ASTM D4397.
- B. Nominal thickness: 0.15 mm (six mils).
- C. Use sheet width to minimize joints.

PART 3 - EXECUTION

3.1 ENVIRONMENTAL REQUIREMENTS

- A. Maintain ambient temperature of work areas at not less than 16 degree C (60 degrees F), without interruption, for not less than 24 hours before installation and not less than three days after installation.
- B. Maintain higher temperatures for a longer period of time where required by manufacturer's recommendation and ANSI Specifications for installation.
- C. Do not install tile when the temperature is above 38 degrees C (100 degrees F).
- D. Do not install materials when the temperature of the substrate is below 16 degrees C (60 degrees F).
- E. Do not allow temperature to fall below 10 degrees C (50 degrees F) after fourth day of completion of tile work.

3.2 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.
 - 1. Verify that substrates for setting tile are firm, dry, clean, free of coatings that are incompatible with tile-setting materials including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
 - 2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind stone tile has been completed.

3. Verify that joints and cracks in stone tile substrates are coordinated with stone tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
4. Start work only when all defects are corrected.
 - a. Note: Installer required to advise Construction Manager of slab requirements prior to installation of slab. See SUMMARY in Part 1.

3.3 ALLOWABLE TOLERANCE

- A. Variation in plane of sub-floor, including concrete fills leveling compounds and mortar beds:
 1. Not more than 1 in 1000 (1/8 inch in 10 feet) where latex-Portland cement mortar setting beds and chemical-resistant bond coats are used.
- B. Variation in Plane of Wall Surfaces:
 1. Not more than 1 in 800 (1/8 inch in eight feet) where dry-set or latex-Portland cement mortar setting materials is used.

3.4 SURFACE PREPARATION

- A. Provide leveling fills as required to bring floor surfaces within ALLOWABLE TOLARENCE.
- B. Prepare surfaces to receive tile as required to achieve proper bond and as recommended by TCNA.
- C. Cleaning New Concrete or Masonry:
 1. Chip out loose material, clean off all oil, grease dirt, adhesives, curing compounds, and other deterrents to bonding by mechanical method, or by using products specifically designed for cleaning concrete and masonry.
 2. Remove protrusions, bumps, and ridges by sanding or grinding.
 3. Use self-contained power blast cleaning systems to remove curing compounds and steel trowel finish from concrete slabs where ceramic tile will be installed directly on concrete surface with thin-set materials.
 4. Steam cleaning or the use of acids and solvents for cleaning will not be permitted.
- D. Patching and Leveling:
 1. Mix and apply patching and leveling compound in accordance with manufacturer's instructions.
 2. Fill holes and cracks and align concrete floors that are out of required plane with patching and leveling compound.
 - a. Thickness of compound as required to bring finish tile system to elevation shown.
 - b. Float finish except finish smooth for elastomeric waterproofing.
 - c. At substrate expansion, isolation, and other moving joints, allow joint of same width to continue through underlayment.
 3. Apply patching and leveling compound to concrete and masonry wall surfaces that are out of required plane.
 4. Apply leveling coats of material compatible with wall surface and tile setting material to wall surfaces, other than concrete and masonry that are out of required plane.
- E. Mortar Bed for Slopes to Drains:

1. Slope compound to drain where drains are shown.
 2. Install mortar bed in depressed slab sloped to drains not less than 1 in 200 (1/16 inch per foot).
 3. Allow not less than 50 mm (2 inch) depression at edge of depressed slab.
 4. Screed for slope to drain and float finish.
 5. Cure mortar bed for not less than seven days. Do not use curing compounds or coatings.
- F. Additional preparation of concrete floors for tile set with epoxy shall be in accordance with the manufacturer's printed instructions.
- G. Cleavage Membrane:
1. Install polythene sheet as cleavage membrane in depressed slab when waterproof membrane is not scheduled or indicated.
 2. Turn up at edge of depressed floor slab to top of floor.
- H. Slab Control Joints: To the maximum extent possible, align joints in tile with joints in substrate. Where alignment is possible, install joints as specified under FLEXIBLE JOINTS below.
1. Where alignment is not possible, cut tile and provide flexible joint. Adjust spacing so no tile of less than half size occurs.
 2. Misalignment of joint in substrate exceeding 1-inch requires cutting tile for alignment with joint in substrate.
 3. Where misalignment does not exceed 1 inch, provide crack suppression membranes.
 - a. Provide fluid type membrane at epoxy setting systems and sheet or fluid type membrane at other setting systems.
 - b. Install in accordance with manufacturer's recommendations.
 4. Sheet Type:
 - a. Fill joint with setting compound.
 - b. Center 12-inch wide strip of membrane over joint. Bond to substrate with same adhesive used for tile setting except organic adhesive not permitted.
 5. Fluid Type:
 - a. Install backer rod to within 1/8 inch of surface.
 - b. Fill joint with elastomeric compound.
 - c. Coat slab with 30 mils of elastomeric compound, extending 3 inches on both sides of joint.
 - d. Embed fiberglass mesh; center on joint, extend 3 inches on both sides of joint.
 - e. Top coat system with additional 30 mils of elastomeric compound, extending minimum 1/2 inch beyond 1st coat.
- I. Interior Walls:
1. In showers or other wet areas provide waterproof membrane over backer board.
 2. Apply patching and leveling compound to concrete and masonry surfaces that are out of required plane.
 3. Apply leveling coats of material compatible with wall surface and tile setting material to wall surfaces, other than concrete and masonry that are out of required plane.
- 3.5 TILE BACKER BOARD
- A. Install in accordance with manufacturer's instructions. TCNA Systems W244C and W244F as applicable.

1. Attach with screws spaced at locations recommended by backer board manufacturer, but not less than 8" centers on perimeter and field.
- B. Treat joints with tape and latex-Portland cement mortar or adhesive.
- C. In addition to the above, comply with requirements of Section 09 29 00 - GYPSUM BOARD at fire rated partitions.
- D. Shim tile backer board flush with adjacent wallboard for the conditions listed below. Provide continuous shims along face of studs.
 1. At wainscot or similar locations where tile terminates in same plane of wall.
 2. At door frames where thickness of gypsum wallboard is greater than thickness of tile backer board.
 3. Conditions which are visually discernible in completed work.

3.6 METAL DIVIDER AND EDGE STRIPS

- A. Install metal divider strips in floor joints between tile floors and adjacent flooring of other materials where the finish floors are flush unless shown otherwise.
- B. Set divider strip in mortar bed to line and level centered under doors or in openings.
- C. At preformed sealant joint:
 1. Comply with recommendations in TCNA "Handbook for Ceramic Tile Installation" Vertical and Horizontal Joint Design Essentials. TCNA System EJ 171.
 - a. Locate joint in tile surfaces directly above joint in sub-floor or where indicated when used with isolation membranes to allow off-setting of joint location from sub-floor joint.
 - b. Fasten full length to sub-floor using a construction adhesive.
 - c. Trowel setting material with full coverage over the entire leg.
 2. Set tile up against the joint ensuring that the top edge of the joint is flush or slightly below the top of the tile.
- D. Metal Edge Strips: Install at locations indicated or where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with top of tile. Install edge strips in continuous lengths, to level straight lines, as described below:
 1. Press perforated anchoring leg solidly into the tile-setting adhesive.
 2. Butt ends of units tightly together with hairline joint.
 3. Trowel an additional layer of tile-setting material over the anchoring leg prior to placement of tiles.
 4. Solidly embed tiles over anchoring leg with surface of tile flush with top of edge strip.
 5. Leave a 1/16 inch wide joint between tile and edge strip for grout.
 6. Fill joints with grout.

3.7 CERAMIC TILE - GENERAL

- A. Comply with ANSI A108 series of tile installation standards in "Specifications for Installation of Ceramic Tile" applicable to methods of installation.

- B. Comply with TCNA Installation Guidelines:
- C. Installing Mortar Beds for Floors: Provide at 1st floor only.
1. Install mortar bed to not damage cleavage or waterproof membrane; 32 mm (1- 1/2 inch) minimum thickness.
 2. Install floor mortar bed reinforcing centered in mortar fill.
 3. Screed finish to level plane or slope to drains where shown, and float finish.
 4. For thin set systems cure mortar bed not less than seven days. Do not use curing compounds or coatings.
 5. For tile set with Portland cement paste over plastic mortar bed, coordinate to set tile before mortar bed sets.
 6. Pools Holding Water: ANSI A108 1C. Do not use Latex Portland cement mortar.
- D. TCNA Workmanship:
1. Cuts: Machine cut joint exposed to view in completed work. Use appropriate machines for clean, crisp cuts resulting in uniform even joint widths
 2. Lay out tile work so that no tile less than one-half full size are used. Make all cuts on the outer edge of the field.
 3. Set tile firmly in place with finish surfaces in true planes. Align tile flush with adjacent tile unless shown otherwise.
 4. Form intersections and returns accurately.
 5. Cut and drill tile neatly without marring surface.
 6. Cut edges of tile abutting penetrations, finish, or built-in items:
 - a. Fit tile closely around electrical outlets, piping, fixtures and fittings, so that plates, escutcheons, collars and flanges will overlap cut edge of tile.
 - b. Seal tile joints water tight as specified in Section 07 92 00, JOINT SEALANTS, around electrical outlets, piping fixtures and fittings before cover plates and escutcheons are set in place.
 7. Set trim shapes in same material specified for setting adjoining tile.
 8. Completed work shall be free from hollow sounding areas and loose, cracked or defective tile.
 9. Remove and reset tiles that are out of plane or misaligned.
 10. Floors:
 - a. Extend floor tile beneath casework and equipment, except those units mounted in wall recesses.
 - b. Align finish surface of new tile work flush with other and existing adjoining floor finish where shown.
 - c. In areas where floor drains occur, slope to drains where shown.
 - d. Terminate floor tile under door.
 - e. Shove and vibrate tiles over 200 mm (8 inches) square to achieve full support of bond coat.
 11. Walls:
 - a. Cover walls and partitions, including pilasters, furred areas, and freestanding columns from floor to ceiling, or from floor to nominal wainscot heights shown with tile.
 - b. Finish reveals of openings with tile, except where other finish materials are shown or specified.
 - c. At window openings, provide tile stools and reveals, except where other finish materials are shown or specified.
 - d. Finish wall surfaces behind and at sides of casework and equipment, except those units mounted in wall recesses, with same tile as scheduled for room proper.
 12. Joints:

- a. Keep all joints in line, straight, level, perpendicular and of even width unless shown otherwise.
 - b. Make joints 2 mm (1/16 inch) wide for glazed wall tile and mosaic tile work.
 - c. Make joints in paver tile, porcelain tile; maximum 3 mm (1/8 inch) wide.
13. Back Buttering: For installations indicated below, obtain 100 percent mortar coverage by complying with applicable special requirements for back buttering of tile in referenced ANSI A108 series of tile installation standards:
- a. Tile wall installations in wet areas, including showers, tub enclosures, laundries and exercise pools.
 - b. Tile installed with chemical-resistant mortars and grouts.
 - c. Tile wall installations composed of tiles 200 by 200 mm (8 by 8 inches or larger).

3.8 WATERPROOFING

A. Floor Waterproofing:

1. See "Waterproofing" under QUALITY ASSURANCE in PART 1.
2. Install in accordance with manufacturer's printed instructions and ANSI A108.13 where applicable. Extend waterproofing up walls full height at job-built shower receptors and 3-1/2" high at all other areas.
3. Install in accordance with manufacturer's printed instructions. Extend waterproofing up walls minimum 3-1/2" high.

B. Shower Wall Waterproofing: Provide full height waterproofing for ceramic tile shower walls. Seal openings and penetrations for watertight installation. Reseal fasteners or other penetrations occurring after waterproofing installed.

1. Job-Built Receptors: Waterproofing specified elsewhere. Extend receptor waterproofing onto walls
2. Extend waterproofing on walls minimum 24" beyond shower. .

C. Wall Waterproofing: Install directly over tile backerboard. Verify waterproofing compatible with tile adhesive.

1. At base, lap onto floor waterproofing not less than 2 inches.
2. Joints: Lap minimum 2 inches; seam in accordance with manufacturer's written recommendations. Shingle horizontal joints to shed water toward tile or drain.

3.9 JOB-BUILT SHOWER RECEPTORS & BATHROOM FLOORS

- A. TCNA Design B415 except finish shower and bathroom floor is resinous flooring specified elsewhere.
- B. Waterproofing: See WATERPROOFING above. Extend onto walls.
- C. Reinforced mortar bed below waterproofing. By resinous flooring trade specified elsewhere. Recessed slab required.

3.10 TILE INSTALLATION, SYSTEM SCHEDULE

- A. Prepare surfaces, fit, set or bond, grout, and clean in accordance with Tile Council of North America, Inc. "Handbook for Ceramic Tile Installation", and as stated below:

- B. Large Format Tile: See DEFINITIONS in Part 1 above. In accordance with TCNA recommendations, the following installation method can produce maximum coverage, with corners and edges fully supported, without backbuttering or beat-in:
1. Select a notched trowel sized to facilitate the proper coverage.
 2. Key mortar into substrate with flat side of trowel.
 3. Comb with notched side of trowel IN ONE DIRECTION.
 4. Firmly press tiles into mortar and move them perpendicularly ACROSS the ridges, forward and back approximately 1/8" to 1/4", to flatten ridges and fill valleys.
 5. Periodically remove and check a tile to assure proper coverage is being attained.
- C. Ceramic Tile on Slabs on Grade: Tile is installed on a 3-inch thick fiber-reinforced topping slab with vapor retarder sandwiched between reinforced structural slab and topping slab.
1. TCNA design F113; Latex Portland Cement mortar, setting and grout with full coverage crack suppression membrane.
 2. Tile: ANSI A108.5
 3. Grout: ANSI A108.
- D. Ceramic Tile on Elevated Slabs:
1. Thinset: TCNA design F122A; Latex Portland Cement mortar, setting and grout, over waterproof or crack-suppression membrane,
 - a. Waterproofing in toilet rooms; crack-suppression membrane elsewhere.
 - b. Tile: ANSI A108.5
 - c. Grout: ANSI A108.10
 2. Medium Set: Similar to "Thinset" above except use special shaped trowel as recommended by mortar manufacturer. Provide for floor tile 12 inches square and larger.
- E. Ceramic Tile Floors at Restrooms on Elevated Slabs: Waterproofed.
1. Thinset: TCNA design F122A; Latex Portland Cement mortar, setting and grout, over waterproof membrane,
 - a. Waterproofing.
 - b. Tile: ANSI A108.5
 - c. Grout: ANSI A108.10
- F. Ceramic Tile on Wet Interior Walls (including Showers). See "Shower Wall Waterproofing" under WATERPROOFING above.
1. At Masonry Walls: TCNA design W211, Cement Mortar Bonded, Latex Portland cement mortar bond coat and grout.
 - a. Tile: ANSI A108.1B (with latex additive).
 - b. Grout: ANSI A108.10
 2. At Stud Walls: TCNA design W244 Similar, Waterproofing over Cement or Fiber-Cement Units, latex Portland cement mortar and grout. See TCNA design B421 and B422 for bonded waterproof membrane.
 - a. Waterproofing: ANSI A108.13.
 - b. Tile: ANSI A108.5
 - c. Grout: ANSI A108.10
 3. Termination at Job-Built Shower Receptor: As detailed.
- G. Ceramic Tile on Dry Interior Walls:

1. At Masonry Walls: TCNA design W202 Latex-Portland Cement Mortar ; Latex Cement mortar grout.
 - a. Tile: ANSI A108.5 or A108.1B (with latex additive).
 - b. Grout: ANSI A108.10
 2. At Stud Walls: TCNA design W243 or W244C/F, Latex Cement mortar and grout.
 - a. Tile: ANSI A118.4
 - b. Grout: ANSI A108.10.
 - c. Substrate: Paperless gypsum board under W243 or tile backer board under W244C or F.
- H. Glass Tile on Interior Walls: Similar to "Ceramic Tile on Dry Interior Walls" except special Glass Tile Setting Mortar required. Glass tile mortar shall not have unsanded mortar mix.
- ~~I. Ceramic Tile in Exercise Pool: All tile work inside pool tank provided under Section 13-17-24. Exercise Pool. Depth markers for pool deck supplied under referenced Section for installation under this Section. See "Products Installed But Not Supplied Under This Section" under DESCRIPTION in Part 1 above.~~
- 3.11 CERAMIC TILE INSTALLED WITH PORTLAND CEMENT MORTAR
- A. Mortar Mixes for Floor, Wall and Base Tile (including Showers, Exercise and Hydro Therapy Pools): ANSI A108.1, except where specified otherwise.
 - B. Installing Wall and Base Tile: ANSI A108.1, except specified otherwise.
 - C. Installing Floor Tile: ANSI A108.1, except as specified otherwise. Slope mortar beds to floor drains a minimum of 1 in 100 (1/8 inch per foot).
- 3.12 PORCELAIN TILE INSTALLED WITH LATEX PORTLAND CEMENT BONDING MORTAR
- A. Due to the denseness of porcelain tile use latex Portland cement bonding mortar that meets the requirements of ANSI A118.4 as modified under Part 2 above. Bonding mortars shall be mixed in accordance with manufacturer's instructions. Improper liquid ratios and dwell time before placement of bonding mortar and tile affects bond.
- 3.13 THIN SET CERAMIC AND PORCELAIN TILE INSTALLED WITH DRY-SET PORTLAND CEMENT AND LATEX-PORTLAND CEMENT MORTAR
- A. Installation of Tile: ANSI A108.5, except as specified otherwise.
 - B. Slope tile work to drains not less than 1 in 100 (1/8 inch per foot).
 - C. Crack Suppression Membrane
 1. Install in accordance with manufacturer's printed instructions and ANSI 108.17 as applicable.
 - a. Full Coverage: TCNA Design F125.
 2. Provide for the following conditions:
 - a. Elevated slabs receiving thin-set tile systems exceeding size limitations of room below. Adding control joints shall not eliminate requirement for crack

suppression membrane. Not required where waterproofing, specified under this Section, is installed as a part of tile system.

- 1) Minor dimension of room exceeds 12 feet.
 - 2) Major dimension of room exceeds 24 feet.
 - 3) Area of room exceeds 288 square feet.
- b. Misalignment of joints in concrete slab. See "Slab Control Joints" under PREPARATION above.

3.14 CERAMIC AND PORCELAIN TILE INSTALLED WITH ELASTOMERIC BOND COAT

- A. Surface Preparation: Prepare surfaces as specified under SURFACE PREPARATION above.
- B. Installation of Elastomeric Membrane: ANSI A108.13 and TCNA F122.
1. Prime surfaces, where required, in accordance with manufacturer's instructions.
 2. Install first coat of membrane material in accordance with manufacturer's instructions, in thickness of 0.75 to 1.3 mm (30 to 50 mils).
 3. Extend material over flashing rings of drains and turn up vertical surfaces not less than 100 mm (four inches) above finish floor surface.
 4. When material has set, recoat areas with a second coat of elastomeric membrane material for a total thickness of 1.3 to 1.9 mm (50 to 75 mils).
 5. After curing test for leaks with 25 mm (one inch) of water for 24 hours.
- C. Installation of Tile in Elastomeric Membrane:
1. Spread no more material than can be covered with tile before material starts to set.
 2. Apply tile in second coat of elastomeric membrane material in accordance with the coating manufacturer's instructions in lieu of aggregate surfacing specified in ASTM C1127. Do not install top coat over tile.

3.15 GROUTING

- A. Grout Type and Location:
1. ~~Grout for tile, except for exercise and therapeutic pool, Portland cement grout, latex-Portland cement grout.~~
 2. Grout for tile of exercise and therapeutic pools: Portland cement grout or ANSI 118.6 with waiting time before immersion as recommended by grout manufacturer.
- B. Workmanship:
1. Install and cure grout in accordance with the applicable standard.
 2. Latex-Portland cement grout: ANSI A108.10.
 3. Portland Cement grout: ANSI A108.10.

3.16 MOVEMENT JOINTS

- A. Location: Locate all flexible joints (expansion, control, and isolation joints) prior to tile installation.
- B. Provide flexible joints as specified herein, regardless if not shown on drawings.

- C. Joints to be continuous from face of tile to bottom of setting or leveling bed. Lath to be discontinuous at joint. Install continuous joint filler strip in joint from setting or leveling bed to a point below face of tile adequate for placement of backing rod and sealant.
- D. Prepare tile expansion, isolation, construction and contraction joints for installation of sealant. Refer to Section 07 92 00, JOINT SEALANTS.
- E. TCNA details EJ 171
- F. Joint Design: TCNA design EJ171 as applicable. Sealant specified elsewhere. Provide sealant joints at the following locations:
1. Column lines in steel structures.
 2. Directly over joints in structural floor and wall substrate including cold joints, construction joints, control joints, and expansion joints.
 3. Where tile work abuts restraining surfaces such as perimeter walls, curbs, columns, pipes, etc.
 4. At all base conditions: See detail on drawings for ¼" joint between straight ceramic base and floor tile. Base extends below floor tile. Saw cut floor tile for crisp even joint width.
 - a. At toe of "flush" type tile cove bases.
 - b. Intersections with other hard bases.
 5. Floor and Wall Areas: Provide joints for areas exceeding the dimensions listed below in any direction.
 - a. Interior:
 - 1) Exposed to Direct Sunlight or Moisture: 8 feet.
 - 2) Remaining Areas: 24 feet.
 6. Where shown.
- G. At expansion joints, rake out joint full depth of tile and setting bed and mortar bed. Do not cut waterproof or isolation membrane.

3.17 SHOWER SHELF (SS-1)

- A. Mount to wall in accordance with manufacturer's written instructions.
- B. Make water-tight seal to finish wall substrate using continuous bead of silicone sealant on:
1. Back side of unit flange, and
 2. Fillet between flange perimeter and wall.

3.18 CLEANING

- A. Thoroughly sponge and wash tile. Polish glazed surfaces with clean dry cloths.
- B. Methods and materials used shall not damage or impair appearance of tile surfaces.
- C. The use of acid or acid cleaners on glazed tile surfaces is prohibited.
- D. Clean tile grouted with epoxy, furan and commercial Portland cement grout and tile set in elastomeric bond coat as recommended by the manufacturer of the grout and bond coat.

3.19 PROTECTION

- A. Keep traffic off tile floor, until grout and setting material is firmly set and cured.
- B. Where traffic occurs over tile floor, cover tile floor with not less than 9 mm (3/8 inch) thick plywood, wood particle board, or hardboard securely taped in place. Do not remove protective cover until time for final inspection. Clean tile of any tape, adhesive and stains.

--- E N D ---

SECTION 09 51 00
ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Metal and FRP ceiling suspension system for acoustical ceilings.
- B. Acoustical units.
- C. Extruded aluminum trim associated with work of this Section.

1.2 RELATED WORK

- A. Pull down tabs in steel decking: Section 05 36 00, COMPOSITE METAL DECKING.
- B. Section 09 06 00, SCHEDULE FOR FINISHES and FINISH LEGEND in Drawings.
- C. Extruded aluminum trim: Section 09 53 14, Ceiling Accessories.
- D. Metal Ceilings: Section 09 54 23, METAL CEILINGS.

1.3 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Product data. Unless otherwise indicated, submit the following for each type of product provided under work of this Section.
- C. LEED Submittals
 - 1. Recycled Content:
 - a. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating costs for each product having recycled content.
 - b. Product Data for Credit EQ 4.1: For sealants, documentation including printed statement of VOC content.
 - c. Laboratory Test Reports for Credit EQ 4: For ceiling systems and sealants, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
 - D. Samples:
 - 1. Acoustical units, each type, with label indicating conformance to specification requirement.
 - 2. Samples for Initial Selection: For components with factory-applied color finishes
 - 3. Colored markers for units providing access.

4. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below:
 - a. Acoustical Panel: Set of full-size Samples of each type, color, pattern, and texture:
 - b. Exposed Suspension-System Members, Moldings, and Trim: Set of 6-inch- (150-mm-) long Samples of each type, finish, and color.
- E. Manufacturer's Literature and Data:
 1. Ceiling suspension system, each type, showing complete details of installation. Submit hanger spacing for non-metallic suspension systems for compliance with Heavy Duty rating.
 2. Acoustical units, each type.
- F. Manufacturer's Certificates: Acoustical units, each type, in accordance with specification requirements.
- G. Manufacturer's certifications that system complies with specified requirements:
 1. For seismic performance: International Code Council Evaluation Report, ESR-1308.

1.4 DEFINITIONS

- A. Standard definitions as defined in ASTM C634.
- B. Terminology as defined in ASTM E1264.
- C. Nonmagnetic: Not capable of being magnetized.

1.5 QUALITY ASSURANCE

- A. Mockup: Provide mockups of not less than 100 sq. ft. for each type of ceiling required. AT-1 through AT-6. Show cut tile and edge detail at wall. Accepted mockups to remain as an acceptable standard of workmanship and can be part of completed Work. Install at a location acceptable to Architect.
- B. Single-Source Responsibility: Provide acoustical panel units and grid components by a single manufacturer.
- C. Seismic Performance: Provide acoustical ceiling systems that have been evaluated by an independent party and found to be compliant with the 2006 International Building Code, Seismic Category **A**.
 1. Tested per International Code Council – Evaluation Services – AC 156 Acceptance Criteria for Seismic Qualification Testing of Non-structural Components as evidenced by International Code Council Evaluation Report, ESR-1308.
- D. Coordination of Work: Coordinate acoustical ceiling work with installers of related work including, but not limited to building insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.
- E. Fire Performance Characteristics: Identify acoustical ceiling components with appropriate markings of applicable testing and inspecting organization.

- F. Coordination of Work: Coordinate acoustical ceiling work with installers of related work including, but not limited to building insulation, gypsum board, expansion joints, light fixtures, mechanical systems, electrical systems, and sprinklers.

1.6 DELIVERY, IDENTIFICATION, HANDLING AND STORAGE

- A. Deliver materials to project site with manufacturer's labels intact and legible. Fire-rated materials shall bear testing agency label and fire classification numbers intact and legible. Handle materials with care to prevent damage; 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 ceiling units, permit ceiling tile to reach room temperature and stabilized moisture content.

1.7 ENVIRONMENTAL CONDITIONS

- A. Do not install interior ceilings until space is enclosed and weatherproof; wet work in place is completed and nominally dry; work above ceilings is complete; and ambient conditions of temperature and humidity are continuously maintained at values near those intended for final occupancy. Building areas to receive ceilings shall be free of construction dust and debris.

1.8 SEQUENCE/SCHEDULING

- A. Sprayed Fireproofing: All attachments to structural steel framing receiving sprayed fireproofing, specified elsewhere, to be installed prior to installation of sprayed fireproofing to preclude removal of fireproofing. Include clips, tracks, hangers, and other devices required for subsequent installation of metal framing suspension assemblies specified under this section.

1.9 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in the text by basic designation only. Latest edition unless otherwise noted.
- B. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)
1. Standard 62-01 Ventilation for Acceptable Indoor Air Quality (IAQ)
- C. American Society for Testing and Materials (ASTM):
1. A641/A641M Zinc-coated (Galvanized) Carbon Steel Wire
 2. A653/A653M Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-coated (Galvannealed) by the Hot-Dip Process.
 3. B221 Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes
 4. C423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
 5. C634 Standard Terminology Relating to Environmental Acoustics
 6. C635 Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings
 7. C636 Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels

8. E84 Surface Burning Characteristics of Building Materials
 9. E119 Fire Tests of Building Construction and Materials
 10. E580 Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Seismic Restraint
 11. E1111 Standard Test Method for Measuring the Interzone Attenuation of Open Office Components
 12. E1264 Classification for Acoustical Ceiling Products
 13. E 1414 Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum (previously known as ASTM E 413)
 14. E1477 Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers
- D. International Code Council
1. Evaluation Services - AC 156 Acceptance Criteria for Seismic Qualification Testing of Non-structural Components
- E. ASCE/SEI 7-05 Standard – American Society of Civil Engineers, Minimum Design Loads for Buildings and Other Structures.
1. Chapter 13, Seismic Design Requirements for Nonstructural Components.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Loads: Design and size components to withstand seismic loads in accordance with the International Building Code, Chapter 11 for Seismic Design Category A.
- B. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 1. Flame-Spread: 0-25 in accordance with ASTM E 84.
 - a. Smoke-Developed: 0-450 in accordance with ASTM E 84.
- C. MRI: Ceiling Grid system in MRI spaces shall be constructed of non-metallic materials. Provide FRP ceiling grid assembly complete with trim, hanger straps and fasteners equal to steel ceiling grid materials specified except metal(s) in the assembly shall be constructed of nonmagnetic components.

2.2 METAL SUSPENSION SYSTEM

- A. ASTM C635, heavy-duty system, except as otherwise specified.
 1. Ceiling suspension system members may be fabricated from either of the following unless specified otherwise.
 - a. Main and cross runners roll formed from and capped with cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, G30 (Z90) coating designation..
 - b. Extruded aluminum.
 2. ~~Use aluminum suspension in kitchens and aluminum or fire resistant plastic hydrotherapy, and swimming pools.~~

3. Areas in toilet/ shower rooms shall be steel grid system as specified above with G-60 zinc coating (ASTM A653) over steel and 0.011" thick aluminum cap with hemmed edges over exposed faces of steel ceiling grid and wall trim molding.
 - a. Deflection: L/360.
 4. Accessories: As required for a complete installation:
 - a. Cross Tee Adapter Clip: Ceiling grid manufacturer's concealed metal angled shaped adapter for securing field cut tee to main runner track that maintains the performance characteristics and appearance of the heavy duty grid system.
- B. Exposed grid suspension system for support of lay-in panels:
1. Exposed grid width 22 mm (15/16 inch) with not less than 8 mm (5/16 inch) panel bearing surface. Where indicated, 14 mm (9/16 inch) exposed grid width. Flat profile bottom flange typical.
 2. Fabricate wall molding and other special molding from the same material with same exposed width and finish as the exposed grid members, unless indicated otherwise.
 - a. Curved Molding:
 - 1) Columns: 3 piece shadow molding assembly with draw. Provide at round columns; sizes as required.
 - 2) Walls: Special moldings to match color and profile of adjacent straight wall molding. Provide manufactured sections field adaptable to curves or custom rolled sections bent to required radius; visually continuous and free from buckles.
 3. On exposed metal surfaces apply baked-on enamel flat texture finish in color to match adjacent acoustical units unless specified otherwise in Section 09 06 00 - SCHEDULE FOR FINISHES.
- C. Clean-Room Gasket System: Where indicated, provide manufacturer's standard system, including closed-cell PVC gasket and related adhesives, tapes, seals, and retention clips, designed to seal out foreign material from and maintain positive pressure in the room designated to receive the Clean Room Gasket System. Clean-Room Gasket System shall meet or exceed a Class 4 performance rating per ISO 14644-1.
- D. Panel Clips: Provide from grid manufacturer. Standard devices configured for suspension grid and ceiling panel thickness.
1. Hold-Down Clips: Devices for retaining panels in grid system when subjected to wind or draft uplift, or required by fire-rating. Provide exterior-rated devices for panels subjected to exterior conditions or forces.
- E. Extruded Aluminum Trim for Transitions and Terminations: See Section 09 53 14 – Ceiling Accessories.
- F. Stabilizer Bars and Spring Clips: Manufacturer's standard devices. See AT-6 under ACOUSTICAL UNITS below.
- 2.3 PERIMETER SEAL
- A. Vinyl, polyethylene or polyurethane open cell sponge material having density of 1.3 plus or minus 10 percent, compression set less than 10 percent with pressure sensitive adhesive coating on one side.

- B. Thickness as required to fill voids between back of wall molding and finish wall.
- C. Not less than 9 mm (3/8 inch) wide strip.

2.4 WIRE

- A. ASTM A641, straightened.
- B. For wire hangers: Minimum diameter 2.68 mm (0.1055 inch).
- C. For bracing wires: Minimum diameter 3.43 mm (0.1350 inch).

2.5 ANCHORS AND INSERTS

- A. Use anchors or inserts to support twice the loads imposed by hangers attached thereto.
- B. Hanger Inserts:
 - 1. Fabricate inserts from steel, zinc-coated (galvanized after fabrication).
 - 2. Nailing type option for wood forms:
 - a. Upper portion designed for anchorage in concrete and positioning lower portion below surface of concrete approximately 25 mm (one inch).
 - b. Lower portion provided with not less than 8 mm (5/16 inch) hole to permit attachment of hangers.
 - 3. Flush ceiling insert type:
 - a. Designed to provide a shell covered opening over a wire loop to permit attachment of hangers and keep concrete out of insert recess.
 - b. Insert opening inside shell approximately 16 mm (5/8 inch) wide by 9 mm (3/8 high over top of wire).
 - c. Wire 5 mm (3/16 inch) diameter with length to provide positive hooked anchorage in concrete.
- C. Clips:
 - 1. Galvanized steel.
 - 2. Designed to clamp to steel beam or bar joists, or secure framing member together.
 - 3. Designed to rigidly secure framing members together.
 - 4. Designed to sustain twice the loads imposed by hangers or items supported.

2.6 CARRYING CHANNELS FOR SECONDARY FRAMING

- A. Fabricate from cold-rolled or hot-rolled steel, black asphaltic paint finish, free of rust.
- B. Weighing not less than the following, per 300 m (per thousand linear feet):

Size mm	Size Inches	Cold-rolled Kg	Pound	Hot-rolled Kg	Pound
38	1 1/2	475	1,047	508	1,120
50	2	590	1,300	572	1,260

2.7 ACOUSTICAL UNITS

A. General:

1. ASTM E1264, weighing 3.6 kg/m² (3/4 psf) minimum for mineral fiber panels or tile.
2. Class A Flame Spread: ASTM 84.
3. Minimum NRC (Noise Reduction Coefficient): 0.55 unless specified otherwise: ASTM C423.
4. Manufacturer's standard finish, minimum Light Reflectance (LR), per ASTM E 1477, coefficient of 0.75 on the exposed surfaces, except as specified otherwise in Section 09 06 00, SCHEDULE FOR FINISHES and FINISH LEGEND. Colored units integrally colored throughout.
 - a. Color: White except where noted otherwise.
5. Lay-in panels: Sizes as shown, with square edges, and tegular edges as indicated on FINISH LEGEND.
 - a. Tegular edges to have either 15 percent taper or beveled edge.
6. Mylar-Faced Panels: Provide fully bonded panels ("Border" units) only at locations requiring field cuts.
7. Tolerances:
 - a. Tegular Panels: Where bottom of suspension grid is intended to be in same plane as scored reveals in field of panel.
 - 1) Tegular Depth: 0.230 inch \pm 0.015 inch.
 - 2) Scoring Depth: 0.170 inch \pm 0.015 inch.
8. Sag Resistance: Formulate panels to resist noticeable sag for a period of not less than 10 years.
9. Anti-Microbial Treatment: Provide panels and paint finishes with broad spectrum anti-microbial treatment to resist growth of mold/mildew and micro-organisms.

B. AT-1: See FINISH LEGEND for size, edge, grid, color, and Basis of Design manufacture/model number:

1. ASTM E 1264 Classification:
 - a. Type XII – Glass fiber base with membrane-faced overlay.
 - b. Form 2 – Cloth.
 - c. Pattern E – Lightly textured.
2. Surface Texture: Fine.
3. Exposed Face: Acoustically Transparent membrane.
4. Provide Scuff Resistant coating on exposed face that is composed of a porous, non-woven chemically bonded fiberglass fibers
 - a. Nominal Thickness: 0.025 inch thickness.
5. Surface Finish: Factory applied Acrylic latex Paint.
6. Emissions Testing: 13.5 ppb or less of formaldehyde when used under typical conditions required by ASHRAE Standard 62.1-2004, "Ventilation for Acceptable Indoor Air Quality".
7. Acoustic Properties:
 - a. NRC: 0.95.
 - b. Articulation Class (AC): 190 per ASTM E 1111.
8. Light Reflectance: 0.90
9. Grid Requirement: 9/16".

C. AT- 3, & 4: See FINISH LEGEND for size, edge, grid, color, and Basis of Design manufacture/model number.

1. ASTM E 1264 Classification:
 - a. Type III – Mineral base with painted finish.
 - b. Form 2 – Water felted.
 - c. Pattern CE – Perforated, small holes, Lightly textured.
 2. Surface Texture: Fine.
 3. Surface Finish: Factory applied Acrylic latex Paint.
 4. Emissions Testing: 13.5 ppb or less of formaldehyde when used under typical conditions required by ASHRAE Standard 62.1-2004, "Ventilation for Acceptable Indoor Air Quality".
 5. Acoustic Properties:
 - a. NRC: 0.50.
 - b. CAC: 35.
 6. Light Reflectance: 0.83
 7. Grid Requirement: 15/16".
- D. AT-7: See FINISH LEGEND for size, edge, grid, color, and Basis of Design manufacture/model number.
1. Special Sizes: Two large sizes required in addition to standard size; refer to drawings.
- E. ATSP-1: See FINISH LEGEND for size, edge, grid, color, and Basis of Design manufacture/model number.
1. ASTM E 1264 Classification:
 - a. Type IV – Mineral base with membrane-faced overlay.
 - b. Form 2 – Water felted.
 - c. Pattern GH – Smooth, Printed.
 2. Surface Texture: Smooth.
 3. Exposed Face: Acoustically Transparent membrane.
 4. Surface Finish: Soil-resistant polyester film.
 5. Emissions Testing: 13.5 ppb or less of formaldehyde when used under typical conditions required by ASHRAE Standard 62.1-2004, "Ventilation for Acceptable Indoor Air Quality".
 6. Acoustic Properties:
 - a. NRC: 0.55.
 - b. Ceiling Attenuation Class (CAC): 35 per ASTM E 1414.
 7. Light Reflectance: 0.79.
 8. Grid Requirement: 15/16" Aluminum, gasketed, "Clean Room".

2.8 COLORS AND PATTERNS

- A. Use colors and patterns for acoustical units and suspension system components as specified in Section 09 06 00 - SCHEDULE FOR FINISHES and FINISH LEGEND in drawings.

2.9 ACCESS IDENTIFICATION

- A. Markers:
1. Use colored markers with pressure sensitive adhesive on one side.
 2. Make colored markers of paper or plastic, 6 to 9 mm (1/4 to 3/8 inch) in diameter.
- B. Use markers of the same diameter throughout building.
- C. Color Code: Use following color markers for service identification:
1. Color Service

2. Red Sprinkler System: Valves and Controls
3. Green Domestic Water: Valves and Controls
4. Yellow Chilled Water and Heating Water
5. Orange Ductwork: Fire Dampers
6. Blue Ductwork: Dampers and Controls
7. Black Gas: Laboratory, Medical, Air and Vacuum

PART 3 - EXECUTION

3.1 CEILING TREATMENT

- A. Treatment of ceilings shall include sides and soffits of ceiling beams, furred work 600 mm (24 inches) wide and over, and vertical surfaces at changes in ceiling heights unless otherwise shown. Install acoustic tiles after wet finishes have been installed and solvents have cured.
- B. Lay out acoustical units symmetrically about center lines of each room or space unless shown otherwise on reflected ceiling plan.
- C. Moldings:
 1. Provide metal wall molding at perimeter of room, column, or edge at vertical surfaces, unless detailed otherwise. Face of wall molding and ceiling grid supporting the edge of ceiling tiles shall be installed coplanar.
 2. Provide special shaped molding at changes in ceiling heights and at other breaks in ceiling construction to support acoustical units and to conceal their edges.
 3. Screw attach moldings to substrate at intervals not more than 400 mm (16 inches) o.c. and not more than 75 mm (3 inches) from ends, leveling with ceiling suspension system to a tolerance of 3.2 mm in 3.6 m (1/8 inch in 12 feet). Miter corners accurately and connect securely.
 4. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- D. Perimeter Seal:
 1. Provide perimeter seal between vertical leg of wall molding and finish wall, partition, and other vertical surfaces.
 2. Install perimeter seal to finish flush with exposed faces of horizontal legs of wall molding. Exposed edge of perimeter seal to match exposed color of wall molding; or install perimeter seal to finish 1/4" above exposed faces of horizontal legs of wall molding and fill gap between horizontal leg and adjacent vertical surface with caulk matching the color of the ceiling grid.
 - a. Caulk: Provide caulk in conformance with Section 07 92 00 - Joint Sealants.

3.2 CEILING SUSPENSION SYSTEM INSTALLATION

- A. General:
 1. Provide metal suspension system for acoustical tile and lay-in panels in accordance with ASTM C636 and seismic design requirements indicated, according to manufacturer's written instructions and Cisca's "Ceiling Systems Handbook."; except as specified otherwise.

2. Use direct or indirect hung suspension system or combination thereof as defined in ASTM C635.
 3. Support a maximum area of 1.48 m² (16 sf) of ceiling per hanger, except as follows:
 - a. Non Metallic Ceiling Grid Assemblies: Space hangers as required to comply with Heavy Duty rating as defined by ASTM C 635. Straps required. Wire prohibited for non-metallic grid applications in MRI. Provide custom attachment to grid to prevent eccentric loading which twists runners.
 4. Prevent deflection in excess of 1/360 of span of cross runner and main runner.
 5. Provide extra hangers, minimum of one hanger at each corner of each item of mechanical, electrical and miscellaneous equipment supported by ceiling suspension system not having separate support or hangers.
 6. Provide not less than 100 mm (4 inch) clearance from the exposed face of the acoustical units to the underside of ducts, pipe, conduit, secondary suspension channels, concrete beams or joists; and steel beam or bar joist unless furred system is shown,
 7. Use main runners not less than 1200 mm (48 inches) in length.
 8. Install hanger wires vertically. Angled wires are not acceptable except for seismic restraint bracing wires. Where width of ducts and other construction within ceiling plenum produces hanger spacing that interfere with location of hangers at spacing required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
 9. Secure wire hangers to ceiling-suspension members and to supports above with a minimum of three tight turns within 3 inches of main beam. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
 10. 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.
 11. Do not attach hangers to steel roof deck unless deck has attachment devices by deck manufacturer. Attach hangers to structural members.
 12. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
 - a. Cut Cross Tees and Cross Tees Off Modular Spacing: Secure cross tee to main runner track with a concealed Cross Tee Adapter Clip. Secure clip to main runner and cross runner with two screws in each leg and equal in appearance and strength interlocked cross tee to main runner track. At cross tees off of modular spacing of openings in main beam to receive cross tees provide cross tee adapter as described above or punch new opening in main beam to receive cross tee. Field punched openings for cross tees in main beam shall be equal to openings punched in factory for cross tees.
- B. Anchorage to Structure:
1. Concrete:
 - a. Install hanger inserts and wire loops required for support of hanger and bracing wire in concrete forms before concrete is placed. Install hanger wires with looped ends through steel deck if steel deck does not have attachment device. Do not attach hangers to steel deck tabs.

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- b. Use eye pins or threaded studs with screw-on eyes in existing or already placed concrete structures to support hanger and bracing wire. Install in sides of concrete beams or joists at mid height.
 - c. Other Methods: As approved by the Resident Engineer including properly sized and spaced powder actuated fasteners if approved by the Resident Engineer.
2. Steel:
- a. When steel framing does not permit installation of hanger wires at spacing required, provide carrying channels for attachment of hanger wires.
 - 1) Size and space carrying channels to insure that the maximum deflection specified will not be exceeded.
 - 2) Attach hangers to steel carrying channels, spaced four feet on center, unless area supported or deflection exceeds the amount specified.
 - b. Attach carrying channels to the bottom flange of steel beams spaced not 1200 mm (4 feet) on center before fire proofing is installed. Weld or use steel clips to attach to beam to develop full strength of carrying channel.
 - c. Attach hangers to bottom chord of bar joists or to carrying channels installed between the bar joists when hanger spacing prevents anchorage to joist. Rest carrying channels on top of the bottom chord of the bar joists, and securely wire tie or clip to joist.
- C. Direct Hung Suspension System:
- 1. As illustrated in ASTM C635.
 - 2. Support main runners by hanger wires attached directly to the structure overhead.
 - 3. Maximum spacing of hangers, 1200 mm (4 feet) on centers unless interference occurs by mechanical systems. Use indirect hung suspension system where not possible to maintain hanger spacing.
- D. Indirect Hung Suspension System:
- 1. As illustrated in ASTM C635.
 - 2. Space carrying channels for indirect hung suspension system not more than 1200 mm (4 feet) on center. Space hangers for carrying channels not more than 2400 mm (8 feet) on center or for carrying channels less than 1200 mm (4 feet) on center so as to insure that specified requirements are not exceeded.
 - 3. Support main runners by specially designed clips attached to carrying channels.
- E. Seismic Ceiling Bracing System:
- 1. Construct system in accordance with ASTM E580.
 - 2. General: Install acoustical panel ceilings to comply with ASTM C 636/C 636M and seismic design requirements indicated, according to manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
 - 3. Connect bracing wires to structure above as specified for anchorage to structure and to main runner or carrying channels of suspended ceiling at bottom.
 - 4. System shall meet or exceed seismic requirements indicated on Structural Drawings.

3.3 ACOUSTICAL UNIT INSTALLATION

- A. General: Provide lay-in acoustic panels in accordance with the approved installation instructions of the manufacturer. Ensure that edges of acoustical units are in close contact with metal supports around the perimeter of the tile, with each other, and in true alignment. Arrange acoustical units so that units less than one-half width are minimized.
- B. Cut acoustic units for perimeter borders and penetrations to fit tight against penetration for joint not concealed by molding. Full size uncut panels must be field panels. Use suitable sharp tools to achieve crisp clean edges free of tears; "ratty" edges not acceptable.
- C. Install lay-in acoustic panels in exposed grid with not less than 6 mm (1/4 inch) bearing at edges on supports.
1. Install tile to lay level and in full contact with exposed grid.
 2. Replace cracked, broken, stained, dirty, or tile not cut for minimum bearing.
- D. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension-system runners and moldings.
- E. For reveal-edged panels on suspension-system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges. At cut edges of panel, cut reveal edge to match factory reveal edge.
- F. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
- G. Provide hold-down clips in areas indicated, in areas required by authorities having jurisdiction,; Space as recommended by panel manufacturer's written instructions unless otherwise indicated and as follows:
1. Spaces with Doors to Unconditioned Spaces: Provide hold-down clips to prevent dislodging of lay-in acoustical ceiling panels due to draft.
- H. Provide clean-room gasket system in areas indicated, sealing each panel and fixture as recommended by panel manufacturer's written instructions.
- I. Protect lighting fixtures and air ducts to comply with requirements indicated for fire-resistance-rated assembly.
- J. Markers:
1. Provide markers of color code specified to identify the various concealed piping, mechanical, and plumbing systems.
 2. Attach colored markers to exposed grid on opposite sides of the units providing access.
 3. Attach marker on exposed ceiling surface of upward access acoustical unit.

~~3.4 CUSTOM CLOSER ASSEMBLY~~

- ~~A. Custom Closer Assembly For Ceiling-Mounted Equipment: Cut hole for fixture as described in Part 2 above. Assemble around fixtures, set in ceiling grid, and connect two halves with splice plate.~~

B. Repair damage, if any, to paint finish.

3.5 CLEAN-UP AND COMPLETION

A. Replace damaged, warped, discolored, dirty, cracked and broken acoustical units.

B. Leave finished work free from defects.

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SECTION 09 53 14
CEILING ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Work Included: Work specified under this Section is provided under the associated sections installing materials on the metal support systems; i.e.: acoustic ceilings, metal ceilings.
1. Transition trim between acoustic and gypsum board ceilings is installed under Section 09 51 00, Acoustical Ceilings and spackled under Section 09 29 00, Gypsum Board.
 2. Perimeter gasket is installed under Section 09 29 00, Gypsum Board.
- B. Related Sections (Items not included in this Project Manual are available through Construction Manager upon request):
1. Gypsum Board: Section 09 29 00.
 2. Acoustical Ceilings: Section 09 51 00.
 3. Linear Metal Ceilings: Section 09 54 23.

1.2 REFERENCES (Latest edition unless otherwise noted)

- A. American Society for Testing and Materials (ASTM):
- | | |
|-------|---|
| C 635 | The Manufacture, Performance & Testing of Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings. |
| C 636 | Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels. |

1.3 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Product Literature: Submit for approval manufacturer's product literature for each system specified. Product data to fully describe system and all components including finishes.
- C. Samples: Submit for approval, samples of each system specified. Minimum length to be 8".

1.4 QUALITY ASSURANCE

- A. Qualifications: Provide materials and methods tested for required fire separations and acoustic performance, installed in accordance with this specification and the requirements of local building officials.
- B. Allowable Tolerances: Provide framing fabricated and erected to conform with the following allowable tolerances.
1. Ceiling Framing: Level within 1/8" in 10' and erected so that deflection of any component does not exceed 1/360 of its span after installation of all finish materials and equipment.

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- C. Base Specification: Methods and materials to conform to specified manufacturer's recommendations as a minimum criteria except where more stringent provisions are shown or specified.
 - D. Mockup: Provide mockups of not less than 10 linear feet for each type of ceiling termination and transition system required. Accepted mockups to remain as an acceptable standard of workmanship and can be part of completed Work. Install at a location acceptable to Architect.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to project site with manufacturer's labels intact and legible. Fire-rated materials shall bear testing agency label and fire classification numbers intact and legible. Handle materials with care to prevent damage.
- B. Store materials off floor, stacked flat, and under cover. Avoid overloading floor system.

1.6 SEQUENCE/SCHEDULING

- A. Sprayed Fireproofing: All attachments to structural steel framing receiving sprayed fireproofing, specified elsewhere, to be installed prior to installation of sprayed fireproofing to preclude removal of fireproofing. Include clips, hangers, and other devices required for subsequent installation of metal suspension assemblies specified under this section.

PART 2 - PRODUCTS

2.1 TRIM

- A. Subject to compliance with requirements, products from available manufacturers that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Armstrong World Industries.
 - 2. USG Interiors.
 - 3. Chicago Metallic.
 - 4. Gordon
- B. General:
 - 1. Extruded-Aluminum Edge Moldings and Trim: Where indicated, provide manufacturer's extruded-aluminum edge moldings and trim of profile indicated or referenced by manufacturer's designations, including splice plates, corner pieces, and attachment and other clips, and the following:
 - a. Aluminum Alloy: Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of aluminum extrusions complying with ASTM B 221 (ASTM B 221M) for Alloy and Temper 6063-T5.
 - b. For lay-in panels with reveal edge details, provide stepped edge molding that forms reveal of same depth and width as that formed between edge of metal tile (panels) panel and flange at exposed suspension member
 - c. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

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- d. Baked-Enamel or Powder-Coat Finish: Minimum dry film thickness of 1.5 mils (0.04 mm). Comply with ASTM C 635/C 635M and coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
- 1) Color: Match adjacent ceiling grid, unless indicated otherwise. Color to be approved by Architect.
- C. Perimeter Gasket at Curtain Wall. Provide continuous gasket where gypsum board ceiling abuts curtain wall framing. Attach gasket to either curtain wall framing or metal trim, but not both. Color to be black or dark gray.
1. Weather-Stripping: Closed cell sponge neoprene, with self-adhesive tape on one side. 1-inch high x 1/2-inch wide, D-shaped. #812 by Zero or equal by Pemko, or National Guard.
- D. Termination System: "Axiom® Classic" by Armstrong, Inc. or approved equal by listed manufacturers. Extruded aluminum trim system to terminate ceiling systems where indicated on drawings.
1. Straight Trim:
- a. Heights: Nominal 4" and 6" as indicated on drawings.
- b. Face Finish: Match ceiling suspension system.
- E. Transition System: "Transition Molding with Reveal" (#7901 & 7902) by Armstrong, Inc. or approved equal by listed manufacturers. Formed pre-finished steel trim system with integral taping flange to transition between gypsum board and tegular acoustic ceiling panels where indicated on drawings.
1. Straight Trim: For near flush transitions. 1-1/4" high with 1-3/8" taping flange and 3/8" wide shadow reveal.
- a. #7901 for 9/16" wide ceiling grid.
- b. #7902 for 15/16" wide ceiling grid.
2. Metal: Cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, G30 (Z90) coating designation.
3. Color: Match ceiling suspension system.
- F. Accessories:
1. Miscellaneous: Hangar clips, splice and alignment plates, T-bar connector clips and other items as required for complete installation.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. General: Examine all spaces to receive work of this Section to verify that they are ready to receive work; commencement of installation constitutes acceptance of the work of other trades.
- B. Ceiling Work: Verify that perimeter wall work where ceiling abuts is complete and dry; all work above ceiling is complete. It is the Contractor's responsibility to coordinate the work of all trades to avoid interference in accordance with requirements of ASTM C 636, Article 3.

3.2 CEILING TRIM

- A. Install systems in accordance with ASTM C 636 and as specified herein. Install system complete where scheduled, including hanger wires and their anchors or attachment devices. Center grid system on room axis, with equal space at opposite walls unless specifically noted otherwise on the drawings.
- B. Install perimeter moldings and trim straight and level at heights indicated. Unless specifically detailed otherwise, bottom of suspension grid members to bear directly on bottom of moldings and trim members so exposed faces appear to be in same plane.
- C. Board Ceiling or Soffit Framing: Specified elsewhere.
- D. Transition Trim: Installed under Section 09 51 00 – Acoustical Ceilings and spackled under Section 09 29 00 – Gypsum Wallboard.
- E. Perimeter Gasket: Attach to curtain wall framing before installing gypsum board assembly. Slightly compress gasket when installing gypsum board assembly.

END OF SECTION

SECTION 09 54 23
METAL CEILINGS**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
1. Interior Metal Ceilings and access sections.
 2. Suspension System.
 3. Extruded aluminum termination trim associated with work of this Section.
- B. Coordination: Exposed to view portions of devices supplied by other trades and located in work of this Section to match the metal ceiling finish.
1. See the following Divisions for actual device requirements:
 - a. Fire Suppression: Division 21.
 - b. Plumbing: Division 22.
 - c. HVAC: Division 23
 - d. Electrical: Division 26
 - e. Communications: Division 27.
 - f. Electronic Safety & Security: Division 28.
 2. Allowable Finishes: Color anodized, baked paint, or powder coat.
 3. Furnish samples not less than 4" x 6" of approved ceiling finish to applicable trades for color match.
- C. Related Sections (Items not included in this Project Manual are available through Construction Manager upon request):
1. Access doors located in work above Access Sections specified herein: Section 08 31 13.
 2. Section 09 06 00, SCHEDULE FOR FINISHES and FINISH LEGEND in Drawings.
 3. Acoustic Ceiling Suspension Assemblies: Section 09 51 00.
 4. Extruded aluminum termination trim: Section 09 53 14, CEILING ACCESSORIES.
 5. HVAC Grilles, Diffusers and VAV boxes: Division 23.
 6. Light Fixtures: Division 26.

1.2 REFERENCES (Latest edition unless otherwise noted)

- A. American Society for Testing and Materials (ASTM):
- | | |
|---------|---|
| C 636 | Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels. |
| E 84 | Test Method for Surface Burning Characteristics of Building Materials. |
| E580-06 | Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Seismic Restraint. |
- B. International Code Council
- C. Evaluation Services - AC 156 Acceptance Criteria for Seismic Qualification Testing of Non-structural Components.

1.3 PERFORMANCE REQUIREMENTS

- A. Fire Performance Characteristics: ASTM E 84:
 - 1. Flame Spread: 0-25.
 - 2. Smoke Developed: 0-50.
- B. Seismic Loads: Design and size components to withstand seismic loads in accordance with the International Building Code, Chapter 11 for Seismic Design Category A.

1.4 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Product Data: Submit manufacturer's product specifications and installation instructions for each type of metal ceiling, including data which substantiates that products comply with requirements.
- C. Shop Drawings: Show joint and seaming layout for approval. Detail terminations.
- D. Samples: Submit 12" long samples of exposed components, showing full range of color, gloss, and texture to be expected in completed work.
- E. Mock-Up: Provide full scale mock-up in location approved by Architect for panels with other than matte finish. Mock-up to be not less than 4 feet wide x 10 feet long.
 - 1. Certificates: Submit test reports from independent testing laboratory certifying that products comply with performance requirements indicated. For seismic performance: International Code Council Evaluation Report, ESR-1308.

1.5 QUALITY ASSURANCE

- A. Exposed materials shall be of uniform appearance and match approved samples.
- B. Seismic Performance: Provide acoustical ceiling systems that have been evaluated by an independent party and found to be compliant with the 2006 International Building Code, Seismic Category C.
 - 1. Tested per International Code Council – Evaluation Services – AC 156 Acceptance Criteria for Seismic Qualification Testing of Non-structural Components as evidenced by International Code Council Evaluation Report, ESR-1308.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver ceiling 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 or other causes.
- B. Handle ceiling components carefully to avoid damaging units in any way.

PART 2 - PRODUCTS**2.1 MANUFACTURERS**

- A. Subject to compliance with requirements, products from available manufacturers that may be incorporated into the Work include, but are not limited to, the following:
1. Alpro Acoustical Systems.
 2. Alcan Building Products
 3. Chicago Metallic Corp.
 4. Hunter Douglas, Inc.
 5. Levolor Lorentzen, Inc.
 6. Lindner USA.

2.2 MC-1 CEILING SYSTEM: See FINISH LEGEND for general description, panel size, and Basis of Design manufacturer/model No. Panel lengths as indicated on reflected ceiling plans.

- A. Metal Panels: Flat perforated aluminum; minimum 0.032 inch thick with perimeter frame.
1. Thickness: 2 inches.
 2. Profile: Flat face.
 3. Perforations: 1/8" diameter holes on 0.328" staggered centers; 13.2% open area.
 4. Structure: Manufacturer's standard devices; nominal 2" high.
 - a. Frame: Extruded aluminum C-channel. Form corners with tight joints.
 - b. Sub-Frame: Extruded aluminum C-channel located inboard from frame, not to exceed 6", for offset mounting as detailed.
 - c. Stabilizers: Formed aluminum hat-channel or C-channel. Provide as needed; attach to frame.
 5. Finish/Color: See FINISH LEGEND.
- B. Access Sections: Manufacturer's standard accessories assembled into access doors of sizes indicated, including hinges, modified carrier sections, metal pans matching remainder of ceiling, and retainer clips for downward access. Provide for equipment items located above ceiling which require service including, but not limited to, mechanical air distribution boxes.
- C. Mounting Hardware: Manufacturer's standard corrosion-resistant devices with load safety factor not less than 2.5.
1. Eyebolts: Attach to frame; minimum 4 per panel.
 2. Hanger Wire: ASTM A 641, not less than 0.1350 diameter.

2.3 ACCESSORIES

- A. Extruded aluminum termination trim: See Section 09 53 14, CEILING ACCESSORIES.
- B. Wire: Galvanized or aluminum as recommended by manufacturer:
1. Hanger Wire: Minimum diameter 2.68 mm (0.1055 inch)
 2. Bracing Wire: Minimum diameter 3.43 mm (0.1350 inch).
- C. Miscellaneous: As needed for complete installation.

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Verification of conditions: Examine spaces to receive metal ceiling installations to verify that they are ready to receive work; commencement of installation constitutes acceptance by installer of the work of other trades. Verify that perimeter wall work where ceiling abuts is complete and dry; all work above ceiling is complete. Coordinate the work of all trades to avoid interference in accordance with requirements of ASTM C 636, Article 3.

3.2 PREPARATION

- A. Measuring: Measure each ceiling area and establish layout to balance border widths and minimize out-of-square conditions.

3.3 INSTALLATION

- A. General: Install materials in accordance with manufacturer's printed instructions, seismic design requirements, and to comply with regulations of governing agencies and industry standards applicable to work.
- B. Suspension Systems: Install carriers spaced as recommended by manufacturer and supported from wire hangers at intervals not to exceed 48 inches on center. Provide not less than two additional hangers at locations supporting light fixtures or mechanical devices.
- C. Wind Bracing: Provide rigid members of size and spacing recommended by manufacturer to withstand wind uplift; see PERFORMANCE REQUIREMENTS in Part 1 above.
- D. Metal Pans: Install metal pans and accessories where scheduled on drawings according to types specified. Cut and fit material as required for installation; where required for fit, provide special size or cut pieces and install at perimeters only. Unless otherwise approved, install to true and level planes with abutting edges flush. Make border units not less than 1/2 size when measured perpendicular to wall. Provide butt-end splices in random pattern so that splices do not occur aligned to one another in adjacent pans and no more than 3 splices occur aligned within any 10'-0" length measured perpendicularly to pan length.
 - 1. Center Access Sections below Access Doors, specified elsewhere and installed in work above metal ceilings.
- E. Tolerances: Installed system to be level within 1/8" in 12 feet.

3.4 ADJUSTING AND CLEANING

- A. Ensure that operating parts move freely and fit neatly. Adjust components as required to comply with manufacturer's recommended installation tolerances.
- B. Clean exposed surfaces of metal ceilings and comply with manufacturer's instructions for touch-up of minor finish damage.

END OF SECTION

SECTION 09 60 15
FLOORING ADHESIVES**PART 1 - GENERAL****1.1 DESCRIPTION**

- A. This Section includes requirements for flooring adhesives, leveling compounds, and primers for flooring types specified elsewhere. Supply adhesives by flooring manufacturers in compliance with this Section.
- B. The following conditions govern which type of adhesives may be used:
 - 1. Concrete slab moisture and pH.
 - 2. Heavy rolling or static loads.
- C. Where high moisture or pH conditions of concrete slab exceed the limits of proposed adhesives, Construction Manager shall provide one of the following at no additional cost to Owner.
 - 1. Delay installation of flooring until slab conditions fall within acceptable limits of adhesive.
 - 2. Provide topical vapor retarder as specified under Section 07 26 14.
- D. Refer to Section 07 26 14, Topical Vapor Retarders for requirements of "Flooring Trades" for amounts and quantities to be included and listed with Bid.

1.2 RELATED WORK (Items not included in this Project Manual are available through Construction Manager upon request)

- A. Concrete slab testing: Section 01 45 24, CONCRETE VAPOR EMISSION AND ALKALINITY TESTING.
- B. Concrete floors: Section 03 30 09, CAST-IN-PLACE CONCRETE
- C. Patching mechanically abrade concrete floors: Section 03 54 00, Cast Underlayment.
- D. Topical Vapor Retarder: Section 07 26 14, TOPICAL VAPOR RETARDER.
- E. Resilient sheet flooring:
 - 1. Section 09 65 16, RESILIENT SHEET FLOORING.
- F. Resilient tile flooring: Section 09 65 19, RESILIENT TILE FLOORING.
- G. Resilient terrazzo floor tile: Section 09 66 16, TERRAZZO TILE.

1.3 QUALITY CONTROL

- A. Adhesives must be labeled as supplied by manufacturer of flooring materials for undivided responsibility.
- B. The floor covering manufacturer shall certify that products supplied for installation comply with local regulations controlling use of volatile organic compounds (VOC's).

-
- C. Pre-installation Conference: Conduct conference at project site.
1. Review methods and procedures related to floor coverings including, but not limited to, the following:
 - a. Examination and preparation of substrates to receive floor covering.
 - b. Moisture content and pH level of slabs in compliance with Section 01 45 24:
 - 1) When acceptable to receive flooring.
 - 2) Options when moisture content or pH level not acceptable.
 - 3) Time requirements for testing.
 - c. Parties required to have a representative attend meeting:
 - 1) Construction Manager
 - 2) Installer
 - 3) Resident Engineer
 - 4) Architect
 - 5) Testing Agency

1.4 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data for each adhesive proposed for each type of flooring product:
1. Description of adhesive materials to be provided as recommended by flooring manufacturer for its products.
 2. List allowable limits for use on concrete slabs base on the following tests specified under Section 01 45 24:
 - a. Calcium Chloride
 - b. Relative Humidity.
 - c. pH.
 3. Designate the following adhesives and their proposed locations:
 - a. "High Moisture-Resistant" adhesives.
 - b. High Performance Adhesives.
 4. Application and installation instructions.
- C. LEED Submittals:
1. Product Data for Credit IEQ 4.1: For installation adhesives, documentation including printed statement of VOC content.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to site in original sealed packages or containers; labeled for identification with manufacturer's name and brand.
- B. Store materials in weathertight and dry storage facility with ambient temperatures maintained as recommended by manufacturer.

1.6 WARRANTY

- A. Submit written special warranty, in accordance with FAR clause 52.246-21, Warranty of Construction requirements except that warranty period shall be extended to include two (2) years.

PART 2 - PRODUCTS**2.1 ADHESIVES****A. General:**

1. Provide water-resistant adhesive types recommended by the flooring manufacturer for the conditions of use and the type of proposed flooring product.
2. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - a. Not more than 50 g/L.

B. Provide adhesives which do not exceed the minimum allowable limits for adhesive use on concrete slabs based on the tests listed below and specified under Section 01 45 24, CONCRETE VAPOR EMISSION AND ALKALINITY TESTING.**C. Basic Adhesives:**

1. Calcium Chloride: 3 lbs/1,000 sq. ft./ 24 hrs.
2. Relative Humidity. 75%
3. pH: 5

D. High Moisture-Resistant Adhesives: Solvent-based unless otherwise approved

1. Calcium Chloride: 5 lbs/1,000 sq. ft./ 24 hrs
2. Relative Humidity. 90%
3. pH: 11.

E. High Performance Adhesives: Epoxy unless otherwise approved.

1. Calcium Chloride: 5 lbs/1,000 sq. ft./ 24 hrs
2. Relative Humidity: 80%
3. pH: 9.

2.2 LEVELING COMPOUND (FOR CONCRETE FLOORS)**A. Provide cementitious products with latex or polyvinyl acetate resins in the mix.****2.3 PRIMER (FOR CONCRETE SUBFLOORS)**

- A. As recommended by the adhesive or sheet flooring manufacturer.
- B. Determine the type of underlayment selected for use by the condition to be corrected.

PART 3 - EXECUTION**3.1 INSTALLATION**

- A. Install work in compliance with manufacturer's instructions.
- B. Install leveling compounds as needed for conditions and primer as recommended by adhesive manufacturer.

- C. Inform the Architect of conflicts between this section and the manufacturer's instructions or recommendations for materials, or installation methods, before proceeding.
- D. Install flooring in full coverage adhesives applied to substrate to produce a completed installation without open cracks, loose edges, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.
- E. High Moisture Adhesives: Provide where moisture or pH limits are above those for "Basic Adhesives" and below limits for "High Moisture Adhesives".
- F. High Performance Adhesives: Provide where heavy static or rolling loads exist: Provide full coverage in the following areas
 - 1. Elevator lobbies at Service elevators.

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